



Published in final edited form as:

Sociol Perspect. 2020 October ; 63(5): 809–832. doi:10.1177/0731121420908896.

Barriers to Bachelor's Degree Completion among College Students with a Disability

Jamie M. Carroll¹, Evangeleen Pattison¹, Chandra Muller¹, April Sutton²

¹The University of Texas at Austin, Austin, TX, USA

²University of California San Diego, La Jolla, CA, USA

Abstract

One of the fastest growing groups on college campuses is students with disabilities, but their rates of bachelor's degree completion remain low. We build on research about barriers to degree completion among historically underrepresented groups on college campuses to examine the extent to which academic preparation before college and processes during college contribute to gaps in bachelor's degree completion among four-year college students with a mental or physical disability. Using the Beginning Postsecondary Students Longitudinal Study, we find that students with a mental disability are significantly less likely to complete a bachelor's degree than students without disabilities and students with a physical disability, net of students' family and academic background. Decomposition of the estimated indirect effect of mental disability on degree completion reveals first-year academic performance as the largest contributor. We discuss the theoretical and practical implications for understanding the barriers faced by college students with a mental disability.

Keywords

disability; health impairment; mental health; educational attainment; educational stratification; health disparities; postsecondary education

Access to higher education has increased in recent decades, especially among students who have been historically underrepresented—namely students of color and first-generation college students. However, students from these status groups have lower rates of college completion in part because they have a harder time adjusting socially and academically to the postsecondary environment (Baum, Kurose, and Ma 2013; Rosenbaum 2011; Snyder, Brey, and Dillow 2018). While academic preparation for college does play a major role in the adjustment to college, first-generation college students and underrepresented minority students who enter college similarly prepared still struggle in their first-year courses, have difficulty integrating with students and faculty, and face disruptions in their enrollment patterns, all of which contribute to their overall likelihood of degree completion (Pascarella

Corresponding Author: Jamie M. Carroll, The University of Texas at Austin, 305 E. 23rd Street, Stop G1800, Austin, TX, 78712, USA. jmcarroll@utexas.edu.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

et al. 2004; Tinto 2012). Scholars argue that some postsecondary institutional policies—such as course requirements and grades, attendance policies, access to school clubs, and faculty roles—are structured around norms of who college students were in the past, making the transition from high school to college more challenging for students who do not fit these norms (Garza and Fullerton 2017; Guiffrida 2006; National Research Council 2004; Tierney 1992). This structural inequality contributes to the social and academic integration of groups of students historically underrepresented on college campuses. Building on this research, we examine degree completion among an understudied marginalized college population—students with a mental or physical disability—and whether they experience some of the same academic and social challenges on the pathway to degree completion.

The proportion of undergraduate students with a disability nearly quadrupled between 1978 and 2011 (Henderson 1992; Snyder et al. 2018), but large gaps in educational attainment between those with and without a disability remain. There is some evidence based on samples of students who participated in special education in secondary schooling (Newman et al. 2011) or who registered with the disability services offices at postsecondary institutions (Adams and Proctor 2010; Fichten et al. 2014) that students with a disability are less likely to persist to a bachelor's degree than students without a disability. In this study, we establish nationally representative baseline estimates of the association between disability status and degree completion and the role of academic preparation for college in the process. We analyze students with a mental or physical disability separately because these groups have different symptoms and needs within educational settings (Fuller et al. 2009).

We next consider the academic and social challenges on the pathway to a bachelor's degree that may derail students with disabilities, even when they entered college with comparable levels of academic preparation. In doing so, we pay particular attention to the crucial first year of college and the role of academic performance, integration, and disrupted enrollment patterns in contributing to bachelor's degree completion gaps between students with a mental or physical disability and students without a disability (Tinto 2012). We use decomposition techniques to assess the relative roles of students' academic preparation *before* they entered college and disparities that emerge *during* college in academic performance, integration, and persistence in explaining differences in degree completion. Developing a more complete understanding of why students with a mental or physical disability may struggle in higher education is important to pinpoint aspects of both secondary and postsecondary educational institutions that make students with a mental or physical disability part of a marginalized status group. Individuals with disabilities have lower participation in the labor market and civic life and these gaps can be traced to unequal levels of educational attainment (Brault 2012; Fleming and Fairweather 2012; Janus 2009; O'Brien 2013; Oliver and Barnes 2012; Shandra 2017, 2020). Closing gaps in academic preparation for college, first-year academic performance, integration, or persistence may contribute to the postsecondary success of this underrepresented, but fast-growing, group of college students.

Disability and Higher Education

Scholars categorize disabilities as “apparent” and “nonapparent,” “visible” and “invisible,” and “noncognitive” and “cognitive” to separate the diverse experiences of physical versus mental disabilities within higher education (e.g., Adams and Proctor 2010; Fuller et al. 2009; Olney and Brockelman 2003). Physical disabilities include sensory, orthopedic, and other noncognitive impairments, and mental disabilities include learning disabilities, depression and emotional disorders, and other cognitive impairments (Brinckerhoff, McGuire, and Shaw 2002; Olney and Brockelman 2003). Approximately 11 percent of individuals with a mental disability and 15 percent of individuals with a physical disability between the ages of 21 and 64 in the United States have a bachelor’s degree, compared with 33 percent of individuals without a disability (Yang and Tan 2016). Part of this gap stems from limited access to postsecondary institutions for individuals with disabilities (Carroll, Humphries, and Muller 2018; Haas and Fosse 2008; McLeod and Fettes 2007; Shandra and Hogan 2009). Yet, there is some evidence that the students with disabilities who do enroll in four-year postsecondary institutions still have lower rates of bachelor’s degree completion than college students without disabilities. For example, of the population of students enrolled in special education programs in high school who entered a four-year college, only 34 percent graduated with a bachelor’s degree, compared with 51 percent of the general population (Newman et al. 2011). In fact, these students are less likely to complete any type of postsecondary certificate or degree program than the general population (41 percent vs. 52 percent, respectively), but attainment rates vary by impairment type. About 53 percent of special education students with a hearing impairment completed a postsecondary certificate, associate’s degree or bachelor’s degree, compared with only 41 percent of special education students with a learning disability and 35 percent with an emotional disorder (Newman et al. 2011).

Students in special education programs, however, are not representative of students with disabilities. Race, socioeconomic status, and school composition all shape who does and does not receive special education services and treatment (Hibel, Farkas, and Morgan 2010; Morgan et al. 2015; Ong-Dean 2006; Simoni 2017). Research using samples of college students who report a disability from a single postsecondary institution also suggests that students with a mental disability are less likely to earn a bachelor’s degree than students with a physical disability (Fichten et al. 2014; Pingry O’Neill, Markward, and French 2012). However, gaps in degree completion between college students who report a physical disability, a mental disability, or no disabilities in nationally representative data remain unknown. Thus, our first objective is to examine whether there are differences in bachelor’s degree completion by disability status among young adults who initially enroll in four-year postsecondary institutions. Given prior research, we expect that students with a disability will have lower rates of bachelor’s degree completion than students without a disability and gaps will be wider for students with a mental disability than for students with a physical disability. Once we establish if there are baseline differences in degree completion between students with a mental disability, a physical disability, and no disability, we examine the role of academic preparation *before* college in any gaps in degree completion by disability status.

Academic Preparation and College Completion

Although protected from discrimination in K-12 education by the Individuals with Disabilities Act (IDEA), students with a mental or physical disability have unequal opportunities and outcomes throughout primary and secondary schooling (McLeod, Uemura, and Rohrman 2012; Needham, Crosnoe, and Muller 2004; Shifrer, Callahan, and Muller 2013) that may contribute to disability-related gaps in educational attainment. Research has found that students with disabilities have higher course failure rates and lower levels of teacher support than students without disabilities, which contribute to lower average high school grades (McLeod et al. 2012; Needham et al. 2004; Shifrer 2013). In addition, only about 3 percent of high school graduates with a disability complete a “rigorous” college preparatory curriculum, as defined by the National Assessment of Educational Progress, compared with 13 percent of all high school graduates (Nord et al. 2011). Students with learning disabilities in particular are often excluded from college preparatory coursework, even when compared to students without disabilities with similar academic aptitude (Shifrer et al. 2013).

One common misconception about disabilities, and learning disabilities in particular, is that they restrict individuals’ capacity to learn. Indeed, stereotypes associated with learning disabilities suggest that these students do not have the ability to succeed in higher education, as indicated by low expectations for educational attainment from teachers, peers, and parents (Shandra and Hogan 2009; Shifrer 2013). On the contrary, research suggests that students with disabilities have the academic aptitude to be successful in higher education; they just need the material presented to them in a manner that suits their needs (Grunau, Whitfield, and Davis 2002). Once individuals with disabilities leave K-12 education, federal legislation (Americans with Disabilities Act and 504) protects them from discrimination if they are similarly “qualified,” meaning they have met “the academic and technical standards requisite for admission,” as individuals without disabilities (504). Our focus is on students with a mental or physical disability who have overcome many academic hurdles to enroll in four-year colleges.

Yet, even among students with disabilities who make it to a four-year college, there may be variation in their high school grades, course-taking, educational expectations, and cognitive abilities that could explain gaps in postsecondary degree completion by disability status. Given research that suggests that students with disabilities, especially a mental disability, have lower academic preparation for college than students without a disability, we expect that academic preparation will explain part of the disadvantage in degree completion by disability status. However, even similarly academically prepared students with a mental or physical disability may be subject to academic and social barriers within postsecondary institutions that limit their progress to a bachelor’s degree.

Postsecondary Barriers to College Completion

Students’ interactions with postsecondary institutions shape their academic performance, social and academic integration, and enrollment patterns, key indicators of persistence to graduation (Tinto 1975, 2012). College students need to adjust to a new academic and social

environment to ensure their progression through each year of college and to their eventual degree completion. College students who are not well integrated into the school environment are less likely to persist to graduation (Tinto 1975, 2012). However, the organization of postsecondary institutions presents barriers for some students while favoring the success of other students. This structural inequality, defined as institutional processes that appear to be neutral but lead to differential treatment or outcomes (National Research Council 2004), contributes to lower rates of bachelor's degree completion for first-generation college students and underrepresented minority students who often have challenges fitting into the academic or social environment of their institution (Goldrick-Rab 2006; Goldrick-Rab and Pfeffer 2009; Ishitani 2006; Jack 2016). One explanation for these challenges is that the structure of postsecondary institutions was designed to support the culture and needs of white, middle class students who historically represented the majority of college students. Students from historically underrepresented groups on college campuses thus are required to adapt to a social and academic environment that favors students from different backgrounds than their own (Garza and Fullerton 2017; Thiele and Gillespie 2017). A college environment that is built around normative structures to support full-time, continuously enrolled white students from college-educated families presents barriers for students who may have different needs inside and outside the classroom.

We examine whether disparities in students' academic performance, integration, and persistence that emerge *during* college present barriers to students with disabilities. Indeed, normative postsecondary institutional practices may favor students without disabilities and not consider the unique needs of students with mental and physical disabilities. For example, grading policies linked to absences may derail students with emotional or physical limitations that make it difficult to get to and from class or require multiple doctors' appointments. Timed reading assignments or tests may be challenging for students with a learning disability. Other research on health and education suggests that students with health impairments or disabilities face challenges in educational institutions not because of their health limitations but because of structural inequality embedded within educational institutional practices that favors "healthy" students (Branigan 2017; Crosnoe 2007; Shifrer et al. 2013). For example, equally academically prepared and cognitively performing students with a learning disability are less likely to take advanced courses in high school than their peers without a disability (Shifrer et al. 2013). Research has also found a link between education and obesity, but gaps are wider in courses with more subjective grading policies, suggesting that obesity is related to academic performance through teachers' perceptions of students rather than through health limitations (Branigan 2017; Crosnoe 2007). In this light, we examine if equally academically prepared students with a disability have lower rates of bachelor's degree completion than students without disabilities and examine the features of their postsecondary education that contribute to these gaps. The process may operate differently for students with a mental versus physical disability because perceptions of the legitimacy and effects of mental impairments are more salient to the academic environment than perceptions of physical impairments. Physical disabilities are more easily detected and documented, and are perceived as more legitimate and less linked to cognitive abilities (Fuller et al. 2009; Upton and Harper 2002). Mental disabilities, especially those related to learning, are more difficult to assess and diagnose and are often

viewed as presenting limitations on academic abilities (Fuller et al. 2009; Olney and Brockelman 2003). In addition, mental disabilities are often invisible, which gives students the option of whether to disclose their disability to faculty, peers, and administrators (Mullins and Preyde 2013). However, trying to keep a disability hidden within social and academic contexts may be an additional burden for students and some disclosure may be required to receive accommodations (Cawthon and Cole 2010). We examine how first-year academic performance, integration, and disrupted enrollment patterns contribute to any gaps in bachelor's degree completion between similarly academically prepared college students with a mental disability, a physical disability, and no disability.

Academic Performance

How well students perform in their courses during the first year of college is one of the strongest predictors of retention and eventual degree completion (Adelman 2007). First-year courses are often general courses to satisfy degree requirements and introductory courses that serve as gate-ways to more advanced coursework (Chang et al. 2008; Gasiewski et al. 2012). The environment of these first-year courses differs drastically from most high school students' experiences; there is less student accountability and teacher support and more self-directed learning to do in one's unstructured time. Early poor academic performance can increase feelings of inadequacy and self-doubt in students, weakening their commitment to the institution (Carroll, Muller, and Pattison 2016). Failing or doing poorly in courses early on can also make it difficult for students to stay on track to graduation, since most colleges require students to complete these building-block courses with a given grade before allowing them to advance to more specialized coursework. Students who struggle to adapt to the normative classroom setting in postsecondary institutions are derailed on their pathways to graduation.

Adjusting to the academic environment of a postsecondary institution during the first year of college may be particularly difficult for students with disabilities who may need a longer time to adapt to new structures and academic demands. Indeed, research has found that, conditioning on prior abilities, postsecondary students with disabilities have lower average grades and fail more courses during the first year of college than students without disabilities, and gaps are especially wide for students with a mental disability (Adams and Proctor 2010; Carroll et al. 2016; Vogel and Adelman 1992; Wessel et al. 2009). Academic services, such as alternative exam formats, course waivers, supplemental notes in class, tutors and assistance with registration, can assist students with a mental or physical disability who may require different educational tools than the normative college setting provides. Yet, even conditioning on the receipt of academic services, students with mental disabilities are less successful in navigating key academic hurdles during the first year of college (Carroll et al. 2016). One explanation for these findings is that perceptions of academic competency of students with a mental disability place them in a stigmatized position on college campuses (Pescosolido 2013). Although students with physical disabilities may also face challenges in adjusting to the college classroom, the stereotypes associated with the symptoms of their impairments are less often linked to mental capacity, which may protect them from discrimination related to academic progress during the first year of college. Stigma can result in heightened stress, lower self-efficacy, and lower levels of performance (McLeod

2015; Pescosolido 2013), which may reproduce inequality in academic achievement related to mental disabilities.

Surprisingly, little is known about the effects of accommodations and other institutional practices on the degree completion of students with disabilities. Accommodations can be more difficult to provide to students with mental disabilities because the symptoms of their impairments are unique and vary with the educational context. Students with a learning disability may have received accommodations and developed strategies to be successful in high school classrooms that are more difficult to apply in the postsecondary context. Students with depression or other emotional disorders may be triggered by experiences in the postsecondary context in a way that increases the severity of their symptoms (Alfeld-Liro and Sigelman 1998; Conley et al. 2014). Institutional practices regarding communication about the disclosure process, what the disclosure process entails, the types of accommodations available, the way accommodations are provided, and faculty and staff training for providing accommodations vary and could contribute to the success of students with disabilities on college campuses (Wessel et al. 2009). However, the extent to which accommodations support the graduation rates of students with disabilities is not clear. Our analysis conditions on students' high school academic performance and receipt of academic services to examine the role of first-year academic performance in predicting bachelor's degree completion for students with a mental or physical disability.

Social and Academic Integration

Students' social adjustment to the university and feelings of social isolation contribute to their institutional commitment and perceived competency, which are important for college persistence (Tinto 1975, 2012). Integration includes students' experiences outside of the classroom, both with social activities—such as school organizations and clubs, fine arts activities, and sports—and academic activities—such as having study groups or meeting with advisors or professors. Underrepresented groups on college campuses report feeling left out of social activities, missing out on forming social relationships to support success in the classroom and for maintaining networks after degree completion (Berger and Milem 1999; Fischer 2007; Jack 2016). Social support may be particularly important for students with disabilities because it helps mediate negative health- and education-related outcomes (Thoits 2011; Umberson and Montez 2010).

However, students with a mental or physical disability may report feeling less socially adapted in the higher education community (Adams and Proctor 2010; Barnard-Brak, Lan, and Lechtenberger 2010). Students with physical disabilities may have lower levels of engagement with faculty or peers outside of the classroom because of the types of activities available or the physical location of activities. Their impairments are generally more visible, making it difficult to avoid disclosure and appear “normal” in social settings. Students with mental disabilities may avoid extracurricular activities or limit interactions with faculty and peers as a symptom of their disability, as with emotional disorders, or to make their disability status less visible and minimize risks of judgment or discrimination (Olney and Brockelman 2003; Thoits 2016). Students who perceive that their teachers do not care about them or respect them report feeling less connected to educational institutions (Hallinan

2008), which can affect their college persistence. Indeed, students with a mental disability are more likely to lower their educational expectations after their first year of college (Carroll et al. 2016), but whether this “cooling out” contributes to lower rates of bachelor’s degree completion remains unknown. In addition, students who reside on campus are more academically and socially integrated into the college environment and have higher rates of bachelor’s degree completion (Allison and Risman 2014; Schudde 2011). However, students with disabilities may have limitations that make living on campus difficult. We consider the role of students’ social and academic integration and changes in educational expectations after the first year of college in explaining gaps in bachelor’s degree completion between students with mental, physical, and no disabilities.

Persistence

Students’ enrollment patterns signal their integration into the school environment and their commitment to graduating (Tinto 2012). Students who do not attend full time at one institution are at risk of not graduating because of slower progress through the degree program and fewer opportunities to have supportive interactions with faculty, staff, and peers (Adelman 2007). Feelings of inadequacy or discrimination on college campuses can interfere with students’ commitment to and progress through college. Students who do not feel like they fit in socially or academically during their first year of college may transfer to a less-challenging institution (such as a nonselective school or two-year college), only attend part time, or take time off of school altogether. These nontraditional enrollment patterns are more common among first-generation college students or students of color, especially if they have low grades during their first year (Goldrick-Rab and Pfeffer 2009). Students with a mental or physical disability may be more susceptible to these disrupted enrollment patterns because of negative experiences during their first year of college.

In general, students with disabilities are more likely to attend part-time, stop-out, or transfer to another school than students without disabilities (Vogel and Adelman 1992; Wessel et al. 2009). Students with disabilities may take fewer courses per term or take breaks from their studies to improve performance in the courses they do take as an adjustment to college life. There is some evidence that postsecondary institutions ask students struggling with emotional disabilities to take a leave of absence (Mintz 2017; Smith 2018). In addition, students with a mental or physical disability may find that their institution does not provide the academic services they need and transfer to another institution with better accommodations. The smoothest pathway from college entry to bachelor’s degree completion is through consistent full-time enrollment at the same institution, and students with disrupted pathways have lower chances of degree completion (Adelman 2007). Given research both on students with disabilities and on other marginalized status groups on college campuses, we expect that aspects of postsecondary institutions related to fitting into the academic and social community will contribute to lower rates of degree completion for students with a mental or physical disability.

The Current Study

We examine the rates of bachelor's degree completion between students with a mental disability, a physical disability, and no disability and the factors that contribute to any gaps we find. We assess whether differences in academic preparation *before* college or processes *during* college account for degree completion gaps by disability status. We complete our analysis by performing a decomposition to assess the extent to which gaps in degree completion by disability status operate indirectly through academic preparation, first-year academic performance, integration, and disrupted enrollment patterns. Throughout, our aim is to develop a more complete understanding of potential institutional sources of unequal rates of bachelor's degree completion for students with a mental or physical disability.

Data and Sample

We use data from the Beginning Postsecondary Students Longitudinal Study (BPS:04/09) and its Postsecondary Education Transcript Study (PETS:09) component. BPS:04/09 is a nationally representative sample of first-time beginning postsecondary students who were initially interviewed in 2004, during the spring of their first academic year, and followed-up in 2006 and 2009. This survey draws from the National Postsecondary Student Aid Study, which is a nationally representative sample of postsecondary students enrolled any time during the 2003 to 2004 school-year in a student-aid-eligible institution in the United States and Puerto Rico. BPS:04/09 collected information about students' demographic characteristics, high school academic preparation for college, physical or mental disability status, social and academic experiences in higher education, and completion of postsecondary degrees. PETS:09 retrieved transcripts from all postsecondary institutions listed by the BPS:04/09 students in any survey wave, including detailed transcript data on students' coursework, academic performance in each course, and enrollment information on each university they attend (Wine et al. 2011).

Our study is based on the sample of students who initially enrolled in a four-year college ($N = 9,120$).¹ We omit students missing postsecondary transcript data ($N = 530$), from which we create our dependent variable. We additionally restrict our analytic sample to students who have information about their high school preparation so we can adequately control on students' academic background. Thus, we exclude individuals over the age of 24, who were not asked for information on their high school preparation ($N = 470$), those missing college entrance exam scores ($N = 250$), and students who did not graduate from high school ($N = 300$). These sample restrictions result in a final analytic sample of 7,570 first-time four-year college students.²

¹All numbers are rounded to the nearest 10 in accordance with the National Center for Education Statistics (NCES)-restricted data use license agreement.

²Students with health impairments are not disproportionately represented in the students omitted due to missing transcript data or high school graduation. Students with a physical impairment are over-represented by those who are missing high school preparation information because only respondents under the age of 24 are given the opportunity to supply this information, and students with a physical impairment in four-year colleges are older on average than students without health impairments. Results imputing high school preparation for these individuals are similar.

Key Analytic Variables

Our dependent variable, *bachelor's degree completion*, is a dichotomous indicator of students' degree completion status within six years of postsecondary entry (by 2009) derived from postsecondary transcripts and constructed by the National Center for Education Statistics.

Disability Status is constructed from students' responses to a base-year question about whether they have a long-lasting (six or more months) health condition or disability that substantially limits a major life activity. Students reported on the type of disability, which we classify as: (1) no disability (reference category); (2) mental disability (includes attention deficit disorder, emotional or psychiatric condition, depression, developmental disability, and learning disability); and (3) physical disability (includes hearing impairment, blindness or visual impairment, speech or language impairment, orthopedic or mobility impairment, health impairment or problem, and brain injury). We also keep in our sample individuals who responded that they had a disability not listed among those included above ($N = 20$; results not shown). Students were asked to report their primary disability and were not given the opportunity to report multiple impairments. This limitation is unlikely to bias our estimates because there is the most diagnostic overlap and comorbidity in developmental disorders and mood, anxiety, behavior, and conduct disorders (Biederman et al. 1993; Mannuzza et al. 1998; Milberger et al. 1995), which are all included in our mental disability category. We chose to combine both emotional and learning disabilities into the mental disability category even though there are important differences between them. Notably, learning disabilities are more directly salient to the mission of learning and are more likely to be disclosed to receive accommodations. As both types of disabilities are mostly invisible and because the patterns we observe are statistically and substantively similar among students with emotional and learning disabilities, we combine them into a single category for parsimony and to improve statistical power. Our conclusions are consistent if we disaggregate the category of mental disability (not shown but available upon request).

We measure *academic preparation* using four indicators to capture variation in high school academic experiences between students with and without disabilities. We use self-reports of high school grade point average (GPA), high school math course-taking (whether or not the student took Calculus), SAT or ACT achievement test scores, and educational expectations (whether students expected a bachelor's degree, graduate-level degree, or professional degree to be their highest level of educational attainment).

We estimate effects of three different college first-year *academic performance* indicators, all derived from students' postsecondary transcripts. GPA is the average of grades earned in first-year courses weighted by the number of credits. We also constructed two indicators for whether the student failed or withdrew from any first-year course.

We measure *integration* in the first year of college with four different indicators. First, we measure students' social integration using a standardized mean of students' reports of how often (never, sometimes, or often) they participated in (1) music, choir, drama, or other fine arts activities; (2) school clubs; and (3) varsity, intramural, or club sports. Second, we measure students' academic integration using a standardized mean of students' reports of

how often (never, sometimes, or often) they (1) participated in study groups outside of the classroom; (2) had informal conversations with faculty members; (3) spoke with faculty about academic matters; and (4) met with an advisor concerning academic plans. Third, we include an indicator of changes in feelings of academic competency by examining whether students lowered their educational expectations after their first year of college. Last, we consider whether the student lived on campus during their first year of college.

We measure *disrupted enrollment patterns* between 2004 and 2006 from students' self-reports of three aspects of enrollment. First, we measure whether the student reported being enrolled part time (full-time enrollment is the omitted reference). Next, we constructed an indicator of whether the student reported stopping out (defined as a break in postsecondary enrollment of five or more consecutive months). Finally, we characterize transfer patterns with a three-category variable that distinguishes students who never transferred (omitted category) from those who transferred horizontally (from one four-year school to another) or in a downward pattern (from a four-year school to two-year school). When students transferred more than once, we classify them based on their first transfer. Sensitivity analyses indicate that transcript-derived indicators with both the same and longer measurement windows for these enrollment patterns produce consistent results.

Controls

Our *demographic background* controls are gender, race/ethnicity, and socioeconomic status (as indicated by parents' educational attainment and income³), each derived from students' reports. We also condition on *initial enrollment characteristics* that are well-established risk factors for degree completion, including whether the student delayed enrollment, initially enrolled part time, is financially independent, and is working full time while enrolled. In addition, we include an indicator of the *institutional selectivity* of the first four-year college attended by the respondent because selective institutions have more resources and higher rates of degree completion overall.

Finally, we include a measure of whether or not students with a disability *used academic services* during their first year. The academic services listed on the survey include adaptive equipment and technology, alternative exam formats, course substitution or waivers, readers or classroom note-takers, registration assistance, sign language or oral interpreters, tutors to assist with homework, and other services.

Analytic Approach

Our main goal is to develop a better understanding of the pathways to bachelor's degree completion for students with a mental or physical disability. To observe baseline differences among students according to their disability status, we first present descriptive statistics for the analytic sample by students' disability category (none, mental, and physical). Next, we use nested logistic regression models to predict bachelor's degree completion. Our basic model estimates the effects of having a disability with adjustments for students' background, enrollment risk indicators, institutional selectivity, and the use of academic services. We then

³For students who do not list themselves as a dependent, we use their own educational attainment and income.

test whether academic preparation *before* college attenuates the relationship between disability status and college completion. Given the possibility of unobserved factors from before postsecondary entry that may be related to both disability status and degree completion, we perform an analysis to assess the robustness of our claims. We use a technique that addresses concerns about internal validity using a counterfactual approach to quantify how much bias would have to be introduced into our sample to invalidate our claims. Specifically, we estimate the number of cases that would have to be replaced with students for whom there was no effect of disability status on college completion to nullify our findings (see Frank et al. 2013).

Then, we test the mediating effects of three processes *during* postsecondary education—first-year academic performance, integration, and disrupted enrollment patterns—on degree attainment by adding each set of variables to the models described above. This nesting allows us to analyze whether each dimension of students' postsecondary experiences explains gaps in degree completion by disability status. Our final logistic regression model includes all our controls, measures of academic preparation, and postsecondary variables. We present the results as average marginal effects (AMEs), which are interpreted as the average percentage point decrease (or increase) in the probability of completing a bachelor's degree, because they can be compared within and between logistic regression models (Buis 2015; Mood 2010). We additionally examine whether each of the postsecondary process variables we examine significantly mediates the association between disability status and college completion using a method to estimate how much an estimated effect changes when additional variables are introduced into the model (the `medeff` command in Stata, Hicks and Tingley 2011).

We find that having a mental disability decreases the likelihood of completing college with a bachelor's degree. We do not find a similar gap for students with a physical disability. In a final step, we decompose the total effect of having a mental disability on bachelor's degree completion into direct and indirect effects to assess the relative contribution of academic preparation *before* college and postsecondary processes *during* college to the total effect. We perform this analysis net of our controls to isolate these factors from potential background and enrollment differences between students with and without disabilities. This method estimates the extent to which each measure of academic preparation, first-year academic performance, integration, and disrupted enrollment patterns contributes to lower rates of bachelor's degree completion among students with a mental disability. The decomposition method we employ presents results as average partial effects (APEs) and assess the relative contribution of each of our proposed mechanisms to the total effect of having a mental disability on degree completion (Kohler, Karlson, and Holm 2011).

We weight our analyses using the National Center for Education Statistics (NCES)-provided sample weights, which adjust for BPS:04/09 sample members missing postsecondary transcript data, to make the BPS panel nationally representative of first-time college students. We use chained multiple imputations (`mi impute` in Stata, 10 imputations) to retain missing data on independent variables derived from the transcripts (less than 5 percent).

Results

The first row of Table 1 shows that students with a mental disability are less likely to complete a bachelor's degree compared with those who do not report a disability. Students who report a physical disability are less likely than students who do not report a disability to earn a bachelor's degree; however, this difference is only marginally significant ($p < .10$). Table 1 also shows that students with a mental disability come from more educated families than both students with a physical disability and students without a disability, reflecting the select sample of students with a mental disability who reach four-year institutions. However, students with a mental disability are more likely to be financially independent than students without a disability, have higher rates of enrolling in moderately selective postsecondary institutions than students without a disability, and have higher rates of using academic services than students with a physical disability.

In terms of academic preparation for college, students with a mental or physical disability who enroll in four-year institutions on average have similar preparation as their peers without a disability. Although students with a physical disability have lower SAT scores, and students with a mental disability have lower high school grades, the groups have comparable levels of high school course-taking and educational expectations. In light of research showing that students with disabilities have worse academic outcomes in high school, these descriptive results suggest that students with a mental or physical disability who make it to four-year schools are an academically select group as well. These students have made it past a number of previous hurdles in their education—taking advanced math, graduating from high school, and entering a four-year college—and are similarly qualified to succeed in college as their peers without a disability.

However, students with a mental disability have different postsecondary experiences compared to those without a disability. Students with a mental disability are more likely to fail or withdraw from courses in their first-year of college, to lower their educational expectations, and to stop-out or transfer than their peers without a disability. In contrast, students who report a physical disability are not statistically distinguishable from students without a disability in terms of their postsecondary experiences, except that they are more likely to fail a course during their first year of college. Students with a mental disability actually have similar levels of social and academic integration, on campus residence, and part-time attendance as students without a disability. Although we observe unequal academic performance and transfer patterns between students with a physical disability, a mental disability, and no disability, it is unclear whether these indicators of adjustment to the postsecondary environment explain lower rates of degree completion for students with a mental or physical disability.

Bachelor's Degree Completion among Postsecondary Students with a Mental or Physical Disability

Turning to the multivariate results, Table 2 shows the AMEs from logistic regression models predicting the relationship between having a mental or a physical disability (compared to no disability) and bachelor's degree completion. After adjusting for controls in Model 1, students who report a mental disability are approximately 18 percentage points less likely to

complete a bachelor's degree than those who do not report a disability. In contrast, students who report a physical disability are statistically indistinguishable from their peers who do not report a disability. A comparison of students with a mental disability to those with a physical disability shows that students who report a mental disability have about a 13 percentage point disadvantage in completing a bachelor's degree relative to students who report having a physical disability (0.178 and 0.049, respectively, $p < .05$). Our results confirm our expectation that students with a mental disability are less likely to complete a bachelor's degree than both students without a disability and students with a physical disability.

To put the magnitude of this effect into perspective, we compare it to disadvantages we find for status groups widely recognized as at risk for not completing a bachelor's degree. The gap in bachelor's degree completion between White and Black students (-0.147) is about 17 percent smaller than the gap that we estimate between students with a mental disability and students without a disability. The magnitude of the advantage for students with college-educated parents (0.081) is less than half of the disadvantage for students with a mental disability in bachelor's degree completion. These results suggest that students with mental disabilities are an important status group to consider in studies of bachelor's degree completion.

In Model 2, we assess whether differences in academic preparation explain part of the gap in bachelor's degree completion by disability status. Even when controlling on high school grades, course-taking, SAT scores, and educational expectations, students with a mental disability on average have a 17 percentage point lower probability of completing college than students without a disability. They remain less likely to complete a degree than students with a physical disability. According to our mediation analyses, each of the factors we examine significantly mediates the association between mental disability and bachelor's degree completion. However, academic preparation explains only about 7 percent (from -0.178 to -0.166) of the gap in bachelor's degree completion by mental disability status. Our robustness test for possible unobserved confounders gives us confidence in our estimate of the effect of mental disability on bachelor's degree completion, as 53 percent of our sample (more than seven times the share of students with disabilities in our sample) would have to be replaced with cases for which there was no effect of disability status on college completion to invalidate our inferences (Frank et al. 2013). These findings suggest that disadvantages in college completion for students a mental disability may be traced to structural inequality embedded within postsecondary institutions.

Postsecondary Experiences Linked to Degree Completion

We next investigate whether processes *during* college contribute to the degree completion disadvantage for students with a mental disability. In Model 3, we add first-year academic performance indicators to our models predicting bachelor's degree completion. Students' early academic performance significantly attenuates the degree completion disadvantage of students with a mental disability (relative to students with no disability). Specifically, the AME associated with having a mental disability is reduced by almost 50 percent (from -0.166 to -0.090). The results from Model 3 also show that once first-year academic

performance is held constant, the degree-attainment gap between students with a mental disability and their peers with a physical disability is no longer statistically significant. Academic performance during the first year of college may be a major hurdle in the path to bachelor's degree completion for students with a mental disability.

Model 4 assesses the role of students' social and academic integration with peers and faculty, changes in educational expectations, and on-campus residence in predicting degree completion. Social integration and living on campus are positively related and lowering one's educational expectations is negatively related to bachelor's degree completion. However, these indicators of integration attenuate the gap in bachelor's degree completion between students with a mental disability and no disability by less than 10 percent (-0.166 to -0.150). Social and academic integration appears to play a small role in disparities in bachelor's degree completion related to disability status.

Model 5, which includes key indicators of disrupted enrollment patterns, but not the first-year indicators of academic performance and integration, suggests that disrupted enrollment patterns partially attenuate the degree completion disadvantage experienced by students with a mental disability; the AME reduces by about 30 percent (from -0.166 to -0.118) between Model 2 and Model 5. Stopping out, in particular, significantly mediates the association between mental disability status and bachelor's degree completion. Nevertheless, we see that students with a mental disability remain less likely to complete a bachelor's degree than their peers without a disability. Unlike the academic performance factors, disrupted enrollment patterns do not explain gaps in degree completion between students with a physical disability and students with a mental disability.

Model 6 shows estimates when all indicators of the postsecondary experiences are included in the model. Accounting for differences in students' first-year academic performance, integration, and disrupted enrollment patterns reduces the degree completion gap between students with a mental disability and those with no disability to statistical insignificance. These results suggest that almost 70 percent (from -0.166 to -0.056) of the gap in degree completion by disability status can be traced to processes within postsecondary institutions.

As a final step, we display results from a decomposition in Table 3 to ascertain how much each measure of academic preparation *before* college and postsecondary processes *during* college contribute to the gap in bachelor's degree completion between students with a mental disability and with no disability. The top of Table 3 shows that 66 percent (-0.110 out of -0.166) of the estimated negative effect of having a mental disability on bachelor's degree completion operates through indirect effects related to academic preparation and postsecondary experiences. The bottom portion of Table 3 shows the contribution of each measure of academic preparation, academic performance, integration, and disrupted enrollment patterns to the indirect effect. Notably, we see that lower academic performance—especially GPA and course failures—in the first year of college accounts for almost 50 percent ($39.86 + 7.30$) of the estimated indirect effect of having a mental impairment on degree completion. Lower educational expectations account for 12.71 percent, and higher rates of stopping out account for an additional 22.50 percent of the indirect effect of mental health on bachelor's degree completion. In contrast, academic preparation *before* college—

namely high school GPA—only accounts for 5.31 percent of the indirect effect of mental disability on bachelor's degree completion.

These results suggest that among the factors tapping postsecondary educational experiences that we modeled, the bachelor's degree completion disadvantage observed for four-year college students with a mental disability is largely driven by challenges these students face in the first year of college that result in poorer academic performance, lowered educational expectations, and subsequent stopping out of school.

Discussion and Conclusion

The stakes for students to succeed in postsecondary education are high because the returns to a bachelor's degree are substantial and increasing. Students with disabilities have been gaining access to postsecondary institutions at greater rates in recent years, but their rates of degree completion lag behind students without disabilities. Our study examines differences in degree completion for students with a mental disability, a physical disability, and no disability, and the role of academic preparation *before* college and processes *during* college in explaining any gaps we find. Our findings suggest that students with a mental disability are less likely to complete a bachelor's degree than students without a disability. Indicators linked to postsecondary institutional processes and not academic preparation before college, largely account for the degree completion disadvantage for students with a mental disability. These findings have implications for theory and research on educational stratification by disability status and for policies aimed at addressing challenges that marginalized status groups face in postsecondary institutions.

Our findings provide evidence that students with a mental disability are susceptible to barriers to degree completion that are consistent with those faced by other historically underrepresented groups who experience marginalization on college campuses. We found that students with a mental disability who are otherwise similar with respect to background and academic preparation are derailed from earning a bachelor's degree by processes that appear to be tied to how the postsecondary institution functions. Although there may be differences in adjusting to college life between students with a mental disability and their college peers, our results suggest that changing the ways postsecondary institutions structure the transition to college could better support these students. Structures built around the historical norm of college students—full-time, continuously enrolled White students without a disability from a college-educated family—present additional hurdles that students with disabilities have to overcome while pursuing a bachelor's degree. Although our findings cannot speak to the exact mechanisms through which this occurs, institutional practices on college campuses, such as the structure of classroom interactions, grading policies, the organization of curriculum, and the “weeding” out of students in the first few years, may contribute to a higher education disadvantage of students with a mental disability. For example, placing freshman students in large lecture courses that prerequisite to future coursework may be particularly detrimental for students with a mental disability who may need time to adjust to the new academic environment in less-impactful courses. Research on mental disability and educational outcomes at other stages of the schooling process finds similar inequalities, suggesting that educational institutions may be structured in a way that

does not meet the unique needs of students with a mental disability. Our findings demonstrate this process at the postsecondary level. We find that students with a physical disability, who have with symptoms and impairments that are less often perceived to be related to mental capacity, do not face the same barriers to degree completion as students with a mental disability.

The factors related to college persistence that affect degree completion for students with a mental disability, including first-year academic preparation and disrupted enrollment patterns, are also barriers to bachelor's degree of other underrepresented groups on college campuses. Research has frequently discussed the unequal experiences of students of color and first-generation college students on college campuses, and many postsecondary institutions have programs that attempt to remove the barriers these status groups face on the pathway to a bachelor's degree (Garza and Fullerton 2017). As a college degree becomes a more essential credential, and as more students with disabilities attend four-year postsecondary institutions, research and policy needs to work to reduce the barriers these students experience on college campuses.

In recent years, postsecondary institutions have responded to increased demands for services for students with disabilities, but whether and how these improvements have impacted students' pathways through college remains unknown. Targeted outreach to all students to report any disabilities, orientation, and transition services specifically designed for students with mental disabilities, and training of faculty and staff on the unique needs of students with disabilities on college campuses is potentially a promising program to close gaps in degree completion among students with disabilities (Wessel et al. 2009). In addition, the increase in mental health counselors and informal services for mental health may be decreasing the stigma of mental health on college campuses and providing students with some supports, but there is still variability within and between postsecondary institutions in both the use and availability of accommodations for classroom learning (Williams 2017). College students struggling with mental disabilities have even filed lawsuits to fight against discriminatory practices on college campuses, including forcing students struggling with mental health issues to take leaves of absence (Mintz 2017; Smith 2018). These practices suggest ways that students with mental disabilities may still be marginalized and underscore the value of an ongoing critical examination of universities' practices to support students with disabilities (Jones and Mitchell 2019). Adjusting to college coursework and disrupted enrollment patterns appear to account for much of the lower rates of degree completion among students with a mental disability in relation to those without disabilities. Restructuring college programs for greater flexibility to adapt to student differences, such that first-year courses allow for adjustment to the academic demands of college life and disrupted enrollment patterns (transferring, attending part time or stopping out) do not derail students, would likely benefit all college students, especially those from underrepresented groups. Our results underscore the value of continuing to assess the graduation rates of students with a disability, particularly those with a mental disability—a broad category that includes developmental and learning disabilities as well as emotional and other mental health disabilities.

As with any empirical study, our analysis has limitations. First, our measure of disability status only considers students' reports of their primary health condition that lasted six or more months in the base-year interviews, which took place in spring of their first year of college. In nearly all cases, it is likely that the disability preceded the postsecondary experiences that we measure, but we do not capture any disabilities that emerged after the first year of study or the severity of the disability at any time during college. During the transition to adulthood, mental health problems can emerge and become more severe, impacting individual's educational and occupational attainment (Shandra and Hogan 2009; Wickrama et al. 2008). We also lack information about comorbidity. It is possible that students with both a mental and physical disability are at even greater risk of degree noncompletion. Thus, our measure masks heterogeneity in disability status, which likely makes our estimates of the relationship between disability and college completion conservative. Future research may find that students whose mental disability emerges during college, especially in conjunction with a physical disability, may face additional barriers to degree completion.

Another limitation is that we only have data for a maximum of six years of postsecondary enrollment. It is possible that the enrollment window is simply not long enough for students with a mental disability to complete their degree, as some research suggests (Mull, Sitlington, and Alper 2001; Wessel et al. 2009). However, an extended period of enrollment is itself a risk factor for noncompletion (Adelman 2007) and also involves additional costs of education incurred by the student. We additionally do not have information about the institutional context for students with disabilities. We control on the institutional selectivity, but there may be variation in policies and how faculty and staff at postsecondary institutions support or interact with students with disabilities. Future research may find that institutional variation in the organization of disability support offices, the training provided to faculty and staff to support students with disabilities, and the openness of an institution to the disclosure of a disability could play a role in students' integration on the college campus and their eventual degree completion. As is always the case with longitudinal data, it is unclear if the students in our study represent the experiences of current students. Although some universities have responded to greater demand for services to students with disabilities, we expect that others have been slower to change. It is important to continue to document the experiences of students with nationally representative data. Despite these limitations, an important strength of our study is our ability to control on academic preparation factors that are associated with health risks and risks of degree noncompletion, which lends credence to the general conclusion that the structure of postsecondary institutions makes mental disability in itself a risk factor for bachelor's degree completion.

As more students, and more diverse students, have access to higher education, students interact with postsecondary institutions in diverse ways. If college programs continue to be structured to support the needs of students historically overrepresented, they will place new groups of students at a disadvantage. Our findings suggest that this group includes students with mental disabilities. Our study is about the young people who are most likely to succeed in higher education, those who have first enrolled in a four-year institution of higher education before age 24. These students have entered into a relatively competitive environment but should be positioned to succeed according to their family and academic

background. That academically prepared students with a mental disability are less likely to complete a degree suggests that they face barriers within postsecondary institutions. Academic institutions need to consider how to best support this status group.

Acknowledgments

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This material is based on work supported by the National Science Foundation (grant numbers HRD 1132028, HRD 1348527, and DRL 1420691). This research also received support from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (grant numbers P2C HD042849 [Population Research Center] and T32 HD007081 [Training Program in Population Studies]). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation or the National Institutes of Health.

Author Biographies

Jamie M. Carroll is a postdoctoral fellow with the National Study of Learning Mindsets at the University of Texas at Austin. Her research investigates how educational institutions contribute to stratification in individual outcomes across the life course by empowering some, while disengaging others.

Evangeleen Pattison is a senior academic program coordinator in the School of Undergraduate Studies and a lecturer in the department of sociology at The University of Texas at Austin. Her research primarily considers demographic disparities in secondary and postsecondary attainment and if/how they shape health inequalities throughout the life course.

Chandra Muller is the Alma Cowden Madden Professor in the sociology department and a research associate at the Population Research Center, University of Texas at Austin. She is currently a principal investigator of the High School and Beyond Midlife Follow-up study. Her research focuses on long run effects of education, especially STEM education, among different population subgroups including persons with disabilities.

April Sutton is an assistant professor in the Department of Sociology at the University of California, San Diego. Her main areas of research are education, stratification and inequality, geographic inequalities, and gender.

References

- Adams Katharine S. and Proctor Briley E.. 2010. "Adaptation to College for Students with and without Disabilities: Group Differences and Predictors." *Journal of Postsecondary Education and Disability* 22(3):166–84.
- Adelman Clifford. 2007. *The Toolbox Revisited: Paths to Degree Completion from High School through College*. Washington, DC: U.S. Department of Education.
- Alfeld-Liro Corinne and Sigelman Carol K.. 1998. "Sex Differences in Self-concept and Symptoms of Depression during the Transition to College." *Journal of Youth and Adolescence* 27(2):219–44.
- Allison Rachel and Risman Barbara J.. 2014. "'It Goes Hand in Hand with the Parties': Race, Class, and Residence in College Student Negotiations of Hooking Up." *Sociological Perspectives* 57(1): 102–23.

- Barnard-Brak Lucy, Lan William Y., and Lechtenberger DeAnn. 2010. "Accommodation Strategies of College Students with Disabilities." *The Qualitative Report* 15(2):411–29.
- Baum Sandy, Kurose Charles, and Ma Jennifer. 2013. *How College Shapes Lives: Understanding the Issues*. Trends in Higher Education. New York: The College Board.
- Berger Joseph B. and Milem Jeffrey F. 1999. "The Role of Student Involvement and Perceptions of Integration in a Causal Model of Student Persistence." *Research in Higher Education* 40(6):641–64.
- Biederman Joseph, Faraone Stephen V., Spencer Thomas, Wilens Timothy, Norman Dennis, Lapey Kathleen A., Mink Eric, Lehman Belinda Krifcher, and Alysa Doyle. 1993. "Patterns of Psychiatric Comorbidity, Cognition, and Psychosocial Functioning in Adults with Attention Deficit Hyperactivity Disorder." *The American Journal of Psychiatry* 150(12):1792–98. [PubMed: 8238632]
- Branigan Amelia R. 2017. "(How) Does Obesity Harm Academic Performance? Stratification at the Intersection of Race, Sex, and Body Size in Elementary and High School." *Sociology of Education* 90(1):25–46. [PubMed: 29593365]
- Brault Matthew W. 2012. "Americans with Disabilities: 2010." *Current Population Reports*. Washington, DC: U.S. Census Bureau.
- Brinckerhoff Loring C., McGuire Joan M., and Shaw Stan F. 2002. *Postsecondary Education and Transition for Students with Learning Disabilities*. 2nd ed. Austin, TX: Pro-Ed.
- Buis Maarten L. 2015. "Logistic Regression: Why We Often Can Do What We Think We Can Do." Presented at the United Kingdom Stata User's Group Meeting, September 10, London, England.
- Carroll Jamie M., Humphries Melissa, and Muller Chandra. 2018. "Mental and Physical Health Impairments at the Transition to College: Early Patterns in the Education-health Gradient." *Social Science Research* 74:120–31. [PubMed: 29961479]
- Carroll Jamie M., Muller Chandra, and Pattison Evangeleen. 2016. "Cooling Out Undergraduates with Health Impairments: The Freshman Experience." *The Journal of Higher Education* 87(6):771–800. [PubMed: 27818527]
- Cawthon Stephanie W. and Cole Emma V. 2010. "Postsecondary Students Who Have a Learning Disability: Student Perspectives on Accommodations Access and Obstacles." *Journal of Postsecondary Education and Disability* 23(2):112–28.
- Chang Mitchell J., Cerna Oscar, Han June, and Saenz Victor. 2008. "The Contradictory Roles of Institutional Status in Retaining Underrepresented Minorities in Biomedical and Behavioral Science Majors." *The Review of Higher Education* 31(4):433–64.
- Conley Colleen S., Kirsch Alexandra C., Dickson Daniel A., and Bryant Fred B. 2014. "Negotiating the Transition to College: Developmental Trajectories and Gender Differences in Psychological Functioning, Cognitive-affective Strategies, and Social Well-being." *Emerging Adulthood* 2(3):195–210.
- Crosnoe Robert. 2007. "Gender, Obesity, and Education." *Sociology of Education* 80(July):241–60.
- Fichten Catherine S., Nguyen Mai Nhu, Rhonda Amsel, Jorgensen Shirley, Budd Jillian, Jorgensen Mary, Asuncion Jennison, and Barile Maria. 2014. "How Well Does the Theory of Planned Behavior Predict Graduation among College and University Students with Disabilities?" *Social Psychology of Education* 17(4):657–85.
- Fischer Mary J. 2007. "Settling into Campus Life: Differences by Race/Ethnicity in College Involvement and Outcomes." *The Journal of Higher Education* 78(2):125–61.
- Fleming Alison R. and Fairweather James S. 2012. "The Role of Postsecondary Education in the Path from High School to Work for Youth with Disabilities." *Rehabilitation Counseling Bulletin* 55(2):71–81.
- Frank Kenneth A., Maroulis Spiro J., Duong Mihn Q., and Kelcey Benjamin M. 2013. "What Would It Take to Change an Inference? Using Rubin's Causal Model to Interpret the Robustness of Causal Inferences." *Educational Evaluation and Policy Analysis* 35(4):437–60.
- Fuller Mary, Georgeson Jan, Healey Mick, Hurst Alan, Kelly Katie, Riddell Sheila, Roberts Hazel, and Weedon Elisabet. 2009. *Improving Disabled Students' Learning: Experiences and Outcomes*. Abingdon, England: Routledge.

- Garza Alma Nidia and Fullerton Andrew S.. 2017. "Staying Close or Going Away: How Distance to College Impacts the Educational Attainment and Academic Performance of First-generation College Students." *Sociological Perspectives* 61(1):164–85.
- Gasiewski Josephine A., Eagan M. Kevin, Garcia Gina A., Sylvia Hurtado, and Chang Mitchell J.. 2012. "From Gatekeeping to Engagement: A Multicontextual, Mixed Method Study of Student Academic Engagement in Introductory STEM Courses." *Research in Higher Education* 53(2):229–61. [PubMed: 23503751]
- Goldrick-Rab Sara. 2006. "Following Their Every Move: An Investigation of Social-class Differences in College Pathways." *Sociology of Education* 79(1):67–79.
- Goldrick-Rab Sara and Pfeffer Fabian T.. 2009. "Beyond Access: Explaining Socioeconomic Differences in College Transfer." *Sociology of Education* 82(2):101–25.
- Grunau Ruth Eckstein, Whitfield Michael F., and Davis Cynthia. 2002. "Pattern of Learning Disabilities in Children with Extremely Low Birth Weight and Broadly Average Intelligence." *Archives of Pediatrics and Adolescent Medicine* 156:615–20. [PubMed: 12038896]
- Guiffrida Douglas A. 2006. "Toward a Cultural Advancement of Tinto's Theory." *The Review of Higher Education* 29(4):451–72.
- Haas Seven A. and Fosse Nathan Edward. 2008. "Health and the Educational Attainment of Adolescents: Evidence from the NLSY97." *Journal of Health and Social Behavior* 49(2):178–92. [PubMed: 18649501]
- Hallinan Maureen T. 2008. "Teacher Influences on Students' Attachment to School." *Sociology of Education* 81(3):271–83.
- Henderson Cathy. 1992. "College Freshmen with Disabilities. A Statistical Profile." Washington, DC: American Council on Education, Heath Resource Center.
- Hibel Jacob, Farkas George, and Morgan Paul L.. 2010. "Who Is Placed into Special Education." *Sociology of Education* 83(4):312–32. [PubMed: 26005224]
- Hicks Raymond and Tingley Dustin. 2011. "Causal Mediation Analysis." *The Stata Journal* 11(4):1–15.
- Ishitani Terry T. 2006. "Studying Attrition and Degree Completion Behavior among First-generation College Students in the United States." *The Journal of Higher Education* 77(5):861–85.
- Jack Anthony Abraham. 2016. "(No) Harm in Asking: Class, Acquired Cultural Capital, and Academic Engagement at an Elite University." *Sociology of Education* 89(1):1–19.
- Janus Alexander L. 2009. "Disability and the Transition to Adulthood." *Social Forces* 88(1):99–120.
- Jones Lindsay and Mitchell Ted. 2019. "Ending the Stigma for College Students with Learning Disabilities." *The Hechinger Report*, 7 16. Retrieved February 12, 2020 (<https://hechingerreport.org/opinion-higher-ed-and-learning-disabilities/>).
- Kohler Ulrich, Karlson Kristian Bernt, and Anders Holm. 2011. "Comparing Coefficients of Nested Nonlinear Probability Models." *The Stata Journal* 11(3):420–38.
- Mannuzza Salvatore, Klein Rachel G., Bessler Abrah, Malloy Patricia, and Maria LaPadula. 1998. "Adult Psychiatric Status of Hyperactive Boys Grown Up." *The American Journal of Psychiatry* 155(4):493–98. [PubMed: 9545994]
- McLeod Jane D. 2015. "Why and How Inequality Matters." *Journal of Health and Social Behavior* 56(2):149–65. [PubMed: 25926565]
- McLeod Jane D. and Fettes Danielle L.. 2007. "Trajectories of Failure: The Educational Careers of Children with Mental Health Problems." *American Journal of Sociology* 113(3):653–701.
- McLeod Jane D., Uemura Ryotaro, and Rohrman Shawna. 2012. "Adolescent Mental Health, Behavior Problems, and Academic Achievement." *Journal of Health and Social Behavior* 53(4):482–97. [PubMed: 23197485]
- Milberger Sharon, Biederman Joseph, Faraone Stephen V., Murphy Jane, and Tsuang Ming T.. 1995. "Attention Deficit Hyperactivity Disorder and Comorbid Disorder: Issues of Overlapping Symptoms." *The American Journal of Psychiatry* 152(12):1793–99. [PubMed: 8526248]
- Mintz Luke. 2017. "Students Sue Oxford for Discrimination amid Surge in Mental Health Claims Against Universities." *The Telegraph*, 8 8. Retrieved February 12, 2020 (<https://www.telegraph.co.uk/education/2017/08/07/students-sue-oxford-discrimination-amid-surge-mental-health/>).

- Mood Carina. 2010. "Logistic Regression: Why We Cannot Do What We Think We Can Do, and What We Can Do About It." *European Sociological Review* 26(1):67–82.
- Morgan Paul L., Farkas George, Hillemeier Marianne M., Mattison Richard, Maczuga Steve, Li Hui, and Cook Michael. 2015. "Minorities Are Disproportionately Underrepresented in Special Education: Longitudinal Evidence across Five Disability Conditions." *Educational Researcher* 44(5):278–92. [PubMed: 27445414]
- Mull Charlotte, Sitlington Patricia L., and Alper Sandra. 2001. "Postsecondary Education for Students with Learning Disabilities: A Synthesis of the Literature." *Exceptional Children* 68(1):97–118.
- Mullins Laura and Preyde Michèle. 2013. "The Lived Experience of Students with an Invisible Disability at a Canadian University." *Disability and Society* 28(2):147–60.
- National Research Council. 2004. *Measuring Racial Discrimination*. Washington, DC: The National Academies Press.
- Needham Belinda L., Crosnoe Robert, and Muller Chandra. 2004. "Academic Failure in Secondary School: The Inter-related Role of Health Problems and Educational Context." *Social Problems* 51(4):269–586.
- Newman Lynn, Wagner Mary, Knokey Anne-Marie, Marder Camille, Nagle Katherine, Shaver Debra, and Wei Xi. 2011. *The Post-high School Outcomes of Young Adults with Disabilities Up to 8 Years after High School*. Menlo Park, CA: SRI International.
- Nord C, Roey S, Perkins R, Lyons M, Lemanski N, Brown J, and Schuknecht J. 2011. *The Nation's Report Card: America's High School Graduates*. NCES 2011462. Washington, DC: U.S. Department of Education, National Center for Education Statistics, U.S. Department of Education.
- O'Brien Rourke L. 2013. "Economy and Disability: Labor Market Conditions and the Disability of Working-age Individuals." *Social Problems* 60(3):321–33.
- Oliver Michael and Barnes Colin. 2012. *The New Politics of Disablement*. New York: Palgrave Macmillan.
- Olney Marjorie F. and Brockelman Karin F. 2003. "Out of the Disability Closet: Strategic Use of Perception Management by Select University Students with Disabilities." *Disability and Society* 18(1):35–50.
- Ong-Dean Colin. 2006. "High Roads and Low Roads: Learning Disabilities in California, 1971-1998." *Sociological Perspectives* 49(1):91–113.
- Pascarella Ernest T., Pierson Christopher T., Wolniak Gregory C., and Terenzini Patrick T.. 2004. "First-generation College Students: Additional Evidence on College Experiences and Outcomes." *The Journal of Higher Education* 75(3):249–84.
- Pescosolido Bernice A. 2013. "The Public Stigma of Mental Illness: What Do We Think; What Do We Know; What Can We Prove?" *Journal of Health and Social Behavior* 54(1):1–21. [PubMed: 23325423]
- Pingry O'Neill Laura N., Markward Martha J., and French Joshua P. 2012. "Predictors of Graduation among College Students with Disabilities." *Journal of Postsecondary Education and Disability* 25(1):21–36.
- Rosenbaum James E. 2011. "The Complexities of College for All: Beyond Fairy-tale Dreams." *Sociology of Education* 84(2):113–17.
- Schudde Lauren T. 2011. "The Causal Effect of Campus Residency on College Student Retention." *The Review of Higher Education* 34(4):581–610.
- Shandra Carrie L. 2017. "Disability and Social Participation: The Case of Formal and Informal Volunteering." *Social Science Research* 68:195–213. [PubMed: 29108597]
- Shandra Carrie L. 2020. "Disability Segregation in Volunteer Work." *Sociological Perspectives* 63:112–34.
- Shandra Carrie L. and Hogan Dennis 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):363–79.
- Shifrer Dara. 2013. "Stigma of a Label: Educational Expectations for High School Students Labeled with Learning Disabilities." *Journal of Health and Social Behavior* 54(4):462–80. [PubMed: 24311756]

- Shifrer Dara, Callahan Rebecca M., and Muller Chandra. 2013. "Equity or Marginalization? The High School Course-taking of Students Labeled with a Learning Disability." *American Educational Research Journal* 50(4):656–82. [PubMed: 24982511]
- Simoni Zachary R. 2017. "Medicalization, Normalization, and Performance Edge: Teachers' Attitudes about ADHD Medication Use and the Influence of Race and Social Class." *Sociological Perspectives* 61(4):642–60.
- Smith SE 2018. "'College Isn't for Everyone': Mentally Ill Students Say Universities Like Stanford Are Leaving Them Behind." *Rewire.News*, 6 5. Retrieved February 12, 2020 (<https://rewire.news/article/2018/06/05/college-isnt-for-everyone-mentally-ill-students-say-universities-stanford-are-leaving-them-behind/>).
- Snyder Thomas D., de Brey Cristobal, and Dillow Sally A.. 2018. *Digest of Education Statistics 2016 NCES 2017–094*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.
- Thiele Megan and Gillespie Brian Joseph. 2017. "Social Stratification at the Top Rung: Classed Reports of Students' Social Experiences on a Selective University Campus." *Sociological Perspectives* 60(1):113–31.
- Thoits Peggy A. 2011. "Mechanisms Linking Social Ties and Support to Physical and Mental Health." *Journal of Health and Social Behavior* 52(2):145–61. [PubMed: 21673143]
- Thoits Peggy A. 2016. "'I'm Not Mentally Ill': Identity Deflection as a Form of Stigma Resistance." *Journal of Health and Social Behavior* 57(2):135–51. [PubMed: 27284073]
- Tierney William G. 1992. "An Anthropological Analysis of Student Participation in College." *The Journal of Higher Education* 63(6):603–18.
- Tinto Vincent. 1975. "Dropout from Higher Education: A Theoretical Synthesis of Recent Research." *Review of Educational Research* 45(1):89–125.
- Tinto Vincent. 2012. *Completing College: Rethinking Institutional Action*. Chicago, IL: University of Chicago Press.
- Umberson Debra and Montez Jennifer Karas. 2010. "Social Relationships and Health: A Flashpoint for Health Policy." *Journal of Health and Social Behavior* 51(Suppl.):S54–66. [PubMed: 20943583]
- Upton Thomas D. and Harper Dennis C.. 2002. "Multidimensional Disability Attitudes and Equitable Evaluation of Educational Accommodations by College Students without Disabilities." *Journal of Postsecondary Education and Disability* 15(2):115–30.
- Vogel Susan Ann and Adelman Pamela B.. 1992. "The Success of College Students with Learning Disabilities: Factors Related to Educational Attainment." *Journal of Learning Disabilities* 25(7):430–41. [PubMed: 1402379]
- Wessel Roger D., Jones James A., Markle Larry, and Westfall Curt. 2009. "Retention and Graduation of Students with Disabilities: Facilitating Student Success." *Journal of Postsecondary Education and Disability* 21(3):116–25.
- Wickrama KAS, Conger Rand D., Lorenz Frederick O., and Tony Jung. 2008. "Family Antecedents and Consequences of Trajectories of Depressive Symptoms from Adolescence to Young Adulthood: A Life Course Investigation." *Journal of Health and Social Behavior* 49(December):468–83. [PubMed: 19181050]
- Williams Lee Burnadette. 2017. "Under Pressure: The Growing Demand for Student Mental Health Services." *The Association of Governing Boards of Universities and Colleges*. Retrieved February 12, 2020 (<https://agb.org/trusteeship-article/under-pressure-the-growing-demand-for-student-mental-health-services/>).
- Wine Jennifer, Janson Natasha, and Wheelless Sara, and R. T. I. International. 2011. "2004/09 Beginning Postsecondary Students Longitudinal Study (BPS:04/09). Full-scale Methodology Report." NCES 2012–246. Washington, DC: National Center for Education Statistics.
- Yang Lisa K. and Tan Hock E.. 2016. *2015 Disability Status Report*. Ithaca, NY: Institute on Employment and Disability, Cornell University.

Table 1.

Descriptive Statistics for Analytic Sample by Type of Disability.

Variables	None		Mental		Physical	
	Mean/prop.	SD	Mean/prop.	SD	Mean/prop.	SD
Dependent variable						
Completed bachelor's degree (within 6 years)	0.61 ^a		0.48		0.56	
Demographic characteristics						
Female	0.56		0.61		0.61	
Race/ethnicity						
White	0.70 ^a		0.81 ^b		0.69	
Black	0.10 ^{ab}		0.03 ^b		0.15	
Hispanic	0.10		0.07		0.06	
Other	0.11		0.09		0.09	
Parental education above a bachelor's degree	0.57 ^a		0.68 ^b		0.49	
Parental logged income	10.91	1.01	10.84	1.45	10.80	1.08
Initial enrollment risk factors						
Delayed enrollment	0.06		0.09		0.09	
Initially enrolled part time	0.07		0.09		0.05	
Financially independent	0.03 ^a		0.06		0.04	
Had a job	0.07		0.06		0.09	
Institutional selectivity						
Highly selective	0.27		0.21		0.27	
Moderately selective	0.54 ^a		0.63 ^b		0.52	
Minimally selective	0.11		0.08 ^b		0.14	
Not selective	0.08		0.08		0.07	
Academic services						
Used any accommodations	0.00		0.39 ^b		0.23	
Academic preparation						
High school GPA	3.32 ^a	0.47	3.20	0.52	3.30	0.46
Completed calculus in high school	0.28		0.22		0.21	
SAT (in 100s)	10.56 ^b	1.89	10.55	1.95	10.24	2.04
Educational expectations						
Bachelor's degree	0.26		0.20		0.26	
Master's degree or certificate	0.47		0.48		0.40	
Professional or doctoral degree	0.27		0.32		0.33	
Postsecondary processes						
First-year academic performance						
GPA	2.86	0.80	2.55	0.92	2.68	0.97

Variables	None		Mental		Physical	
	0.92		0.04		0.03	
	Mean/prop.	SD	Mean/prop.	SD	Mean/prop.	SD
Ever failed	0.24 ^{ab}		0.33		0.31	
Ever withdrew	0.22 ^a		0.35		0.28	
First-year social integration						
Social Integration Scale	-0.09	0.98	-0.03	1.00	-0.10	0.99
Academic Integration Scale	-0.08	1.01	0.03	1.05	-0.04	1.18
Lowered expectations	0.27 ^a		0.38 ^b		0.29	
Lived on campus	0.63		0.64		0.68	
Disrupted enrollment patterns						
Enrolled part time	0.19		0.21		0.22	
Ever stopped out	0.19 ^a		0.28		0.24	
Type of transfer						
None	0.81 ^a		0.73		0.78	
Horizontal	0.11 ^a		0.14		0.11	
Downward	0.08 ^a		0.12		0.11	
<i>N</i>	7,000		340		210	

Source. Beginning postsecondary students: 04/09.

Note. Details may not sum to total due to rounding. Twenty individuals are categorized as "other" (not shown).

GPA = grade point average.

^aValue is significantly different than mental disability, $p < .05$.

^bValue is significantly different than physical disability, $p < .05$.

Table 2.

Average Marginal Effects on Probability of Bachelor’s Degree Completion within Six Years of Entry.

Variables	1	2	3	4	5	6
Type of disability [ref. none]						
Mental	-0.178 ^{***a}	-0.166 ^{***a}	-0.090 [*]	-0.150 ^{***a}	-0.118 ^{***a}	-0.056
	(0.041)	(0.040)	(0.039)	(0.035)	(0.040)	(0.034)
Physical	-0.049	-0.048	-0.020	-0.049	-0.027	-0.019
	(0.040)	(0.038)	(0.035)	(0.036)	(0.034)	(0.032)
Background characteristics						
Female	0.102 ^{***}	0.085 ^{***}	0.029 [*]	0.079 ^{***}	0.066 ^{***}	0.026 [*]
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.011)
Race/ethnicity [ref. White]						
Black	-0.147 ^{***}	-0.067 ^{**}	-0.043 [*]	-0.094 ^{***}	-0.068 ^{***}	-0.067 ^{***}
	(0.022)	(0.023)	(0.021)	(0.022)	(0.021)	(0.020)
Hispanic	-0.137 ^{***}	-0.103 ^{***}	-0.086 ^{***}	-0.080 ^{***}	-0.095 ^{***}	-0.065 ^{**}
	(0.022)	(0.022)	(0.021)	(0.022)	(0.020)	(0.020)
Other	-0.020	-0.025	-0.012	-0.012	-0.026	-0.006
	(0.024)	(0.022)	(0.021)	(0.022)	(0.020)	(0.019)
Parental education above a bachelor’s degree	0.081 ^{***}	0.054 ^{***}	0.044 ^{***}	0.031 [*]	0.049 ^{***}	0.028 [*]
	(0.014)	(0.014)	(0.013)	(0.013)	(0.012)	(0.012)
Parental logged income	0.036 ^{***}	0.029 ^{***}	0.018 [*]	0.025 ^{**}	0.030 ^{***}	0.018 ^{**}
	(0.009)	(0.008)	(0.007)	(0.008)	(0.007)	(0.006)
Initial enrollment risk factors						
Delayed enrollment	-0.084 ^{**}	-0.063 [*]	-0.075 ^{**}	-0.030	-0.060 [*]	-0.039
	(0.031)	(0.030)	(0.027)	(0.029)	(0.030)	(0.024)
Initially enrolled part time	-0.210 ^{***}	-0.180 ^{***}	-0.118 ^{***}	-0.138 ^{***}	-0.070 [*]	-0.031
	(0.028)	(0.026)	(0.028)	(0.026)	(0.028)	(0.029)
Financially independent	-0.067	-0.083	-0.090	-0.039	-0.054	-0.035
	(0.061)	(0.059)	(0.048)	(0.058)	(0.049)	(0.040)
Had a job	-0.138 ^{***}	-0.121 ^{***}	-0.083 ^{**}	-0.088 ^{**}	-0.094 ^{***}	-0.046
	(0.030)	(0.028)	(0.025)	(0.028)	(0.024)	(0.024)
Institutional selectivity [ref. highly selective]						
Moderately selective	-0.130 ^{***}	-0.055 ^{***}	-0.053 ^{***}	-0.046 ^{**}	-0.045 ^{**}	-0.039 ^{**}
	(0.015)	(0.016)	(0.015)	(0.015)	(0.014)	(0.014)
Minimally selective	-0.287 ^{***}	-0.179 ^{***}	-0.182 ^{***}	-0.151 ^{***}	-0.142 ^{***}	-0.133 ^{***}
	(0.022)	(0.023)	(0.021)	(0.022)	(0.021)	(0.019)
Not selective	-0.309 ^{***}	-0.180 ^{***}	-0.215 ^{***}	-0.136 ^{***}	-0.162 ^{***}	-0.159 ^{***}
	(0.028)	(0.030)	(0.028)	(0.029)	(0.027)	(0.025)
Used academic accommodations	0.064	0.096 [*]	0.078	0.072	0.078	0.046
	(0.053)	(0.049)	(0.047)	(0.046)	(0.045)	(0.044)
Academic preparation						

Variables	1	2	3	4	5	6
High school GPA		0.142 *** (0.016)	0.064 *** (0.015)	0.125 *** (0.015)	0.113 *** (0.014)	0.053 *** (0.013)
Completed calculus in high school		0.039 * (0.016)	0.023 (0.015)	0.032 * (0.016)	0.024 (0.015)	0.011 (0.014)
SAT (in 100s)		0.023 *** (0.005)	0.004 (0.004)	0.017 *** (0.005)	0.017 *** (0.004)	0.000 (0.004)
Educational expectations [ref. Bachelor's]						
Graduate degree		0.068 *** (0.015)	0.050 *** (0.014)	0.122 *** (0.015)	0.064 *** (0.014)	0.080 *** (0.014)
Professional degree		0.050 ** (0.018)	0.017 (0.016)	0.140 *** (0.019)	0.052 ** (0.016)	0.075 *** (0.017)
Postsecondary mechanisms						
First-year academic performance						
GPA			0.171 *** (0.010)			0.125 *** (0.0102)
Ever failed			-0.075 *** (0.017)			-0.060 *** (0.016)
Ever withdrew			-0.047 *** (0.0137)			-0.026 * (0.013)
First-year integration						
Social integration scale				0.0230 ** (0.007)		0.012 * (0.006)
Academic integration scale				0.006 (0.007)		0.002 (0.006)
Lowered educational expectations				-0.167 *** (0.014)		-0.091 *** (0.013)
Lived on campus				0.111 *** (0.013)		0.082 *** (0.012)
Disrupted enrollment patterns (first two years)						
Ever enrolled part time					-0.054 *** (0.016)	-0.036 * (0.016)
Ever stopped out					-0.286 *** (0.012)	-0.241 *** (0.012)
Type of transfer [ref. none]						
Horizontal					-0.081 *** (0.016)	-0.073 *** (0.016)
Downward					-0.256 *** (0.022)	-0.151 *** (0.021)
Log-Likelihood	-815,722	-781,407	-694,378	-748,293	-680,765	-607,742

Note. N = 7,570. Models also include controls for "other" health designation. GPA = grade point average. All the p values are based on two-tailed tests.

^aThe estimated effect of mental disability is significantly different from the estimated effect of physical disability ($p < .05$).

* $p < .05$.

**
 $p < .01$.

 $p < .001$.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 3.

Decomposition of Estimated Direct and Indirect Effects of Mental Disability on Bachelor's Degree Completion and Contribution of Academic Preparation and Postsecondary Processes to the Indirect Effect.

Decomposition of direct and indirect effect		
	APE	(SE)
Total effect	-0.166	0.036
Direct effect	-0.057	0.035
Indirect effect	-0.110	—
Contribution to indirect effect		
	%	(Sig.)
Academic preparation		
HS GPA	5.31	*
Completed calculus in HS	0.39	
SAT (in 100s)	0.00	
Expected a graduate degree	-1.97	
Expected a professional degree	-3.52	
First-year academic performance		
GPA	39.86	*
Ever failed	7.30	*
Ever withdrew	3.89	
First-year integration		
Social integration scale	-0.07	
Academic integration scale	0.10	
Lowered educational expectations	12.71	*
Lived on campus	-0.92	
Disrupted enrollment patterns (first two years)		
Ever enrolled part time	-1.28	
Ever stopped out	22.50	*
Type of transfer		
Horizontal	3.22	
Downward	4.65	

Note. $N = 7,570$. No health impairment is omitted reference. Models include controls for institutional selectivity, demographic attributes, and the use of academic services in higher education. Results are presented as APE. Standard errors (SE) are presented in parentheses. SE of difference are not yet known for APE method (Kohler, Karlson, and Holm 2011). APE = average partial effect; HS = high school; GPA = grade point average. All the p values are based on two-tailed tests.

* $p < .05$.