

The Effect of Disability Disclosure on the Graduation Rates  
of College Students with Disabilities

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## ABSTRACT

Previous studies on postsecondary graduation rates indicated that college students with disabilities have lower graduation rates than students without disabilities. As many college students do not disclose their disability to their institution upon enrollment, the effect of the timing of disability disclosure on graduation rates warranted examination. This study was a quantitative study of 14,401 undergraduate students at one large research university in the years 2002, 2003, and 2004, of which 423 had disabilities. Quantitative methods were used to conduct an exploratory analysis of the effect of disability, disability disclosure, disability-type and gender on graduation rates. A chi-square analysis revealed that students with disabilities had significantly lower six-year graduation rates than their peers. In addition, students with disabilities who disclosed their disability after their first year of enrollment had significantly lower six-year graduation rates than students with disabilities who disclosed within the first year of enrollment. Results of a multiple regression analysis showed that disability disclosure, disability-type, and gender accounted for 38% of the variance in the length of time to graduation. Finally, for every year that a student delayed disclosing a disability, the length of time to graduation increased by almost half a year. The implications of the study were discussed and recommendations for future research were made.

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## Chapter One: Introduction

Educational achievement is a path toward personal prosperity, active citizenship, and full participation in a democratic society (McMahon, 2009). Though certainly not a guarantee, opportunities for meaningful and sustaining employment are more abundant for individuals who complete postsecondary education (U.S. Bureau of Labor Statistics, 2013). Degree completion, or graduation, is regarded as the most significant marker of educational achievement (Berkovitz & O'Quinn, 2006; Skahill, 2002-2003). Ideally, participation in higher education should be available and accessible for any qualified individual.

Unfortunately, degree completion remains unattainable for many. Retention and graduation rates have not significantly improved in recent decades despite widespread efforts to increase opportunity and access to higher education (Delen, 2011; Henderson, 2001; Jones & Braxton, 2009; Tinto, 2006). Just 59% of full-time undergraduate students who sought a bachelor's degree in 2005 completed that degree within six years (Snyder & Dillow, 2012, p. 228). A broad range of theories exist about the strongest predictors of postsecondary degree completion. For some students, low aptitude, poor skills, or disengagement contribute to poor educational achievement (Adelman, 2006; Bowen, Kurzweil, & Tobin, 2005; Tinto, 1993). Degree completion also varies by gender, race, age, and socioeconomic status (Snyder & Dillow, 2012).

Enrollment rates have increased significantly over the past four decades for students with disabilities at colleges and universities (Dukes, 2001; Newman et al., 2011). Even so, students with disabilities who are otherwise-qualified to pursue a degree are not experiencing equal access, opportunities, and the same levels of success as the general college population (Belch, 2005). As a result, graduation rates for students with disabilities are lower than for students

without disabilities (deFur, Getzel, & Trossi, 1996, p. 232). The presence of disability can also negatively impact an individual's overall educational career and chances of degree completion (Trammel, 2009).

Evidence exists that indicates that with the proper resources, accommodations, and supports, college students with disabilities can be as successful as their peers without disabilities (Mamiseishvili & Koch, 2011; Pingry-O'Neill, Markward, & French, 2010). To receive accommodations, services, and supports, students must be aware of their disability and then choose to disclose that they have a disability to their institution's disability services office. A college student with a disability is not required to disclose the presence of a disability to their respective institution, and many choose not to do so. Some students become aware of or acquire a disability during college, and then need to make a disclosure decision. Students who do not disclose their disability early in their postsecondary career may be at higher risk for not completing their degrees (Lightner, Kipps-Vaughn, Shultz, & Trice, 2012).

### **Purpose**

A variety of factors have been linked to academic outcomes of students with disabilities such as disability type, gender, and accommodations; however, the timing of disclosure of a disability has not been adequately addressed as a contributing factor for degree completion. My purpose for conducting this research was neither to identify "flaws" in the behaviors or characteristics of students with disabilities nor to assess the types of qualities of accommodations and services that students utilized. Rather, my hope was to explore trends and impacts of disclosure patterns and graduation rates that could be placed in a larger context.

The purpose of this study was to explore the effect of disability disclosure on the graduation rates of students with disabilities at one four-year, research-intensive university in the

southeastern region of the U.S. Specifically, it was a quantitative, exploratory study of the relationship between disability disclosure patterns and the degree completion of 14,401 entering full-time baccalaureate degree seeking freshmen (EFBDS), of which 423 were identified as having a disability. The research was limited to one university setting during a specific period of time. The population only included undergraduate students, which excluded transfer, part-time, and graduate students. Validity, in terms of generalizing to other populations, should be carefully considered.

### **Research Questions**

This research is an archival study. Quantitative methods were used to conduct an exploratory analysis of relationships between disability-type, disability disclosure, and graduation rates. The research questions that guide this study are as follows:

For entering first-time baccalaureate degree-seeking students at one institution in the cohort years 2002, 2003, and 2004

1. What is the difference between the six-year graduation rates of students with disabilities and of students without disabilities?
2. What is the difference between the six-year graduation rates of students who disclosed their disability in their first year of enrollment and the six-year graduation rates of students with disabilities who disclosed after the first year?
3. Of students with disabilities who graduated, what is the effect of disability disclosure, disability-type, and gender on the length of time to graduation?

(Definitions of the terms and concepts are listed in Appendix A and the variables are defined in Chapter Three).

## Significance of the Study

### Disability Prevalence

Estimates of the prevalence rates of disability among college students ranged from 11% in 2003-2004 (Horn, Nevill, & Griffith, 2006) to 13% in 2012 (Pryor, Hurtado, DeAngelo, Paulki, & Tran, 2010). These rates were based on self-reports from students at all levels of postsecondary education (freshman through seniors and graduate students). The National Center for Education Statistics (NCES) reported that for the 2008-2009 year, 99% of four-year public institutions enrolled students with disabilities (NCES, 2012, Table 376). Approximately 202,200 students who attended public, four-year institutions were registered with a disability services office in 2008-2009 (Snyder & Dillow, 2012), which constituted approximately 28.5% of students with disabilities at all postsecondary institutions. Students with disabilities often present with highly complex and severe disabilities and require multiple levels of accommodation and support (Belch & Marshak, 2006; Gregg, 2007).

The majority of disabilities among college students can be characterized as cognitive, emotional, medical, physical, or sensory. In both K-12 schools and in the higher education setting, the most common disabilities are learning disabilities (LD) and Attention Deficit Hyperactivity Disorder (ADHD) (Gregg, 2007). Psychological disabilities, (e.g. bi-polar disorder, obsessive-compulsive disorder) are the fastest growing category of disability on campuses (Brockelman, 2009). The prevalence of developmental disabilities, including Asperger's Syndrome and autism, are also increasing on campus and often require intensive intervention and support (White, Ollendick, & Bray, 2011). The NTLs-2 (Newman et al., 2011) reported that, of special education students who attended a four-year postsecondary institution, 15.9% had learning disabilities, 8.3% had psychological disabilities, and 18.2% had other health

impairments. (In K-12 education, students with ADHD are often categorized as having other health impairments). The students most likely to not finish their degrees, both at the high school and postsecondary levels, were those with learning disabilities, psychological disabilities, and behavior problems (Belch & Marshak, 2006; Gregg, 2007)

The Cooperative Institutional Research Program (CIRP) collected data on the prevalence of disability among a large sample of freshmen who attended a four-year postsecondary institution (Pryor et al., 2010). Thirteen percent of the survey respondents reported a disorder that could qualify as a disability. Students reported the following disabilities: ADHD (5%); psychological disorders (3.8%); LD (2.9%); physical disability (including mobility and sensory) (2.7%), chronic illness (1.8%), and other (3.3%). Additionally, 11.9% reported one disorder, and 2.7% reported more than one disability (Pryor et al., 2011, p. 2).

The estimated number of college students with disabilities appears to be much higher than the number of students with disabilities who self-disclose to their institution's disability services office. According to NCES, there were 7.3 million students enrolled in public four-year institutions in 2008-2009 (Snyder & Dillow, 2012). Therefore, approximately 2.7% of students were registered as having a disability, which is consistent with a 1-4% estimate by Hedrick, Dizen, Collins, Evans, & Grayson (2010). Yet estimates of the actual number of students with disabilities in college, per self-report, were as high as 13% (Prior et al, 2013). .

Although there seems to be consensus among these studies about the prevalence of disability among postsecondary students who disclose to their institution, the exact number of students with disabilities in higher education remains unknown. Only 28% of students who received special education services in grades K-12 disclosed their disability to their postsecondary schools, and only 19% reported that they received any accommodations or

supports in college (Newman et al., 2011, p. 31). Students with disabilities who do not disclose to an institution's disability services office generally do not receive any supports nor are they included in research studies.

### **Historical and Legal Context**

Society has historically viewed disability as a chronic problem that was inherent to an individual and represented a malady that needed to be fixed or eliminated (Davis, 2006).

Individuals with disabilities were, and still are, blamed for their condition and viewed as medically, socially, or morally defective in comparison with a social norm (Linton, 1998).

"People with disabilities have been isolated, incarcerated, observed, written about, operated on, instructed, implanted, regulated, treated, institutionalized, and controlled to a degree probably unequal to that experienced by any other minority group" (Davis, 2006, p. vi.). Unfortunately, many countries today do not protect individuals with disabilities from discrimination.

Prior to recent decades, individuals with disabilities in the U.S. were not afforded basic human rights or civil protections. The Civil Rights Act of 1964 did not include disability as a protected status. It would take an additional 25 years for individuals with disabilities to gain status as a marginalized and oppressed group that had federal protection. Students with disabilities were not granted protection in higher education nor provided access until the 1970s.

A major milestone for creating access to higher education for students with disabilities was the Vocational Rehabilitation Act of 1973 (Madaus, 2011). Section 504 of the act required that institutions of higher education admit qualified students with disabilities and provide reasonable accommodations. The act gave students with disabilities access to admissions, campus facilities and programs, and some types of accommodations (Madaus, 2011, p. 10). The result was that

more students could attend college and have some recourse when they faced discrimination on the basis of disability.

In 1990, Congress passed the Individuals with Disabilities Education Act (IDEA). IDEA was amended and reauthorized several times since 1990, and remains the template for modern day special education services in K-12 public schools (Individuals with Disabilities Education Act, 20 U.S.C. § 1400 (2004)). IDEA mandates that all public school students be provided a free and appropriate education, in the least restrictive environment, with an Individualized Education Plan (IEP) unique to each individual. IDEA also requires transition planning for students with disabilities from high school to postsecondary education.

An estimated 6.6 million school children received special education services in 2006-2007 (U.S. Department of Education, 2008). Although secondary schools have made progress in improving high school graduation rates of students with disabilities, they are still much less likely to graduate from high school than other students. Special education, including transition programming, is not a standardized program among or within states. With increasing enrollment in special education services and decreasing school funding (Jackson, 2003), it is not surprising that postsecondary transition planning and implementation may not be adequate for all students. Secondary students who are qualified to attend college are often missing out on opportunities in high school to adequately prepare for higher education (Shaw & Dukes, 2006).

In higher education, students with disabilities are protected by Title II and Title III of the Americans with Disabilities Act (ADA). The ADA, passed in 1990, is civil rights legislation that applies to most sectors of society including employment, transportation, public venues, communications, and education. The ADA defines disability as (A) a physical or mental impairment that substantially limits one or more of the major life activities of such individual;

(B) a record of such an impairment; or (C) being regarded as having such an impairment (U.S.C. § 12010 (2)). Under the ADA, students with disabilities are entitled to reasonable accommodations and are protected from discrimination based on a disability.

The ADA and the IDEA differ in significant ways in regards to the identification and accommodation of students with disabilities. The IDEA designates educators as the responsible party for identifying students with disabilities and ensuring their success. In postsecondary education, under the ADA, students are responsible for identifying themselves to an institution and for providing professional documentation of a disability that warrants accommodations. Only those students who do so will receive accommodations and be protected from discrimination. Postsecondary institutions are not mandated by the ADA to identify and serve students who either are unaware of disability services or are reluctant to seek services and accommodations.

The Americans with Disabilities Act Amendments Act (ADAAA) of 2008 expanded the definition of a disability. The ADAAA mandated that disability, as originally defined by the ADA of 1990, “shall be construed in favor of broad coverage” and “should not demand extensive analysis” (Association of Higher Education and Disability (AHEAD), 2012, pp. 2-4). The term “substantially limited” was also expanded under the ADAAA, and now includes major bodily functions such as kidney functioning, immune system functioning, and reproduction. Prior to the ADAAA, if an individual had a medical condition that met criteria for disability, but had a mitigating measure such as medication, adaptive equipment, or other treatment that reduced the impact of the disability, they could be denied the status of disability and denied accommodations. Under the ADAAA of 2008, with the exception of eyeglasses, a person must be viewed without mitigating measures to make the determination of a disability.

## **Current Significance**

The numbers of postsecondary students who qualify as having a disability and who may be eligible for disability services is expected to continue to grow (Association of Higher Education and Disability, 2012). Even though the ADAAA reduced the burden of extensive disability documentation for students, the authority for disability determination and accommodation selection still remains within the purview of an institution (Heyward, 2011). Postsecondary institutions vary widely in their philosophies and practices regarding their approach to identifying and engaging students who may have disabilities and who could benefit from accommodations and services (Harding, Blaine, Whelley, & Chang, 2006). Some institutions may choose to be passive in the process, and only provide assistance to students who are knowledgeable about their disability, have appropriate documentation, and identify themselves to their institution. A few proactive campuses have created programs and services to identify students who may have disabilities and to support them in obtaining appropriate documentation and accommodations (U.S. Government Accountability Office, 2009).

Regardless of the philosophy of an institution on being passive or active, students must make a choice to disclose their disability. Only then can they receive direct support from an institution's disability services office. It remains to be seen if the growing number of students with disabilities will seek disability services from their institution.

Delayed disclosure of a disability may have serious consequences. First, students who could benefit from accommodations and accessible instructional delivery will not have such supports if they do not disclose their disability. This may negatively impact their degree completion, which has financial costs for students and institutions. Second, disability services offices may be missing opportunities to demonstrate the need for adequate resources to serve

students with disabilities if the reported prevalence of disability remains low. Third, outcome studies may be widely discrepant in terms of graduation rates depending on whether or not students with disabilities who disclose late are included in research (Wessel, Jones, Markel, & Westfall, 2009). Efforts to assist students with disabilities will require assessment of the effectiveness of interventions in terms of academic success. To better assist students with disabilities, it is important to be able to accurately identify who they are and what they may need.

For many students who do not graduate from a postsecondary institution, a wide range of personal and environmental factors may have an interactional effect on a student's chances of degree completion (Tinto, 1987). Social inequality, differentiated opportunities, discrimination, stigma, and poor institutional climates are some of these broader influences that continue to prevent full access to educational opportunities and degree completion (Bowen, et al., 2005; Deming & Dynarski, 2009; Jones & Braxton, 2010; Pinel, Warner, & Chua, 2005). Postsecondary administrators, educators, and policy-makers need evidence-based practices as they strive to recruit, retain and graduate larger numbers of students from an increasingly diverse population (Attewell, Heil, & Riser, 2011). Postsecondary institutions need to improve the self-disclosure process for students with disabilities and decrease institutional barriers for full inclusion. It was my intent that this study will contribute to an emerging body of research aimed at improving the college graduation and retention rates of students with disabilities to a level equal to those of students without disabilities.

### **Organization of the Document**

This research study is organized in five chapters. Chapter One introduced the issue of graduation rates and SWDs, and provided the rationale, context, and research questions for the study. Chapter Two is a review of the research literature that identifies factors associated with

degree completion and the phenomenon of disability disclosure. Chapter Three is a description of the research methodology used for the data collection and analysis. Chapter Four is a presentation of the results of the data analysis. Chapter Five offers a discussion of the results, an analysis of the limitations of the study, implications, and recommendations for future research and practice.

## **Chapter Two: Literature Review**

This chapter provides a theoretical foundation for the current study, a comprehensive picture of research literature relevant to postsecondary outcomes of students with disabilities, and a summary of recent literature about the phenomena of disability disclosure. Relying primarily on peer-reviewed sources, literature reviews of this type orient the researcher and the reader to the current landscape of the issue at hand (Galvan, 2009). The review is also intended to establish strengths and weaknesses in existing literature, identify knowledge gaps in critical areas, and provide a rationale for the current study. This chapter is organized by a) summary of the methods for this literature review, b) a description of theoretical frameworks, c) a discussion of the literature regarding graduation degree completion for students with disabilities, and d) research pertaining to disability disclosure among students with disabilities.

### **Literature Review Methods**

Comprehensive methods were used to locate potential research articles for this review. Multiple databases were searched including EBSCO Host, Academic Search Complete, MUSE, SAGE, and Google Scholar. ERIC was the primary database used. Search terms included disability, postsecondary education, graduation rates, retention, postsecondary outcomes, and disability disclosure. The databases yielded references, research articles, and additional resources. Journal articles and other sources were cross-referenced with an existing literature review on postsecondary education and disability (Brown, Takahasi, & Roberts, 2010) to ensure a comprehensive approach. More than 300 potential resources, including peer-reviewed research articles, government publications, and professional books, were found that using this method.

To narrow the field of literature to the studies most relevant for the purposes of this research, a set of selection criteria for inclusion in the review were established. The criteria were

a) the research participants or subjects were postsecondary students, b) students were the primary focus of the study, or were a subset of the study, c) the postsecondary institutions in the studies were four-year degree granting institutions, and d) the research contributed to the understanding of the factors associated with either the degree completion of students with disabilities and/or the disclosure of a disability to a postsecondary institution. The sources had to be peer-reviewed articles, published dissertations, or research reports, such as official government publications.

### **Theoretical Framework**

Despite many attempts at improving graduation rates in U.S. colleges and universities, little progress has been made over the last thirty years (Tinto, 2006). Historically, students were thought to be at fault for failure to graduate either through laziness or lack of ability (Tinto, 2006, p. 2). In recent decades, a shift in retention and graduation philosophy has encompassed a wide range of factors such as student characteristics (Bowen, Chingos, & McPherson, 2009), financial costs (Singell, 2005), social engagement (Tinto, 2006), and institutional type and policies (Attewell et al., 2011).

Attewell et al., (2011) conducted a large-scale analysis of degree non-completion and found that although certain factors predicted non-completion for certain types of students at certain types of institutions, no single dominant predictor was associated with improved graduation rates. Students learn and perform in the context of their social environment and institutional setting. Theoretical models that incorporate the effects of interactions between multiple factors in specific contexts are perhaps the most useful for understanding complex patterns such as graduation and retention.

Just as no one single model or factor seems to predict graduation rates of all college students, the same is true for students with disabilities. In order to approach the problem, a

multitude of variables should be considered in research studies. When dealing with a large number of variables, constructing categories can simplify complicated phenomena.

Four categories of factors are associated with graduation. Mamisheishvili and Koch (2010) constructed three categories of student variables for students with disabilities: *Background characteristics* (gender, age, ethnicity, socioeconomic status, first-generation student status, and high school grade point average (GPA)); *In-College characteristics* (first-year GPA, attendance intensity, remediation, housing status, net price of attendance, degree aspirations, academic and social integration, and first institution level); and *Disability-Related characteristics* (main disability type, and disability-related services and accommodations) (pp. 96-97). In addition, *Institutional characteristics* (type, culture, policies, and practices) should be considered (Getzel, 2008). These four categories, a) background characteristics, b) in-college characteristics, c) disability-related characteristics, and d) institutional characteristics, provide a structure for analyzing previous research associated with graduation among students with disabilities.

### **Factors Associated with Graduation among Students with Disabilities**

#### **Background Characteristics**

Gender, ethnicity, race, socioeconomic status, and age are factors associated with degree completion among college students. Studies involving students with disabilities have usually considered some or most of these factors (Attewell et al., 2011; Mamisheivili & Koch, 2010; Newman et al., 2011). A recent study on the graduation rates of students with disabilities at three different four-year institutions found that females older than age 23 were more likely to graduate than their male counterparts (Pingry-O'Neill et al., 2010). A similar study found that

being female and having a strong high school standing were stronger predictors of graduation than race or disability type (Wessel et al., 2009).

Very few studies specifically addressed the effect of race and ethnicity on the experiences and outcomes of students in postsecondary education. One longitudinal transition study of students with disabilities found no significant differences in graduation rates among ethnicities or socioeconomic status at the postsecondary level (Sanford et al., 2011, p. 20). Another study found that African-American students were less likely to be identified as having disabilities and seek professional evaluations that would establish the presence of a disability (Pelligrino, Sermons, & Shaver, 2011). Therefore, students from this minority group, and potentially others, may be so underrepresented that there is not enough of a sample or population to account for variance in graduation rates among all students with disabilities. Although ethnicity was not a strong predictor in the aforementioned studies, race is often included as a variable in graduation and retention studies as it is generally considered to be a factor in degree completion (Attewell et al., 2011) and is used for comparison purposes between research populations.

### **In-College Characteristics**

Academic preparedness is a predictor of persistence to degree completion (Bowen et al., 2005; Horn, 2010). “About one third of today’s undergraduates enter college with weak high school academic preparation and face a higher risk of failing college courses and dropping out” (Attewell et al., 2011, p. 539). For students who were aware of their disability in high school, accommodations may have been provided to them for their coursework and they may have qualified for testing accommodations on college entrance examinations such as the Scholastic Aptitude Test (SAT) (Mandinach, Bridgeman, Calahan-Laitusis, & Trapani, 2005). Students who acquire or learn about a disability while in college would not have had accommodations in

K-12 or on college entrance exams. The more selective admissions are at an institution, the higher the four-year graduation rate (Bowen et al., 2009), which includes students with disabilities who enroll in selective institutions. Therefore, consideration of institutional type and admissions criteria is important when comparing graduation rates across institutions.

In theory, grade point average (GPA) should reflect the degree to which students learn material and are able to demonstrate what they have learned. One mixed-methods study measured GPAs of students with learning disabilities who delayed disclosing their disability to the institutions' disability services office (Lightner et al., 2012). There were three groups of students ( $N= 44$ ): early discloser, later freshman group, and late group. The mean GPAs were highest for those who disclosed earliest. Students with disabilities who disclosed later also earned less academic credits than students who disclosed early on. This study did not track students with disabilities to graduation, but it gave an indication of the importance of distinguishing between types of disclosers, and the benefit of using accommodations and services sooner in one's academic career.

Troiano, Liefeld, and Trachtenberg (2010) studied students with learning disabilities (LD) and Attention Deficit Hyperactivity Disorder (ADHD) and found that GPAs were positively correlated with students' rates of attendance at a learning support center, compared to students with LD and ADHD who did not use such services. Adams and Proctor (2010) hypothesized that perhaps students' use of accommodations and services accounted for higher GPAs than they predicted. The participants in both studies self-reported their GPA, which may have been a less accurate way to measure grades than if the researchers had used institutional records. Another limitation of the studies in this review is that GPA was recorded at one particular instance. GPA changes over time, more drastically for some students than for others.

No studies reported changes in students' GPA as a result of accommodations, services, or interventions.

One study used logistic regression to determine which background characteristics and in-college characteristics were the strongest predictors of persistence, when controlling for disability-related variables. Age, gender, ethnicity, GPA, residence (on or off campus), and price of attendance were predictors of patterns in persistence. Use of accommodations and services in the freshmen year also accounted for differences in persistence among students with disabilities (Mamishvili & Koch, 2010, pp. 99-100), with early use of accommodations being a predictor of persistence. Students' background and in-college characteristics are parts of the equation that predict graduation for students with disabilities, but the impact of disability on an individual must also be considered.

### **Disability-Related Characteristics**

Disability-related characteristics have been linked to adaptation to college (Adams, 2007), academic success (Kaminski, Turncock, Rosen, & Laster, 2006), extracurricular involvement and social interaction patterns (Bradshaw, 2001; Greenbaum, Graham, & Scales, 1995), and employment outcomes (Madaus, Ruban, Foley, & McGuire, 2003). A specific type of disability, in and of itself, does not manifest in the same ways in every individual. Determinants of functional impact include the nature and extent of a particular disability, and the personality, aptitudes and coping skills of an individual in relation to a disability (Alston & Burkhead, 2005; Crewe & Vash, 2004). Disabilities that produce weaknesses in some areas can also produce or amplify strengths in other areas (Trainor, 2008).

Although individuals will experience similar types of disabilities in different ways, some patterns of graduation and retention by disability type have been found. No one single standard

of classifying or reporting types of disabilities exists. In many studies, disability types are grouped together for statistical analysis (Pingry-O'Neill et al., 2010; Wessel et al., 2009) or to provide continuity in longitudinal studies (Newman et al., 2011; Sanford et al., 2011).

For students who received special education services in high school, the type of disability a student had made a difference in enrollment in postsecondary education (Sanford et al., 2011). Students with sensory impairments were more likely to enroll at four-year institutions than students with learning disabilities, emotional disabilities, and other health impairments (19.5%) (Sanford et al., 2011, p. 16). However, in the postsecondary environment, LD and ADHD make up the majority of disabilities in four-year institutions (Sanford, et al., 2011) due to the higher prevalence rates in general.

There are more postsecondary students with what are considered cognitive disabilities, also known as hidden or non-apparent disabilities, than there are students with sensory impairments and mobility impairments, which are often considered visible or apparent disabilities (Wessel et al., 2009). A recent study of large public institutions found that students with cognitive or psychological disabilities were less likely to graduate than students with physical disabilities (Pingry-O'Neill et al., 2010, p.29). The authors theorized that due to the high cognitive demands of academic coursework, cognitive disabilities may have the strongest negative impact on grades and degree persistence (p. 32).

To state the obvious, in order for graduation to occur, students must stay enrolled (or retained) at an institution for a sequence of semesters or terms. Retention rates can be thought of as persistence rates from one academic year to the next. Wessel et al. (2009) conducted a longitudinal study of the persistence and graduation rates of students with disabilities at one four-year institution. The study consisted of 11,387 students who were enrolled from 1994-1996.

The researchers tracked students' academic outcomes over an eight year period of time, and recorded the graduation and retention rates of the students (Wessel et al., 2009, p. 177).

The researchers divided the students into three categories, a) Students with Apparent Disabilities (SWAD), b) Students with Non Apparent Disabilities (SWND), and c) Students Without Disabilities (SWOD) (Wessel et al., 2009, p.118). The students with disabilities in the study had disclosed their disability to the institution's disability support office prior to the first census day of their first semester at school. The results of the study showed that “the retention and graduation rates did not show statistically significant differences among the three groups” (Wessel et al., 2009, pp.120-121). Wessel et al. (2009) theorized that the disability services offices provided accommodations and support early in the freshman year for the students in the study, which leveled the playing field for the students with disabilities early on. Students with disabilities who disclosed after the first semester were not included in the study.

### **Institutional Characteristics and Policies**

Studies that focus on student's background characteristics, in-college characteristics, and disability-related variables are critical to understanding degree completion. However, misinterpretation of these types of studies could lead some individuals to place the “blame” of failure on the student because they had a disability, thereby diminishing institutional responsibility for the outcomes of students with disabilities. Institutional climate, including social attitudes towards disability and institutional policy and practice regarding students with disabilities, interacts with student characteristics and disability-related factors to influence graduation rates.

Getzel (2008) addressed the persistence and retention of students with disabilities in higher education through a framework that described the critical components of student retention

as a function of institutional characteristics. Getzel (2008) said that students' self-determination and self-regulation skills should be improved through institutional programmatic efforts such as academic coaching. Three recent studies studied students' level of satisfaction, perceived usefulness, and additional needs. The studies concluded that college students with disabilities need better support services, increased collaboration among disability services offices and teaching faculty, improved career transition services, and advocacy programming to change faculty and employer attitudes about disabilities (Dutta, Kundu, & Schiro-Geist, 2009; Dowrick, Anderson, Heyer, and Acosta, 2005; Hennessey, Roessler, Cook, Unger, & Rumrill, 2006).

Students' perceptions of the responsiveness and acceptance from faculty influences the likelihood that a student with a disability will self-disclose and subsequently receive access to the instructional environment as well as accommodations and other supports (Lightner, et al, 2012). The interaction between student and institutional characteristics will ultimately have an effect on graduation rates (Getzel, 2008). The impact of disability stigma on the disclosure of disability should also be considered in the context of an institution's climate (Trammel, 2008).

### **Disability Disclosure**

Students are responsible for disclosing their disability to an institution's disability services office in order to receive accommodations and services. A student must have an awareness of a condition that qualifies as a disability, as well as knowledge of, and access to, a disability services office. However, a large percentage of students who had accommodations and services in secondary education did not disclose to their institution, and did not use accommodations or services (Newman et al., 2011; Lightner et al., 2012). Undergraduate students who are aware of their disability can be classified into two distinct groups: those who

were aware of their disability prior to attending college, having been identified in grades K-12, and those who became aware of their disability while enrolled in college.

### **Disclosure among Students with Disabilities Identified in K-12**

High school transition programs play an important role in preparing students with disabilities to be self-advocates and feel comfortable with identifying themselves to a disability services office (Janiga & Costenbader, 2002). A student's IEP and transition plan is intended to facilitate transition to higher education, and can be considered as a factor in predicting student success. However, there is significant variation in the availability and quality of transition planning among college transition programs. There is also diversity among types of students who enroll as freshmen. For example, international students would not be transitioning through the U.S. special education system, and might not have a comparable high school experience or knowledge of disability and the ADA.

The NTLS-2 study showed that only a small percentage of students (19%) who received special education services in high school used disability services in college, although 87% had used accommodations in high school (Newman et al., 2011, p. xv). Participants responded to a follow-up study and answered questions about the reasons they did or did not disclose to their disability in college (Sanford et al., 2011). They were asked about the extent to which they considered themselves to have a disability. Of the respondents, only 24% considered themselves to have had a disability and reported it to their postsecondary institution prior to enrollment; 8.5% of the respondents considered themselves to have a disability, but did not report it to their institutions until after being enrolled; and 4.5% never reported their disability (Sanford et al., 2012, p. 31). The remaining 63% of students did not consider themselves to have a disability,

even though they had been considered as such in K-12 and had received special education services during high school (Sanford et al., 2012, p. 31).

The NTLS-2 found that the type of disability a student had accounted for variance among the rates of disability disclosure to a disability services office. Students who were most likely to have considered themselves as having a disability, and who were most likely to have disclosed that disability, had either orthopedic or mobility impairments, visual impairments, multiple disabilities, deaf-blindness, autism, or hearing impairments (Sanford et al., 2011, p. 39). Students who were least likely to consider themselves as having a disability were students with communication disorders, learning disabilities, other health impairments, and emotional disturbances (psychological disabilities) (Sanford et al., 2011, p. 39). The findings fit with other theories (Lightner et al., 2012; Wessel et al., 2009) that the outward visibility or immediate apparentness of a disability affects disclosure patterns.

### **Disclosure among Students with Disabilities who are Diagnosed in College**

Disabilities can be identified or acquired at any time during a student's academic career. Some previously undiagnosed students qualify for accommodations due to psychiatric or medical conditions that develop in college (Kleinman & Egan, 2001). A study about students' perceptions of accommodations in high school versus accommodations in college found that out of 55 students with disabilities from 17 different universities, 38% had never had special education services of any kind in grades K-12 (Bolt, Decker, Lloyd, & Morlock, 2011, p. 17).

One reason for the lack of services in high school may be because of the more restrictive definitions of disability under IDEA (Heyward, 2011). Unidentified college-bound students may not have been identified in secondary education because of their high levels of intelligence, ability to compensate with learned strategies (Morris & Turnbull, 2007), and a highly structured

educational and home environment (Madaus, 2006b). The demands of college may expose difficulties with learning and academic performance, leading a student to seek a professional evaluation and services (Kong, 2012).

Students must become aware of their disability to make a disclosure and self-advocate, which is a complicated process. Students have to figure out that they have a diagnosable condition such as a learning disability, Asperger's Disorder, or a chronic illness. A student may be struggling for years with the impacts of disability on academic and life functions. It is only when someone such as a professor, counselor, or peer refers them to a disability office that the student begins to understand that they have a disability (Kong, 2012). Morris and Turnbull (2007) theorized that because college faculty and academic advisors did not always understand the nature of disabilities, they assumed students' continual struggles to read and spell were a result of personal flaws or under-preparedness, rather than a potentially undiagnosed disability.

Students may be aware of a specific condition or a set of symptoms they have, but may not understand that their condition is a disability under the ADA. The concept of disability in postsecondary education is markedly different than the definition of a "disabled person", which often conjures images of a person unable to work or care for oneself (King, 2004). Students with disabilities have to be otherwise-qualified to attend an institution, and are admitted on the same criteria as other students. Therefore, high-achieving college students may have a difficult time associating themselves with the label of disability.

A professional evaluation of a disability is usually required for registering with a disability services office. Raue & Lewis (2011) provided national data about documentation requirements at two-year and four-year degree granting postsecondary institutions. Overall, 92% percent of postsecondary institutions in the study required verification of a disability from an

outside professional or school system. The researchers found wide variation among institutions as to the documentation requirements for a student to be considered as having a disability. Therefore, being considered as a student with disability, or not, will largely depend on a particular institution's policies regarding acceptable and adequate documentation. It can take weeks to months to establish a disability, and all the while a student does not have accommodations or services. During the time a student learns they may have a disability, their self-identity can be challenged.

An individual's personal reaction to being diagnosed with a disability is influenced by the stage of life when an individual becomes aware of having a disability (Hadley, 2011). Kong (2012) used a qualitative approach to examine the emotional impact of a new diagnosis on students enrolled in a medical school. The participants experienced emotional and psychological reactions that were categorized as distress, self-doubt, embarrassment, frustration, relief, confidence and motivation (Kong, 2012, p. 127). Kong (2012) theorized that students' ability to adjust to their diagnosis of disability was affected by their preconceived concepts of disability. Students were relieved about not being "stupid", but at the same time, expressed resentment for not being identified earlier.

Students with learning disabilities at one large public university were asked about why they may have waited to seek disability services (Lightner et al., 2012). Students who participated in the qualitative piece of the study said that lack of knowledge about their disability and available accommodations and services delayed their disclosure. Participants revealed that their desire for independence, their naivety about the difficulty of courses, and a hassle factor (paperwork, time, meetings) were also deterrents to disclosure.

For the one-third of students in the study who disclosed their disability early in their college career, they reported that self-understanding of their disability, participation in transition planning, parental involvement, and early contact with a disability services office were factors that led them to disclose early. For later disclosers, an academic crisis, such as a failing test grade, academic probation, or failure to meet academic requirements of a major or campus program were much stronger influences in self-disclosure than a high school IEP and transition plan. University faculty, staff, advisors, counselors, parents, and peers played an important role in referring students with disabilities to appropriate resources for assistance with known disabilities, or to find resources to determine if there was a previously undiagnosed disability (Lighter et al., 2012 pp. 154-155; Kong, 2012).

Students who disclose late or never disclose to an institution are not often considered in research studies, or if they are, the dynamic factors of the onset of a disability and late identification is not being accounted for in study results. Almost every study in the existing literature sampled students with disabilities who were registered with their disability services office. Quite often, those studies made no distinction between students who disclosed their disability when they enrolled as entering freshmen, transfer students, or graduate students and those students who acquired disabilities through injury or illness, who were not diagnosed prior to enrolling, or those who were simply undiagnosed. Wessel et al. (2009) recommended further research into the effect of disability disclosure on graduation rates.

### **Summary**

The review of the literature revealed that there are multiple theories regarding the factors that affect graduation rates for college student with disabilities. From the articles reviewed, postsecondary outcomes for students with disabilities were measured directly in terms of GPA

(Adams & Proctor, 2010; Troiano et al., 2010), retention and graduation rates (Jameson 2007; Wessel et al., 2009), and postsecondary employment rates (Madaus, 2006a; Madaus, 2008). Factors related to these outcomes include student attributes and behaviors (Kaminski et al., 2006; Parker & Boutelle, 2009) and the differences among the impacts of specific types of disabilities (Madaus, 2006a; Kaminski et al., 2006; Wessel et al., 2009). Postsecondary outcomes are also linked to faculty's knowledge and attitudes, and to institutional practice, policies, and climate (Harding et al., 2006; Dutta et al., 2009; Preece, Roberts, Rash, Schwalb, & Martinelli, 2007; Vogel, Holt, Sligar, & Leake, 2008). Graduation and retention rates can be improved through structured service programs and campus initiatives (Roessler, Hennessey, Hogan, & Savickas, 2009). The body of research encompasses a range of topics studied by a variety of methods, but significant limitations hinder a conclusive answer to the research questions at hand.

Weaknesses in the studies included sampling problems such as convenience sampling (Burgstahler & Doe, 2006), low survey response rates (Hennessey et al., 2006) and lack of comparison groups (Jameson, 2007; Kaminski et al., 2006; Troiano et al., 2010). Students with disabilities do not come to the attention of disability support services offices in the same ways. There are students that never register with disability services, and there are students who register after their freshman year, having either a new diagnosis or an urgent motivation to disclose.

The research questions and methodology for this study were designed to explore the theory that disability disclosure timing accounts for some level of variation among the findings in the previous research described in this literature review. The inclusion of certain variables and methods used in this research are based on the reported findings from the literature review,

and is discussed in Chapter Three. The interpretation of findings, found in Chapter Five, is also based on these previously conducted studies and theoretical frameworks.

### **Chapter Three: Methodology**

The purpose of this study was to explore the effect of disability disclosure on graduation rates of students with disabilities. This chapter details the methodology that I used to conduct the study. I outline the process I used for selecting the sample and the inclusion criteria for students in the study. Next, the instrumentation and data collection methods are presented. Then, I describe the variables and the methods of data analysis.

#### **Population**

The students in the study attended one large, four-year, land-grant, public institution with approximately 29,000 total students (undergraduate and graduate) enrolled annually. The university was classified as a very high research activity university, with a balanced arts and sciences undergraduate program, and a science, technology, engineering and mathematics dominance in the graduate programs (Carnegie Foundation, 2010). The institution has a “more selective” admissions process for undergraduate admission, and a relatively low transfer-in rate (Carnegie Foundation, 2010).

Each year, the entering, first-time, bachelor’s degree-seeking students who are enrolled at the time of the university census date are part of a cohort for that year. I examined data for all of the entering full-time baccalaureate degree-seeking students from three cohort years, 2002, 2003, and 2004, at the institution. I selected the three cohort years for several reasons. First, the students would have had ample time to reach graduation by time the study was conducted in 2013. Second, it allowed for virtually all students with disabilities from the three cohort years to have been identified as having a disability at the time of the data collection. Third, it would be expected that very few students, if any, would still be enrolled as undergraduates at the time this study was initiated, and so the cases were in an archival status. After approval from the

university's Institutional Review Board (IRB) (Appendix B), I began identifying students with disabilities for inclusion in the study. The IRB waived informed consent requirement as the data was collected from archival records and stripped of identifying information.

### **Instrumentation & Data Collection Procedures**

Data was collected only on students who were no longer enrolled at the university. No subjects were directly involved in the research process. The university provides publicly accessible aggregated data, including demographic information and graduation rates for all students through its institutional research department. I collected aggregated data for all entering, first-time bachelor's degree-seeking students (EFBDS) from the institution's publically accessible reports. I recorded the number of EFBDS in each cohort year, and the aggregated data on gender, ethnicity, and six-year graduation rates.

The identification of students with disabilities (SWD) in the study was a multi-step process that consisted of several stages of filtering out ineligible cases. I collected data from the individual student records and the historical electronic files in the university's disability services office. I had access to students' individual paper files, and also to the office's records that were kept on students' progress to graduation. From the disability services office's database, I identified students who used disability services from 2002-2010, and determined if they had been an undergraduate student who entered as an EFBDS in the years 2002, 2003, and 2004. Transfer-in students, graduate/professional students, and non-degree seeking students were excluded from the study. The rationale for this exclusion was to maximize heterogeneity between SWDs and students without disabilities (SWOD) in terms of being EFBDS.

I reviewed 614 potential cases individually from the disability services office records. I assigned each potentially eligible student a case ID number. The case ID number and the

student's disability service record number were linked together on one encrypted electronic file, and stored on a secured, university maintained, fire-walled protected server. Only I had the password and access to the file.

To further filter the subject pool, I examined the student database form in the student record and determined if the student had been eligible for consideration as a SWD. Some students had a record with the disability services office, but had never been identified as having a disability. For each of the 423 SWDs who were registered as having a disability, I collected data that included student demographics (cohort year, gender, and ethnicity), disability related variables (disability type and number of disabilities), date of disclosure of a disability, and graduation date (if they did indeed graduate). I did not have permission from the institution to collect grade point averages, SAT scores, or any other personal information.

The data collection instrument was a 14-item questionnaire (Appendix C). Each questionnaire was assigned a non-identifying case ID number to match the students' case ID. Data was entered into a statistical software package, .JMP (.JMP, 2012), with the case ID as the identifier for each SWD. No additional identifying information was recorded on the questionnaire or entered in a database (such as name, student ID number, GPA, major, or birth year). The data collection was checked for accuracy by a second rater, and any missing or questionable entries were corrected.

### **Variables**

Independent variables included student's gender, ethnicity, disability-type, number of disability types reported, and time of disability disclosure (Table 1). For SWDs, gender and ethnicity were collected from students' self-report on the disability services office's database form in the student record. For the variable ethnicity, I used the same categories as the

institution's classification of race for comparison purposes. However, the disability services office did not ask students if they were international students or non-resident aliens, as did the institution. Disability-type was determined by the disability services office based on a student's self-report and confirmation by a professional evaluation in the form of a student's documentation.

For disability-type, the following ten categories were recorded: Attention Deficit Hyperactivity Disorder (ADHD), communication disorder, deaf or hard of hearing, learning disability (LD), medical disability, mobility disability, pervasive developmental disability, psychological disability, vision impairment, and traumatic brain injury. Disability-type is somewhat problematic because students often had more than one type of disability. For instance, one student had ADHD only, another student had ADHD and LD, and another had the combination of ADHD, medical and psychological disabilities. In theory, there were almost limitless combinations of disability categories if each combination of disability was viewed as a distinct event. There would not be sufficient numbers of students with each combination of disabilities for meaningful statistical analysis.

A previous study was able to determine which disability was reported as "primary" and used that to assign one disability per subject (Pingry-O'Neill et al., 2010), and K-12 special education services usually do the same (Sanford et al., 2011). For this current study, when students had more than one disability category, it could not be determined which was primary. There were a significant percentage of students with more than one type of disability reported. Therefore, during data collection, I chose to treat each disability as a separate variable and I coded each as a yes/no for each case. For example, a student could be 'yes' for ADHD and 'yes'

for medical, and 'no' for the rest of the categories. This student would also have been recorded as having two disabilities under the variable disability number.

For the purposes of statistical analysis, I created one disability category, disability-type, with four categories (Table 1). The four categories of disability-type were: a) cognitive-only, which included students who had ADHD only *or* LD only, b) psychological-only, which included students who had a psychological disability only, c) combination, which included students who had at least two disabilities, and at least one disability was ADHD, LD, or psychological disability (e.g., a student with ADHD and LD, or a student with a psychological condition and a medical disability), and d) no cognitive/psychological disability, included students who had any other type of disability/(ies) - medical, mobility, deaf and hard of hearing, visual, communication, and traumatic brain injury- *without* the presence of ADHD, LD, or psychological disability. The categories in disability-type were mutually exclusive.

I used the records at the disability services office to determine the time at which a SWD disclosed their disability to the institution. The office recorded the approximate date when a student disclosed a disability. If a student disclosed their disability prior to enrolling in the university, or within the first year of enrollment, then the student was recorded as having disclosed in "year one." From the student records, it was sometimes noted the exact date a participant disclosed. Unfortunately, not all cases were recorded this way, and it was difficult to distinguish precisely when in a given year a student disclosed. Therefore, the data was coded by year. I determined the length of time to disability disclosure from the data an SWD disclosed.

Table 1

*Variables: Name, Description, Variable, Codes*

Variable Name	Description	Abbreviation	Codes
<u>Dependent Variables</u>			
Gender	Student's Gender	GEND	Female=0 Male=1
Disability-presence	Presence of disability	SWDP	SWOD=0 SWD=1
Disability number	Number of disabilities	DIS#	0 through 4
Disability-type	Disability type cognitive-only psychological-only combined no cognitive/psychological	DISTYP	COGON = 1 PSYCON = 2 COMBO = 3 NOCOGPSY = 4
Disclose date	Year after enrolling disability disclosed	DISCLOSE	0 through 8
Disclose year 1	Disclosed within year one	DISCLOSE1	No = 0; Yes = 1
Disclose-year	Number of years to disclose	DISY	1 through 8
<u>Independent Variables</u>			
Graduation Date	Semester and year graduated	GRADDATE	Semester & Year
Graduated 6-year	Graduated within 6 years	GRADYR6	No = 0; Yes = 1
Graduate years	Number of years to graduation	GRDY2	4 through 8
Graduation rate	6-year grad rate by percentage	GRAD6%	Percentage
Graduation number	6-year grad rate by frequency	GRAD6#	Frequency

The dependent variable collected from the databases was the year of an SWD's graduation, or graduation date. SWDs who never graduated were coded as 999. The length of time to graduation and the six-year graduation rates were calculated from the enrollment date, or cohort year. The reason that I chose to focus on six-year graduation rates for question one and questions two is that the standard definition of a degree completion rate is "the total number of completers who graduate within 150 percent of normal time divided by the number of students in a particular cohort" (Horn, 2010, p.2). For EFBDS at a four-year institution, the 150 % degree completion mark is year six. Institutional graduation rates are compared and ranked by the percentage of students who complete a degree in six years.

The institution considered students who graduated in a consecutive fall, spring, or summer semester of one academic year to have graduated within the same year. For example, if a student enrolled in year 2002, and graduated in either fall 2007, spring 2008, or summer 2008, they would be coded as having graduated within six years. If a student graduated within six years of enrollment, they were coded as a "yes" for the variable graduated within six years, or 'no' if they did not. I calculated the number of years to graduation from the year a student graduated since his or her enrollment (cohort) year.

### **Data Analysis Methods**

This section outlines the data analysis methods I used to address the research questions, the rationale for the methods, hypothesis, and predetermined levels of significance. Each research question is addressed separately. However, the first step will be to report on the characteristics of the sample under study using descriptive statistics. This should allow the reader to make comparisons of the sample under study to other populations. For all analyses, I used the statistical analysis program .JMP (.JMP, 2012).

**Research Question #1**

What is the difference between the six-year graduation rates of students with disabilities and of students without disabilities?

The chi-square ( $\chi^2$ ) test of proportions is a procedure for testing a hypothesis when the variables are categorical (Howell, 2007). In this case, both the independent variable, disability-presence, and the dependent variable, graduated in six years, are categorical. For SWODs, the six-year graduation rate was provided by the institution in percentages. I converted the numbers from percentages to frequencies. For SWDs, the frequency of students graduating in six years was summed from the data collected from students' records in the disability services office.

The null hypothesis ( $H_0$ ) was that there was no difference in the six-year graduation rates of SWODs and SWDs. The alternative hypothesis ( $H_1$ ) was that the two groups were different with respect to six-year graduation rates. I used a significance of  $\alpha = 0.05$  to accept or reject the null hypothesis. To evaluate the effect size, I chose to use risk estimates, as they are usually more easily understood than odds ratios (Howell, 2007), and would be appropriate when discussing risk of failure to graduate. Howell (2007) also advised against using effect size measures such as correlation for 2x2 contingency tables unless it was very necessary to know the correlation between two variables. In this case, I opted for the risk estimates as the most meaningful way to interpret any differences in six-year graduation rates.

**Research Question #2**

What is the difference between the six-year graduation rates of students who disclosed their disability in their first year of enrollment and the six-year graduation rates of students with disabilities who disclosed later?

First, I determined the year of graduation for every SWD in the study. Next, I separated the group by the dichotomous variable, disclosed year-1. If the SWD disclosed in year-1 they were a “yes” and if they disclosed in year-2 or later, they were a “no”. Then, I created a 2x2 contingency table for disclosed year-1 by graduated within six-years. Both variables were categorical, so I used a chi-square test of independence to test the hypothesis that there were no differences in the six-year graduation rates of SWDs who disclosed their disability in the first year or later.

Specifically, the null hypothesis ( $H_0$ ) was that there were no differences between the six-year graduation rates of SWDs who disclosed in year-1 and the SWDs who disclosed after year-1. The alternative hypothesis ( $H_1$ ) was that the two groups were different with respect to six-year graduation rates. I used a significance of  $\alpha = 0.05$  to accept or reject the null hypothesis, and the same data analysis methods as in question one. I calculated the risk estimates to evaluate the effect sizes of any statistically significant results.

### **Research Question #3**

Of students with disabilities who graduated, what is the effect of disability disclosure, disability-type, and gender on the length of time to graduation?

The purpose of this question was to determine if disclosure patterns had an effect on graduation rates in a straightforward and relatively simple statistical analysis. I used multiple regression as the statistical test for this question. Multiple regression has several advantages over other types of tests for analysis such as this one.

Multiple regression can use both categorical and continuous independent variables.

Multiple regression can easily incorporate multiple independent variables. Multiple

regression is appropriate for experimental or nonexperimental research, and used to explain a phenomenon. (Keith, 2006, p. 18)

The dependent variable in this analysis was the number of years to graduation, which is the length of time it took for a SWD to graduate from the institution. Those who did not graduate were not included in this analysis because there was not a logical way to represent them on a continuous number scale. For instance, if a student graduated in four years, they would have a value of four for years to graduation, and student who graduated in five years would have a value of five. If a student never graduated, then a missing variable or 999 or a zero would be assigned, which would not make sense numerically, and would severely affect the mean time to graduation and other statistical tests. The limitations of my choices for question three will be discussed in more detail in Chapter Five. Thus, for this question, the SWD-subset (SWDs who graduated) is the population.

For the independent variables in this analysis, date of disclosure was continuous, and gender and disability-type were categorical. To conduct a multiple regression analysis on the categorical variable disability-type, I dummy coded the variables and assigned a reference category. Current literature, as described in Chapter Two, indicated that the absence of cognitive and psychological disabilities is correlated with shorter graduation rates. Therefore, the reference group for disability-type was assigned to the no cognitive/psychological category. Also, female SWDs have tended to graduate sooner and at higher rates than male counterparts (Pingry-O'Neill et al., 2010; Wessel et. al, 2009). For the variable gender, female was assigned as the reference category.

The number of years to graduation was regressed over the date of disability disclosure, disability-type, and gender. The  $R^2$  statistic is the “proportion of variance explained in the

outcome variable by the predictor variable” (Keith, 2006, p. 18). The regression coefficient,  $b$ , represents a change in slope of the regression line, or the predictive strength of the variable on the outcome of the dependent variable, with the other independent variables statistically controlled.

The null hypothesis ( $H_0$ ) was that the regression coefficients,  $b$ , are zero for the three independent variables. I used a significance level of  $\alpha = 0.05$  to accept or reject the null hypotheses. The residuals, or the error term for the regression equation, can be used to identify any potential patterns in the residuals that would suggest that nonlinear modeling might be more appropriate (Keith, 2006). The multiple regression analysis included evaluation of  $R^2$ , the residuals, the statistical significance of the whole model, and the individual variable regression coefficients. I also addressed critical assumptions for multiple regression analysis.

### **Limitations**

There are limitations to this study, as there are with any research endeavor. The study was limited to one university setting during a specific period of time. The study was intentionally conducted at one university with an emphasis on a traditional four-year undergraduate student body. This reduced as many potentially confounding variables as possible (e.g. admissions criteria, difficulty of academic programs, institutional climate). However, my design excluded transfer, non-traditional, part-time, and graduate students. The university at which the data was collected is classified as a large, research intensive, public university in the southeast United States (Carnegie Foundation, 2010). Validity, in terms of generalizing to other populations, should be carefully considered.

The data from this study were collected from historical records. The benefit was that no students in the study were enrolled as undergraduates at the institution at the time of data

collection, which protected privacy and minimized risk to individuals. The drawback to exploratory, historical research is that data collection cannot be retroactively planned in accordance with a model or theory (Berkovitz & O'Quinn, 2006). It was assumed that disability records were kept accurately based on current practices at the institution, but it was impossible to absolutely confirm that every record was accurate. Fortunately, the size of the population of the study mitigated the influence of outliers.

Quantitative methods allow researchers to count, compare, and correlate data points about a particular phenomenon. There is no qualitative or explanatory piece of this current research study. Aside from the independent variables used, we won't know any additional personal, social, or institutional factors that delayed disability disclosure or prevented graduation. Furthermore, this study is considered institution-centered research, and therefore cannot tell us if a student who did not graduate transferred to another institution or simply did not complete their degree.

Despite these limitations, this study can be used to answer the research questions posed. It may point to some new directions for inquiry, action, and improvement in the field of disability in higher education. The methodology outlined in this chapter provides the framework for Chapter Four. The results of the analysis are presented in Chapter Four. The results are discussed and interpreted in Chapter Five.

## **Chapter Four: Results**

The purpose of this chapter is to report the results of data collection and analysis. The first part of this chapter reports on the characteristics of the population. Demographic characteristics provide a description of the subjects in the study and compare students with disabilities (SWD) to students without disabilities (SWOD). Disability characteristics and disability disclosure patterns are described as well as the six-year graduation rates by gender, disability-type, and disability disclosure. The second part of this chapter, data analysis results, is divided into three sections. Each section corresponds to one of the research questions. The research questions that guided this study were:

For entering first-time baccalaureate degree-seeking students at one institution in the cohort years 2002, 2003, and 2004

1. What is the difference between the six-year graduation rates of students with disabilities and of students without disabilities?
2. What is the difference between the six-year graduation rates of students who disclosed their disability in their first year of enrollment and the six-year graduation rates of students with disabilities who disclosed after the first year?
3. Of students with disabilities who graduated, what is the effect of disability disclosure, disability-type, and gender on the length of time to graduation?

For each of the research questions, the associations between the variables and the results of the statistical analysis were explored. Chi-square analyses were used to examine the first two research questions and multiple regression analysis was used to answer research question three.

### **Characteristics of the Population**

#### **Demographic Characteristics**

The study population consisted of 14,401 entering, full-time, baccalaureate degree-seeking students (EFBDS) who began their college career at one institution during the years 2002, 2003, and 2004. The students were in one of two groups, students with disabilities (SWD) and students without disabilities (SWOD). SWDs were those students who were registered with the disability services office by virtue of providing documentation of disability ( $n = 423$ ). SWODs were all other students ( $n = 13,978$ ). SWDs represented 2.9% of all students, and SWODs comprised 97.1% of all students (Table 2).

Table 2

*Gender and Ethnicity of the Study Population (N = 14,401)*

Group	Gender						Ethnicity			
	Male		Female		White		All Others			
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
SWD	423	2.9	250	59.1	173	40.9	332	78.5	92	21.5
SWOD	13,978	97.1	8,083	57.8	5,898	42.2	10,386	74.3	3,321	23.8

Among SWDs, 59.1% were male and 40.9% were female (Table 2). For SWODs, 57.8% were male and 42.2% were female, which indicates that SWD and SWOD groups are representative of the overall student population. The ethnicity of undergraduate students at the institution is primarily white. White students comprised 78.5% of SWDs and 74.3% of SWODs. There were minor differences in the proportions of two small groups of minority students. However, students with ethnicities other than white represented such small percentages of the SWD group that an analysis among all types of ethnicities was not feasible to report in this study. Additionally, the very small number of SWD students in different ethnic groups could lead to the

identification of individual students, and so the numbers of specific ethnic groups was not reported here. In summary, the SWDs reflected, to a large degree, the characteristics of all undergraduate students at the institution.

### **Disability Characteristics**

The institution's disability services office determined the category of disability or disabilities based on a student's professional documentation. The disability services office recognized ten classification categories (Attention Deficit Hyperactivity Disorder (ADHD), communication disorders, deaf and hard of hearing, learning disabilities (LD), medical disabilities, mobility impairments, pervasive developmental disabilities, psychological disabilities, visual impairments, and psychological disabilities). Of the 423 SWDs, 71.6% reported one disability type, 24.4% had two disability types, and 4% had three or more disability types. The type(s) and number of disabilities reported was recorded for each student.

During the data collection, each disability that a student reported was entered separately because a primary, meaning most impactful, disability could not be determined from a student's records. The majority of students had ADHD, LD, or psychological disabilities. Several disability types such as vision impairments and communication disorders had such small representation that an individual student could potentially be identified from the data, so a listing of percentages of all disabilities categories was not appropriate to report.

For the purposes of statistical analysis, and to protect individual students' identities, the 10 disability variables were combined into one variable, disability-type, which consisted of four mutually exclusive categories. The creation of disability-type was theory based as discussed in Chapter Three. Sorting the students into one of four categories allowed for each SWD to be in a mutually exclusive disability-type category (Table 3).

Table 3

*Frequency of Disability-Type by Gender (N=423)*

Disability-Type	All		Gender			
			Male <i>n</i> = 250		Female <i>n</i> = 173	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Cognitive Only	210	49.6	129	51.6	81	46.8
Psychological Only	22	5.3	9	3.6	13	7.5
Combination	67	15.8	43	17.2	24	13.9
Non- Cognitive/Psychological	124	29.3	69	27.6	55	31.8

Students with cognitive-only disabilities were the largest category of disability-type with 49.6% of the overall SWD population (Table 3). The second largest group was the no cognitive/psychological disability-type, with 29.3% of the population. The combination disability-type was the third largest category at 15.8%. Only 22 SWDs (5.3%) had a psychological-only disability. There was a higher percentage of males than females in the disability-type categories cognitive-only and combination, while there was a higher percentage of females in the psychological-only and non-cognitive/psychological categories. Of note, psychological disabilities were highly likely to be present with another disability. Of the 105 students who reported more than one disability category, 40.8% had a psychological disability.

### **Disability Disclosure Patterns**

Students with disabilities were categorized into two groups according to the time at which they disclosed a disability (Table 4). All SWDs disclosed either within year-1 or after year-1, and there were no missing values. Of all 423 SWDs, 58.2% disclosed within year-1, and 41.8 % disclosed their disability after year-1. Males and females were about equally as likely to

disclose within year-1 with 57.2% of male SWDs disclosing within year-1 and 59.5% of female SWDs disclosing within year-1.

Table 4

*Year-1 Disability Disclosure Rates by Gender and Disability-Type*

	All <i>n</i>	Disability Disclosure Timing			
		Within Year-1		After Year-1	
		<i>n</i>	%	<i>n</i>	%
All	423	246	58.2	177	41.8
Gender					
Male	250	143	57.2	107	42.8
Female	173	103	59.5	70	40.5
Disability-Type					
Cognitive Only	210	119	56.7	91	43.3
Psychological Only	22	4	18.2	18	81.8
Combination	67	19	28.4	48	71.6
Non-Cognitive/Psychological	124	104	83.9	20	16.1

There was greater variance in the first-year disclosure rates of SWDs by disability-type than by gender ranging from 18.2% to 83.9%. Students with no cognitive or psychological disabilities disclosed earliest in their academic careers, at a rate of 83.9%. SWDs with cognitive-only disabilities disclosed in the first year at a rate of 57.6%. Those with combined-type disabilities disclosed at a rate of 28.4%. Only four (18.2%) students with the presence of a psychological disability alone disclosed within the first year (Table 4).

## Six-year Graduation Rates

The six-year graduation rates for student at the institution were reported in percentages for each cohort year, and were combined into one group. The six-year graduation rate for the 13,978 SWODs was 79.7%. The six-year graduation rate for the 423 SWDs was 69.5% (Table 5). The six-year graduation rates by gender and disability-type are also provided for comparison.

Table 5

Six-year Graduation Rates by Gender, Disability-Type, and Disclosure ( $N = 14,401$ )

	All <i>n</i>	Graduated Within 6 Years			
		Yes		No	
	<i>n</i>	<i>n</i>	%	<i>n</i>	%
All Students	14,401	11,434	79.4	2,967	21.6
Students without Disabilities	13,978	11,140	79.7	2,938	20.3
Students with Disabilities	423	294	69.5	129	30.5
Gender of Students with Disabilities					
SWD-Males	250	160	64.0	90	36.0
SWD-Females	173	134	77.5	39	22.5
Disability-Type					
Cognitive Only	210	151	71.9	59	28.1
Psychological Only	22	6	27.3	16	72.7
Combination Disability	67	40	59.7	27	40.3
Non-Cognitive/Psychological	124	110	88.7	14	11.3
Disability Disclosure					
Disclosed Within Year-1	246	209	85.0	37	15.0
Disclosed After Year-1	177	85	48.0	92	52.0

## Data Analysis

### Results of Data Analysis for Research Question #1

What is the difference between the six-year graduation rates of students with disabilities and of students without disabilities?

The frequencies and percentages of six-year graduation rates for SWDs and SWODs are listed in Table 5. I used a chi-square test of proportions to determine if a statistically significant difference existed in the six-year graduation rates of SWODs and SWDs. The chi-square value is found by dividing the sum of the squared differences of observed and expected values by the expected values of a dependent variable. Chi-square analysis assumes that the observations are independent of each other (Howell, 2007). In this study, the graduation rates of SWODs and SWDs were independent of each other, and had no known effect on the other. All observations of occurrences and non-occurrences of graduation equaled precisely the number of participants in the study. Thus, the assumptions needed for chi-square analysis were satisfied.

To conduct the chi-square tests of independence, I created a contingency table with the independent variable, six-year graduation rate, at the distribution level of the presence of disability. Table 6 shows results of the chi-square analysis.

The proportion of SWODs who graduated in six years was 79.7%, and the proportion of SWDs who graduated in six years was 69.5% (Table 6). The difference is statistically significant ( $\chi^2 = 26.164$ ,  $df = 1$ ,  $p < .0001$ ). Recall the null hypothesis, ( $H_0$ ), that there was no difference in the 6-year graduation rates between students with and students without disabilities, with a significance level of  $\alpha = 0.05$ . Thus, we reject the null hypothesis and accept the alternative hypothesis that the results are not likely due to chance.

Table 6

*Chi-Square Analysis of 6-Year Graduation Rates of SWDs and SWODs*

	SWD		SWOD		$\chi^2$ (1)
	<i>n</i>	%	<i>n</i>	%	
Graduated in 6-years	294	69.5	11,140	79.7	26.164*

\* $p < .0001$

Clearly there is a statistically significant difference between the two groups, but statistical significance does not tell us if the difference in proportions has any real or practical meaning. Examining effect sizes can inform us of the practical significance of the differences. One way to measure effect size is by measuring risk estimates, which is the difference between the two proportions (Howell, 2007, p. 154). In this study, SWODs six-year graduation rate is 10.2 percentage points higher than SWDs.

Perhaps a more meaningful way to examine the effect size of having a disability on a six-year graduation rate is to look at the risk of *failure* to graduate in six years. In this case, 20.3% ( $n = 2,836$ ) of SWODs did not graduate within six years, and 30.5% of SWDs ( $n = 129$ ) did not graduate within six years. The risk ratio, also known as relative risk, is the ratio of the two risks (Howell, 2007, p. 154) and is expressed as,  $RR = \frac{Risk_{SWD}}{Risk_{SWOD}} = \frac{30.5\%}{20.3\%} = 1.5$ . Therefore, the risk of not graduating in six years was 1.5 times higher for SWDs than SWODs. The presence of an identified disability decreased the likelihood of graduation in six years for the students in the study.

## Results of Data Analysis for Research Question #2

What is the difference between the six-year graduation rates of students who disclosed their disability in their first year of enrollment and the six-year graduation rates of students with disabilities who disclosed after the first year?

The frequencies and percentages of six-year graduation rates for SWD who disclosed after year-1 and those who disclosed within year-1 are detailed in Table 5. To test for a statistically significant difference between the six-year graduation rates SWDs who disclosed within their first year and those who did not, a chi-square test of independence was once again employed. This was done in a very similar manner as in research question one, using the frequencies of each group, and determining the chi-square value based on the differences between observed and expected values. The assumptions for independence of observations is met, as is the inclusion of all non-occurrences of graduation.

The six-year graduation rate of SWDS who disclosed within year-1 was 85% while only 48% who disclosed after year-1 graduated within six years. The difference is statistically significant ( $\chi^2 = 66.257$ ,  $df = 1$ ,  $p < .0001$ ). Recall that the null hypothesis ( $H_0$ ) was that there is no difference in the six-year graduation rates of SWDs who disclose within year-1 and those who do not, at significance level of  $\alpha = 0.05$ . Thus, we reject the null hypothesis and accept the alternative hypothesis that the results are not likely due to chance.

Clearly, there is a statistically significant difference between the two groups, but statistical significance does not tell us if the difference in proportions has any real meaning. In this study, the six-year graduation rate for students who disclosed in year-1 was 37 percentage points higher than for students who disclosed after year-1. Perhaps a more meaningful way to

examine the effect size the timing of disability disclosure on a six-year graduation rate is to look at the risk of *failing* to graduate in six years.

Table 7

*Chi-Square Analysis of 6-Year Graduation Rates of Disability Disclosure*

	Disclosed Year-1		Disclosed After Year-1		$\chi^2$ (1)
	<i>n</i>	%	<i>n</i>	%	
Graduated in 6-years	209	85	37	15	66.257*

\* $p < .001$

In this case, 52% ( $n = 92$ ) of SWDs who disclosed after year-1 did not graduate within six years, while 15% ( $n = 37$ ) of SWDs who disclosed in year-1 failed to graduate within six years. The risk ratio, also known as relative risk, is the ratio of the two risks (Howell, 2007, p. 154) and is expressed as,  $RR = \frac{Risk_{Year1}}{Risk_{After Year 1}} = \frac{52\%}{15\%} = 3.5$ . Therefore, the risk of not graduating in six years was 3.5 times higher for SWDs who delay disclosure longer than one year. The timing of disclosure appears to have had a significant and meaningful effect on six-year graduation rates.

### **Results of Data Analysis for Research Question #3**

What is the effect of disability disclosure, disability-type, and gender on the number of years to graduation?

For this analysis, I used multiple regression to determine if any predictive relationships existed between the independent and dependent variables. The dependent variable in this portion

of the analysis is the number of years-to-graduation. The three independent variables were the a) number of years-to-disability disclosure, b) gender, and c) disability-type. Before I present the results of the data analysis, I provide a description of the students included in research question three as well as a detailed listing of the frequencies and the means of the independent and dependent variables.

The previous two research questions were related to the six-year graduation rates of students with disabilities (SWD) ( $n = 423$ ). Question three pertains to the number of years-to-graduation, which was determined by the number of years from the date a student entered the institution until their graduation date. Thus, only SWDs who graduated were included in this analysis ( $n = 319$ ) and were in the group labeled SWD-subset. Students in the SWD-subset graduated in a timeframe of four to eight years. SWDs who never graduated from the institution ( $n = 104$ ) were excluded from this analysis simply because they did not have a graduation date.

Male students were 55.2% of SWD-subset, and females were 44.8% (Table 8). Years-to-disclosure was the length of time, in years, that a student took to disclose their disability to the institution after enrolling as a first-year student. The average time to disclosure was 1.65 years ( $SD = 1.12$ ). On average, males waited a slightly longer time to disclose a disability ( $M = 1.67$  years,  $SD = 1.19$ ) than females ( $M = 1.61$  years,  $SD = 1.11$ ). Students who had non-cognitive/psychological disabilities only disclosed the earliest, with a mean time to disclosure of 1.24 years ( $SD = 0.61$ ). Students with cognitive-only disabilities took 1.91 years on average to disclose a disability ( $SD = 1.41$ ). Students with combination disabilities waited, on average, 2.53 years to disclose ( $SD = 1.48$ ), and the small number of students with psychological-only disabilities disclosed, on average, 3.41 years after enrollment ( $SD = 1.91$ ).

Table 8

*Years to Disclosure and to Graduation by Gender and Disability-Type (N = 319)*

Variable	All		Years To Disclosure		Years to Graduation	
	<i>n</i>	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
All	319	--	1.65	1.15	4.83	0.98
Gender						
Male	176	55.2	1.67	1.19	4.95	1.02
Female	143	44.8	1.61	1.11	4.67	0.91
Disability-Type						
Cognitive Only	165	51.7	1.91	1.41	4.93	0.99
Psychological Only	9	2.8	3.41	1.74	5.44	1.33
Combination	34	10.7	2.53	1.48	5.44	1.11
Non-Cognitive/Psychological	111	34.8	1.24	0.61	4.43	0.68

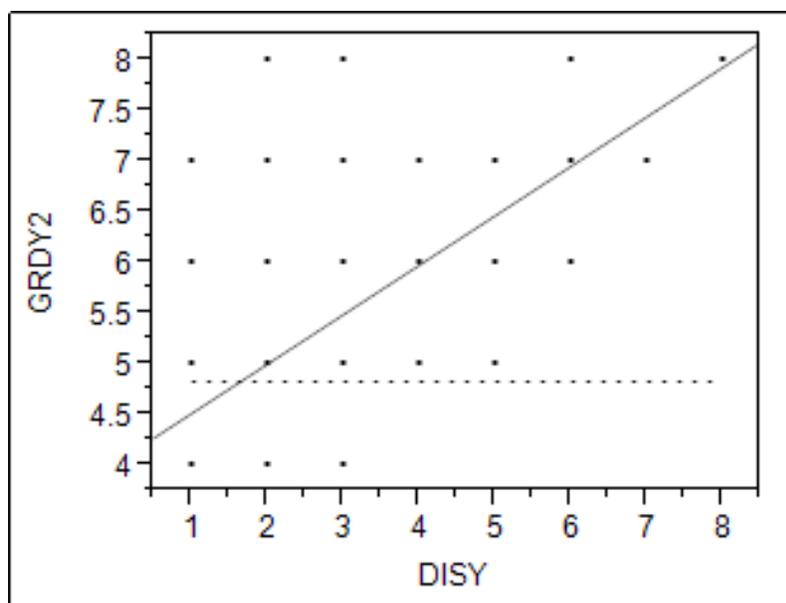
The mean number of years to graduation for the subset of 319 students was 4.83 years ( $SD = 0.98$ ) (Table 8). There were some differences between the mean number of years to disclosure, and the mean time to graduation, especially in regard to disability-type. Students who had the with disability-types psychological-only disabilities and cognitive disabilities, had a mean time to disclosure of 3.41 and 2.53 years, respectfully, and both had a graduation of 5.44 years. Students with the disability-type non-cognitive/psychological, had a mean time to disclosure of 1.24 years, and a mean time to graduation of 4.43 years ( $SD = 0.68$ ), which is lower than the overall SWD mean time to graduation.

Having examined the mean years to disclosure and graduation by gender and disability-type, the next step was to explore the effect of disability disclosure on the length of time to graduation. Figure 1 shows a scatterplot of the relationship between the dependent variable,

number of years-to-graduation (GRDY2) by the number of years-to-disclosure (DISY). The fit line appears to indicate a positive, linear relationship between the two variables. To determine the degree to which disability disclosure had an effect on the length of time to graduation, while statistically controlling for disability-type and gender, I employed multiple regression.

Figure 1

*Number of Years to Graduation by Years to Disclosure*



\_\_\_\_\_ = Fit line    - - - - - = Mean (4.83 years).

For this analysis, the independent variable, disability disclosure, was treated as a continuous variable. Disability-type is a categorical variable with four attributes. Thus, dummy coding was necessary for the purposes of this analysis. Gender is also a categorical variable. The reference category for disability-type was non-cognitive/psychological, and for the variable gender, female was the reference category.

A multiple regression analysis was conducted on years-to-graduation, by year disclosed, gender, and disability-type (Table 9, Figure 2). The model produced an  $R^2$  value of .377, which was statistically significant [ $F(6, 32) = 37.2990, p < .0001$ ]. The independent, continuous variable, years-to-disclosure, had a significant effect on years-to-graduation ( $b = 0.44, t = 10.96, p < .0001$ ). For the independent categorical variable disability-type, combination was significant to the model ( $b = 0.29, t = 3.70, p = .003$ ), as was cognitive-only ( $b = 0.12, t = 2.49, p = .013$ ), compared with non-cognitive/psychological. The category psychological-only disability was not significant to the model ( $b = .16, t = 1.15, p = .249$ ). For the independent categorical variable gender, male was significant to the model ( $b = .012, t = 2.9, p = 0.004$ ) with female as the reference group.

Table 9

*Regression Analysis Summary for Variables Predicting Time to Graduation*

Variable	<i>b</i>	<i>SE b</i>	$\beta$	<i>t</i>	<i>p</i>
Year Disclosed	0.44	0.19	.52	10.96	<.0001
Psychological-only	0.16	0.04	.05	1.15	.249
Combination	0.29	0.07	.18	3.70	.003
Cognitive-only	0.12	0.04	.16	2.49	.013
Gender (male)	0.12	0.04	.13	2.90	.004

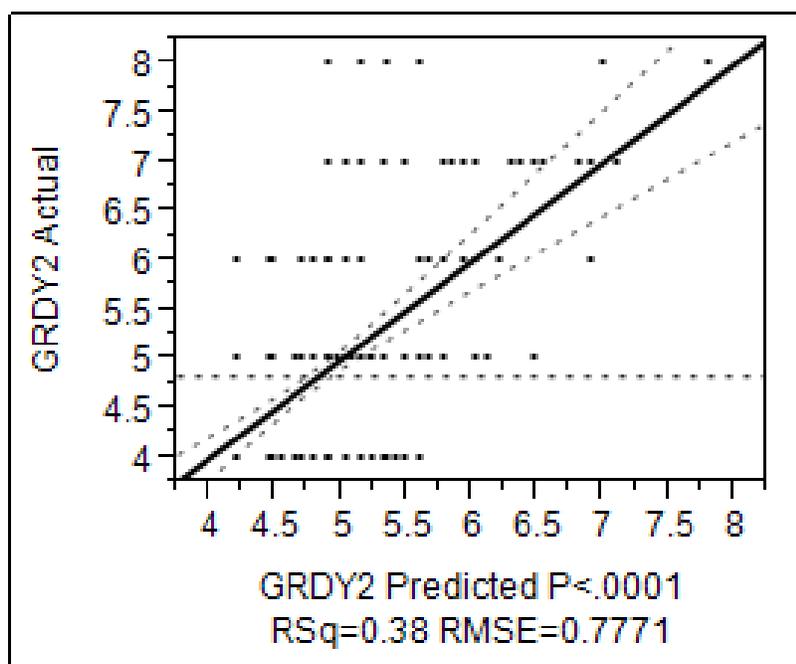
Note:  $R^2 = .38$  ( $N = 319, p < .0001$ ).

Recall that the null hypotheses for this question were that the  $R^2$  value was equal to zero and the regression coefficients were equal to zero. Therefore, the null hypotheses for this question are rejected and we conclude that the differences in R-squared and the regression coefficients are not likely due to chance.

The intercept is the value of Y (GRDY2) where all values of the independent variables are zero (Figure 2). The y-intercept is interpreted as the level of the reference categories (non-cognitive/psychological and female) at the predicted value for  $Y = 0$ . Because students must complete a full semester to advance, and therefore can only graduate at specific intervals, any time longer than a whole year indicates at least one additional semester.

Figure 2

*Whole Model Actual By Predicted Plot*



The timing of disability disclosure appeared to have the strongest effect on the predicted number of years to graduation. From the regression coefficient, for every year that a student delayed disclosing a disability, the length of time to graduation increased by 0.45 years, which would indicate at least one additional semester of college for every year of delayed disclosure. This represented one half a standard deviation in time to graduation ( $\beta = 0.52$ ) from the mean time to graduation for every year a student delayed disclosure.

The presence of the disability-type combination increased the predicted length of time to graduation by more than a quarter of year, which would indicate one semester, longer ( $b = 0.29$ ), compared to the reference category. The presence of a cognitive-only disability-type also increased the predicted length of time to graduation ( $b = .12$ ) by 1.44 months, compared to those students with no cognitive/psychological disabilities.

The disability category, psychological-only, did not enter the model at a statically significant level. There were only nine students (2.8%) in this group, which substantially restricts any inferences that can be made about the students with psychological-only disabilities. Students with psychological-only disabilities took longer, on average, than any other disability-type to graduate and disclosed later than any other type (Table 8). Here, it bears reporting that of all SWD-subset, 32 had a psychological disability. Only nine were included in the psychological-only category, because 23 students had a psychological disability and another disability, and thus were assigned to the combination disability-type category. Implications for this occurrence are discussed in Chapter 5.

Finally, There is a statistically significant difference between males and females mean time to graduation, ( $b = .12$ ). Males have a longer predicted time to graduation of more than a month and this is a relatively small effect size. However, it would indicate that males may take at least one semester longer, on average, to graduate than female students with disabilities.

There are several main assumptions to consider when conducting multiple regression analysis including linearity, independent observations, normality of errors, and homoscedasticity, (Keith, 2006). A review of the partial scatterplot of the independent variable, GRDY indicated that the length of time to graduation was correlated with the year of disclosure, DISY (Figure 1). To further examine this assumption of linearity, Figure 3 shows plots of the whole model and the

residuals by observed value and a review of the unstandardized residuals by predicted values provided further evidence of linearity (Keith, 2006).

Figure 3

*Unstandardized Residuals by Predicted Values*

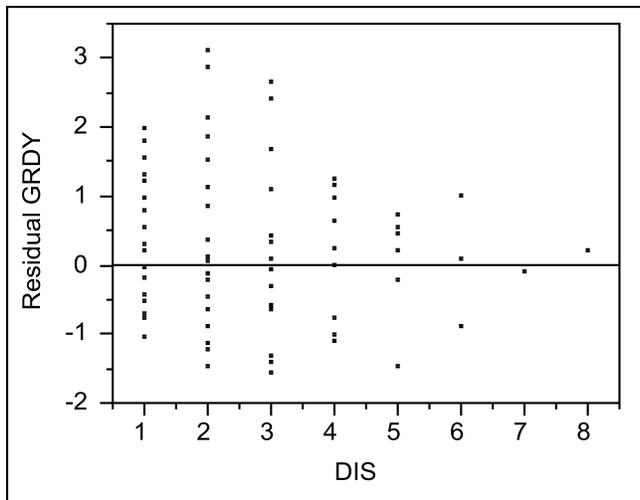
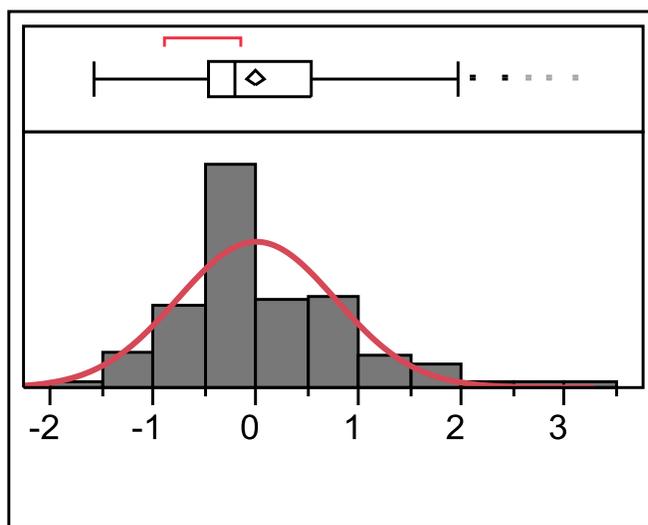


Figure 4

*Distribution of Residuals*



The assumption of normality of errors was tested by analysis of the distribution of the unstandardized residuals (Figure 4). Review of the Shapiro-Wilk test for normality revealed that the residuals are normally distributed ( $SW = 0.945$ ,  $p < .0001$ ). Homoscedasticity assumes that “the variance of errors around the regression line is fairly consistent across levels of the independent variable” (Keith, 2006, p. 190). Referring to Figure 4, there is fairly consistent variation in the standard error across values of the dependent variables. There was a higher degree of variance in the residuals for the predicted year-5, variance = 0.828 ( $M = -0.03$ ;  $SD = 0.91$ ) and year-6 variance = .773 ( $M = 0.1$ ,  $SD = .87$ ). The model was more accurate when the prediction was for graduating in year-4 (variance = 0.33,  $M = .012$ ,  $SD = .58$ ) and for graduating in year-5 (variance = 0.34,  $M = 0.14$ ,  $SD = .58$ ).

According to Keith (2007, p. 298), “as a rule of thumb is that a ratio of high to low variance of less than 10 is not problematic”. For our case, the highest variance is .773 and the lowest variance is .034, which gives a ratio of 2.28. Therefore, the criteria for homoscedasticity are met. In real terms, the variance is between half to one year (one to two semester) errors in prediction. The primary assumptions of the multiple regressions have been addressed and reasonably met. Thus, the statistical results can be treated as valid for interpretation.

### **Summary**

The three research questions for this analysis were addressed using descriptive and inferential statistics. Demographics and other student characteristics were presented. The results of a chi-square analysis of the differences in six-year graduation rates of SWODs and SWDs were significant in terms of the difference between the two groups, with SWDs having lower rates of graduation ( $\chi^2 = 26.164$ ,  $df = 1$ ,  $p < .0001$ ). The results of a second chi-square analysis showed statistically and practical significance in the six-year graduation rates between SWDs

who disclosed a disability in year one, then those who disclosed after year one ( $\chi^2 = 66.257, df = 1, p < .0001$ ). Multiple regression analysis revealed a strong relationship between the timing of disability disclosure on the length of time to graduation, as well as a predictive relationship between type of disability-type and gender on the years to graduation  $R^2 = .377 [F(6,32) = 37.2990, p < .0001]$  Of the independent variables, disability disclosure had the strongest effect on the predicted years to graduation. From the regression coefficient, for every year that a student delayed disclosing a disability, the length of time to graduation increased by 0.45 years, which would indicate at least two additional semesters of college for every year of delayed disclosure. The results for the three analyses were presented, and the assumptions for the validity of each type of test were examined. In Chapter Five, the results of the analyses are interpreted and discussed.

## **Chapter 5: Discussion and Implications**

### **Research Summary**

Students with disabilities do not graduate from college at the same rates as their peers who do not have disabilities. Though college enrollment is continuing to increase for students with disabilities, a host of complex factors impedes their progress towards degree completion. This exploratory study was designed to investigate my theory that the timing of disability disclosure has an effect on the graduation rates of students with disabilities. More specifically, I hypothesized that the longer a student waits to disclose a disability, the lower their chances of completing a degree within six years. The purpose of this study was to explore the effect of disability disclosure on the graduation rates of students with disabilities at one institution.

### **Population**

The study population consisted of 14,401 first-year undergraduate students from one institution of higher education who enrolled during the years 2002, 2003, and 2004. The students in the study attended one large, four-year, land-grant, public institution with approximately 29,000 total students (undergraduate and graduate). The university was classified as a very high research activity university, with a balanced arts and sciences program, and a science, technology, engineering and mathematics dominance in the graduate programs (Carnegie Foundation, 2010). The majority of the students in the study were white (78.5%), and 59.1% of the population was male.

Within this population, 423 students (2.9%) were identified as having a disability by virtue of having provided adequate evidence/documentation of a disability to the institution's disability services office. All full-time, degree-seeking student with disabilities who entered in 2002, 2003, and 2004 were included in the study regardless of the date they disclosed their

disability, which ranged from the first year of enrollment to the sixth. Students with disabilities (SWD) were assigned to a disability-type category. The four categories were: a) cognitive-only (49.6%), b) psychological-only (5.3%), c) combined (15.8%), and d) non-cognitive/psychological (29.3%).

### **Graduation Rates**

For the first research question, the six-year graduation rates of students with disabilities were compared to students without disabilities (SWOD). It was important to compare these rates to demonstrate the degree to which students with disabilities differed from their peers. SWDs were significantly less likely to graduate in six years (69.5%) than SWODs (79.7%) with a difference of 10.2 percentage points ( $\chi^2 = 26.164$ ,  $df = 1$ ,  $p < .0001$ ). The risk of failing to graduate in six years was 1.5 times higher for students with disabilities. However, this risk ratio does not imply direct causality between having a disability and being at higher risk for not graduating, only that there is a distinct difference between the two groups, and more detailed analysis is warranted.

The second stage of analysis compared the six-year graduation rates of SWDs who disclosed their disability within their first year of enrollment to the six-year graduation rates of SWDS who disclosed after their first year of enrollment. Of the 423 SWDs in the study, 58.2% disclosed their disability within their first year, and 41.8% disclosed after their first year. The six-year graduation rate for students who disclosed within year-1 was 85%; only 48% of students who disclosed after year-1 graduated within six years. The difference was statistically significant ( $\chi^2 = 66.257$ ,  $df = 1$ ,  $p < .0001$ ). Therefore, the risk of not graduating in six years was 3.5 times higher for students who delayed disability disclosure longer than one year. However, this risk ratio does not imply direct causality between disclosure timing and being at higher risk for not

graduating, only that there is a distinct difference between the two groups, and more detailed analysis is warranted.

These findings support my theory that disability-disclosure is an important factor to consider in research studies regarding the retention and graduation rates of students with disabilities. However, it was not known the extent to which disability disclosure accounted for the actual length of time to graduation. The third research question was designed to measure the effect of the timing of disability disclosure on the length of time to graduation, while accounting for disability-type and gender.

### **Length of Time to Graduation**

The third research question examined the effect of disability disclosure, disability-type, and gender on the number of years-to-graduation. Disability disclosure, measured in years, was the length of time a student disclosed a disability to the institution after enrolling. The average length of time to disclosure was 1.65 years ( $SD = 1.12$ ). A multiple regression analysis was conducted on years-to-graduation by disability disclosure, disability-type, and gender (Table 9, Figure 2). The model produced an  $R^2$  value of .377, which was statistically significant [ $F(6, 32) = 37.2990, p < .0001$ ]. Of the independent variables, disability disclosure had the strongest effect on the predicted years to graduation. From the regression coefficient, for every year that a student delayed disclosing a disability, the length of time to graduation increased by 0.45 years, which would indicate at least one additional semester of college for every year of delayed disclosure (depending on the length of a semester and the number of credit hours needed for graduation requirements).

The presence of the disability-type combination increased the predicted length of time to graduation by more than a quarter of a year, which indicated one semester longer ( $b = 0.29$ ),

compared to the reference category. The presence of a cognitive-only disability-type also increased the predicted length of time to graduation ( $b = .12$ ) by 1.44 months, compared to those students with no cognitive or psychological disabilities. The disability category, psychological-only, did not enter the model at a statically significant level, and the sample size,  $n = 9$ , was too small to allow for inferences to be made. Males had a longer predicted time to graduation compared to females. Although this appears to be a small effect size, students cannot complete a degree in one month, and must attend classes for at least one additional semester to finish their coursework.

## **Discussion**

### **Graduation Rates**

The results of the data analysis showed that in the overall entering first-year student population studied, the six-year graduation rates of SWDs were lower (69.5%) than SWODs (79.7%). It is not a new finding that differences exist in the graduation rates of students with and without disabilities. However, the results of this current study indicate that the problem may be more profound than previously reported.

The National Transitional Longitudinal Study-2 (NTLS-2) found that in the year 2007, of students with disabilities who received special education services in high school, 34% graduated in six years. The study reported that the national six-year graduation rate for four-year institutions for the same year was 51.2% (Newman et al., 2011, p.48). This showed a discrepancy between the national six-year graduation rates of students with disabilities and students without disabilities across all types of institutions. National six-year graduation rates can vary from the single digits through the ninetieth percentile across institutions (Bowen et al., 2005). Therefore, it was important to compare the students with disabilities' six-year rates to

students with disabilities at similar institutions as the one in the study, and to students without disabilities at the same institution (which this study did).

Traditionally, the institution at which this current study was conducted has had a competitive admissions criterion. Students who attended this institution may have been more prepared to complete a degree than students who attended other institutions with open or lower admissions criteria. A study of graduation and retention rates of students with disabilities was conducted at a similar type of institution as the one in this study (Wessel et al., 2009). The study found that the six-year graduation rates for students without disabilities and with disabilities were not significantly different, nor was the mean time in years to graduation significantly different (p. 116). This contradicts findings from our current study. The sample of students with disabilities in Wessel's et al. study only included students with disabilities who disclosed within the first several weeks of their enrollment in the institution. Students who disclosed after that time were not included in the study. The inclusion of students with disabilities who disclosed at any time in their academic career is a critical distinction between the Wessel's et al. study and this current study.

### **Graduation Rates and Gender**

To consider the effects of factors other than the presence of a disability on graduation rates, gender was included as an independent variable. There were no significant differences between the proportions of males and females in the general student population and the students with disabilities in the study. The six-year graduation rates for students without disabilities by gender were not available for the cohort years in the study. However, for students with disabilities, 64% of males graduated within six years and 77.5% of females graduated within six years.

This confirms other research findings that female students with disabilities are more likely to graduate from college than males with disabilities (Pingry-O'Neill et al., 2010; Wessel et al., 2009). Females may be more likely than males to seek disability services and assistance earlier in their careers. Students who use accommodations and services earlier in the academic career are more likely to benefit and have been found to have higher GPAs and earn more academic credits than students who delay disclosure (Lightner et. al, 2012). (Other types of background characteristics such as socioeconomic status, SAT scores, and high school preparation were not included in this study due to privacy restrictions by the institution).

Disability prevalence varied by gender in this study. A majority of SWDs had Attention Deficit Hyperactivity Disorder (ADHD) and/or Learning Disabilities (LD), which is consistent with previous studies that found these to be the highest prevalence rates of disabilities among college students (Gregg, 2007; Sanford et al., 2011; Pingry-O'Neill et al., 2010). Males in this study tended to have higher rates of cognitive disabilities such as ADHD and LD. Of all SWDs ( $N = 423$ ), a higher percentage of males (51.6%) had ADHD or LD only, compared with 46.8% of females. The same is true for the disability-type combination, with 17.2% of males in this category, compared to 13.9% of females. These two groups had lower six-year graduation rates than all students in the study, which implies that gender and disability-type should be considered as variables that affect graduation rates.

### **Graduation Rates and Disclosure**

The results of this study showed that the six-year graduation rates of SWDs who disclosed after year-1 were lower (48%) than six-year graduation rates of SWDs who disclosed in year-1 (85%). No other known studies examined the effect of timing of disability disclosure on six-year graduation rates. Male (57.2%) and female (59.5%) students were about equally as

likely to disclose within year-1. However, there was a higher degree of variance in the first-year disclosure rates by disability-type.

Students with no cognitive or psychological disabilities were most likely to disclose a disability within year-1 (83.9%). These were students who were either deaf or hard of hearing, had medical conditions (e.g. diabetes, Crohn's disease), mobility impairments, and/or visual impairments. By contrast, students with any type of cognitive and/or psychological disability were less likely to disclose within the first year. Students with the disability-type cognitive only, were less likely to disclose within their first year (57.2%). This category consisted of students who had either ADHD or LD. The first-year disclosure rate for students in the disability-type combination (ADHD, LD, combined with any other disability) was 28%. Students who had only a psychological disability were least likely to disclose within year-1 (18.2%). Previous research provides some context for these differences in disclosure rates by disability-type.

The disabilities in the non-cognitive/psychological category may be more apparent or visible than cognitive or psychological disabilities (Wessel et al., 2009). Students with apparent disabilities may be more likely to have received special education services than high-achieving students with hidden disabilities (Gregg, 2007), be aware of their disability prior to college, and disclose their disability early (Sanford et. al, 2011). For example, a student who is deaf may be more likely to identify his or herself as having a disability, disclose the disability, and request accommodations than a student who has a bi-polar disorder or an attention problem. Students with non-apparent disabilities may experience real or perceived stigma about a disability such as a mental health disorder (Trammel, 2009), and this may prevent them from disclosing a disability until an academic crisis occurs.

Students who delayed disability disclosure after year-1 were at 3.5 times the risk of not graduation as students who disclosed prior year-1 of enrollment. These results are striking in that there was a clear relationship between disability-type, disability disclosure, and six-year graduation rates. Students who had disabilities other than cognitive and psychological had a higher six-year graduation rate (88.7%) than students without disabilities (79.7%) and students with disabilities in the other three disability-type categories. The six-year graduation rate for students with cognitive-only disabilities was 71.9%, the six-year rate for disability-type combination was 59.7%, and the six-year rate for students with psychological disabilities was only 27.3%. No previous research studies provided a direct interpretation for these results, but some gave possible explanations for what may have contributed to the findings.

Previous research studies confirm that there is a disconnection between special education services in high school and student's use of accommodations and services in college (Newman et al., 2011). Students with disabilities who were aware of their disability in high school were not seeking accommodations in college (Sanford et al., 2012). These students may not have understood that the demands of coursework and the challenges of being independent are usually much more difficult in college than in high school. Students might not have had adequate transition services from high school to college, even to the point where they were unaware of the existence of disability service and accommodations in college (Lightner et al, 2012).

College coursework places high demands on cognition such as concentrating in lectures, testing, reading retention, and comprehending complex concepts. Individuals with psychological disabilities such as depression and anxiety can have symptoms that affect memory, concentration, and motivation (American Psychiatric Association, 2000). The institution under study had rigorous science, math, and engineering programs, which place high demands on

cognitive functioning. The combination of high cognitive demand and delayed disclosure may have resulted in a situation where the students who needed accommodations the most were the last to receive them.

### **Length of Time to Graduation, Disability-Disclosure, Disability-Type, and Gender**

The results of the data analysis for this question indicated that the timing of disability disclosure had a strong effect on the length of time to graduation. For the 319 students with disabilities who graduated from the institution, the longer a student took to disclose, the longer their predicted time to graduation. Students' gender and the type of disability a student had also influenced the length of time to graduation. Results of the multiple regression model showed that disability disclosure, disability-type, and gender accounted for 38% of the variance in the model. No known previous studies have used this model or examined time to graduation in quite this way. However, some existing research does provide opportunity for discussion.

Disability-type was a predictor of the length of time to graduation. Students with the disability-type combination took at least one year longer, on average, to graduate than students with non-cognitive disabilities. Students with one type of cognitive disability, ADHD or LD, took at least one semester longer to graduate than students with non-cognitive disabilities. The presence of a cognitive disability was a significant predictor of taking longer to graduate (Table 9).

Students with psychological-only disabilities did not enter the regression model as they represented only 2.8% of SWDs who graduated. It bears reporting that of all SWD-subset, 32 students had a psychological disability. Only nine were included in the psychological-only category because 23 students had both a psychological disability and another disability, and thus were assigned to the combination disability-type. Students with psychological-only disabilities

took as long to graduate as students with combined disabilities ( $M = 5.44$ ), and were also the group most likely to delay disclosure. This finding is congruent with previous research that showed that serious psychological disabilities (e.g. post-traumatic stress disorder and bi-polar) often manifest between the ages of 18-24, can be difficult to identify early on in one's academic career (Kleinman & Egan, 2001), and are sometimes uncomfortable to disclose (Trammel, 2009). No studies were identified that directly addressed the interactional effect of multiple types of disabilities on an individual's academic functioning.

For students with disabilities who did graduate, the mean time to disclosure was 1.61 years for females and 1.67 years for males, which is a minimal difference in time. The average time to graduation for males was 4.95 years and the average time for females was 4.67 years. However, the multiple regression analysis revealed that being male, compared to being female, slightly increased the predicted time to graduation ( $b = 0.12$ ,  $t = 2.90$ ,  $p = .004$ ). Though this seems to be a small degree of difference, we must keep in mind that any fraction of one year can indicate an additional semester. In real-world terms, a semester is usually 15 weeks long, and requires a full-time tuition payment.

College students with disabilities may experience significant physical or emotional health problems (Belch & Marshak, 2006). They may need to make adjustments to their academic plan that result in taking longer to graduate. These adjustments include taking time off from school or reducing course loads to attend to medical conditions or other issues related to a disability. Many students in the study did not disclose until after their second year. Students with disabilities often seek professional evaluations and accommodations after they encounter academic problems, such as poor grades. As a result, they have to retake classes, change majors, or face academic suspension. Students may come across obstacles and barriers in accessing the

curricular environment or may be reluctant to disclose a disability due to perceived and real stigma and discrimination (King, 2004; Trammel, 2009). The findings from my study support my theory that disability disclosure is an important and relevant research topic. Delays in disclosure can result in longer times to graduation or to not graduating at all. Students bear personal, financial, and opportunity costs for either situation.

### **Implications & Areas for Future Research**

The results of this study have implications for students, secondary education, postsecondary institutions, and educational researchers. Completion of a college degree and competitive employment is the ultimate goal for college students with disabilities. Based on the findings of this research, when students with disabilities delay disclosure of a disability the consequences can be very negative. Students who wait to disclose until they face an academic crisis such as poor grades will take longer to graduate, which bears a financial and opportunity cost. These students may not be as competitive as their peers to potential employers or graduate schools. They may lose scholarships, be forced out of their major, or academically suspended. These are important implications for educators and administrators at the secondary and postsecondary levels.

### **Secondary and Higher Education**

The earlier students with disabilities access accommodations and supports, the greater the positive impact on graduation rates. Postsecondary institutions and educators have traditionally relied on a passive approach to identifying and serving students with disabilities. This needs to shift to a more proactive approach. For students who are identified in grades K-12, there must be comprehensive and coordinated transition planning.

Transition planning is more effective the earlier in high school it is started, and when there are coordinated efforts between secondary schools and college disability services offices. Students with disabilities face important decisions when selecting appropriate institutions to meet their educational, career, development, financial, and disability needs (Sanford et al., 2012). Disability services offices should be highly visible during a student's college selection and orientation process, providing accurate information on disability issues in college, and be willing to work with prospective students prior to enrollment. Disability offices should be easily accessible to incoming students. It would be beneficial to educate academic advisors and faculty about the disability disclosure process to encourage and support learners with disabilities.

For students who are not identified as having a disability in K-12, there are steps that institutions could take to reach these students earlier in their postsecondary careers. Providing outreach programming, online self-assessments, and streamlined referral services, would be a few of these steps. Assistance with financial support for obtaining professional evaluations might help students navigate the process of disability determination quickly and smoothly. Once students with disabilities are identified, disability support providers must go beyond basic legal compliance to providing programming and support services.

Intentional faculty training is recommended that assures that students with disabilities are afforded rights under the ADA, treated fairly, accommodated appropriately, and encouraged to seek assistance. Students with disabilities and educators should understand what the ADA means in terms of rights and protections (Getzel, 2008). Faculty's knowledge about disability, skills in working with students, and attitudes towards disabilities influence students' academic success and equitable treatment (Burghstahler & Doe, 2006). Faculty development initiatives

can help educators improve knowledge, skills and attitudes about disabilities (Vogel, et al., 2006, p. 25).

## **Research**

If we, the researchers, do not convey that students with disabilities are more at risk than other students then they may continue to fall behind their peers in an increasingly competitive educational and economic environment. Future research should examine students' disability type, time of onset or diagnosis, or disclosure patterns in relations to their academic and employment success. In addition to disability-related variables, research studies should investigate background, in-college, and institutional characteristics in relation to student outcomes. Independent variables such as SAT scores, high-school standing, and first-year GPA may be important factors in identifying students with disabilities who are at risk for not completing a degree. I recommend that disability services offices collect and retain non-identifying background and academic data on students for research purposes, to the extent that students grant permission to do so, to prevent having to request data held exclusively by an institution's enrollment manager.

In hindsight, the design of research question three was problematic. Changing the independent variable from six-year graduation rates to the length of time to graduation overcomplicated the study. The creation of the subset of students with disabilities who graduated may have been hard for a reader to follow. The degree to which disability disclosure impacts graduation rates may have been lessened because students who never graduated might be the least likely to disclose early. Although creating the subset of students with disabilities who graduated allowed me to use multiple regression techniques, recommendations for future

analysis should include logistic regression to determine the impact of the independent variables on the six-year graduation rates of all students with disabilities in the study.

Future studies should be expanded to include more diverse populations (Kaminski et al., 2006; Madaus, 2006b), and previous studies could be repeated across diverse socio-cultural-economic backgrounds (Dutta et al., 2009; Wessel et al., 2009). The validity of instruments used to assess students should be further examined among diverse populations by replicating existing studies with different groups.

New research questions have emerged from the results of this current analysis that warrant further investigation. What are the effects of disability disclosure on graduation for groups other than undergraduate students at one institution? Why are students with certain types of disabilities less likely to disclose? What other factors delay or prevent graduation? What institutional factors or barriers delay disclosure? Can institutional practices or cultures be changed to promote disclosure and inclusion? Studies that address these questions have the potential to make a lasting and significant contribution to the field of disability in higher education, and to the quality of education for students with disabilities.

### **Concluding Remarks**

The researcher is always situated in the context of time, place, and politics. I do my work at a large institution, with a particular philosophy, mission, and standard of practice. The institution requires that students take the initiative to self-disclose, present professional documentation of a disability, and engage in an interactive process with disability services staff. The staff has the authority to accept or deny a student's request to register as a student with a disability and/or to receive accommodations, support, advocacy, and protection from discrimination. When students disclose, they take a risk. They may feel marginalized and

experience shame or embarrassment resulting from stigmatization from faculty, peers, or others. It is important to me that my research serves to empower students.

I have found that institutional change can be a difficult and slow process. Although I provide services for students with disabilities at an institution that has not moved away from a service-delivery model, I envision a time when students will be much more integrated into a universally accessible and inclusive academic environment. I foresee a future where students will come to understand disability as a part of diversity, as a potential asset, and not a character flaw. In this future, disability services will be more focused on educating the academic community and engaging with its members in reducing barriers and social stigma. Students with disabilities will no longer feel as though they have to hide the disability aspect of their lives or feel ashamed to receive accommodations. Instead, they will be valued for their differences and feel empowered by the strengths that they possess.

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## Appendix A

### Definitions of Terms and Concepts

One of the current problems in the field of disability in higher education is a lack of consistency of concepts and terminology. To make this study as useful as possible for practitioners, and to attempt to provide some streamlining of definitions for future researchers, I selected common and useable definitions, and clarified terms used throughout this research. Though every concept is based on a set of assumptions and values, I did not challenge standard concepts currently used in postsecondary research and reporting.

*Disability:* (A) a physical or mental impairment that substantially limits one or more of the major life activities of such individual; (B) a record of such an impairment; or (C) being regarded as having such an impairment” (U.S.C. § 12010 (2)).

*Disability-Type:* A broader category of disability type as reported and documented. Disability type as a variable is discussed in Chapter Three.

*Disability Services:* Programs designed to provide reasonable academic accommodations and support services to empower students who have disabilities to competitively pursue postsecondary education.

*Disability Service Office:* The department, office, or professional(s) designated by a postsecondary institution to carry out the requirements of the ADA. A disability service office does so by determining a student's status as a person with a disability based on documentation and observation, determines accommodations and services for students, and to facilitate equal access to the educational environment (Dukes, 2001).

*Awareness of disability:* An individual is aware that he or she has a condition that meets criteria for the definition of a disability.

*Documentation of a disability:* Primary (self-report), secondary (observation and interactions) and/or tertiary (formal evaluations from external or third-party sources) that substantiate a student's disability and request for accommodations (Shaw, 2012).

*Disclosure of disability:* The act that a student takes in notifying the appropriate disability services office on campus of disability, usually to seek services and/or accommodations (Lightner et al., 2012).

*Registered disability:* When a student has presented qualifying documentation of a disability to a disability services office, and the office regards that student as having a disability (Newman et al., 2011).

*Postsecondary education:* "The provision of a formal instructional program whose curriculum is designed primarily for students who are beyond the compulsory age for high school. This includes programs whose purpose is academic, vocational, and continuing professional education, and excludes vocational and adult basic education programs (Snyder & Dillow, 2012, p. 699).

*Postsecondary institution:* An institution which has as its sole purpose or one of its primary missions, the provision of postsecondary education (Snyder & Dillow, 2012).

*Higher education:* Although often used interchangeably with the term postsecondary education, higher education does not have a formal definition from NCES. The term generally refers to 2-year and 4-year degree granting institutions.

*Bachelor's degree:* "A degree granted for the successful completion of a baccalaureate program of studies, usually requiring at least 4 years (or equivalent) of full-time college-level study" (Snyder & Dillow, 2012, p. 690).

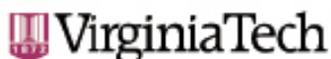
*Degree-seeking student:* “A student enrolled in courses for credit and recognized by the institution as seeking a degree, certificate, or other formal reward” (Snyder & Dillow, 2012, p 691).

*First-time student (undergraduate):* “A student who has no prior postsecondary experience...attending any institution for the first time at the undergraduate level. Includes students enrolled in the fall term who attended college for the first time in the prior summer term, and students who entered with advanced standing (college credits earned before graduation from high school)” (Snyder & Dillow, 2012, p. 694).

*Graduation rate:* “The cohort is defined as first-time, full-time, degree or certificate-seeking undergraduate students, and the completion rate is calculated as the total number of completers within 150 percent of normal time divided by the number of students in a particular cohort”. Using this definition, an eligible cohort members in a four-year institution who finished a bachelor’s degree at that same institution in six or fewer years...would be counted as completers (Horn, 2010, p. 2).

*Retention Rate:* A measure of the rate at which students persist in their educational program at an institution, expressed as a percentage. For four-year institutions, this is the percentage of first-time bachelors (or equivalent) degree-seeking undergraduates from the previous fall who are again enrolled in the current fall (Horn, 2012, p.3).

## Appendix B IRB Approval Letter



Office of Research Compliance  
Institutional Review Board  
2000 Kraft Drive, Suite 2000 (0497)  
Blacksburg, VA 24060  
540/231-4606 Fax 540/231-0959  
email [lr@vt.edu](mailto:lr@vt.edu)  
website <http://www.irb.vt.edu>

### MEMORANDUM

**DATE:** March 5, 2013  
**TO:** Susan Asselin, Robyn Lynn Hudson  
**FROM:** Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)  
**PROTOCOL TITLE:** Disability disclosure and graduation rates  
**IRB NUMBER:** 12-961

Effective March 5, 2013, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

### PROTOCOL INFORMATION:

Approved As: Expedited, under 45 CFR 46.110 category(ies) 5  
Protocol Approval Date: November 28, 2012  
Protocol Expiration Date: November 27, 2013  
Continuing Review Due Date\*: November 13, 2013

\*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

### FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

*invent the Future*

## Appendix C

## Data Collection Instrument

CASE ID: \_\_\_\_\_ REVIEWER: \_\_\_\_\_ DATE: \_\_\_\_\_

COHORTYR	2002	2003	2004
ENTER	1	2	3

DISSTAT	Not Registered	Registered	GENDER	Female	Male
ENTER	0	1	ENTER	0	1

ETHNICITY	AI/AN	ASIAN	B/AA	HISPAN	NH/PI	WHITE	2+	RA	NR
ENTER	1	2	3	4	5	6	7	8	9

DISTYPEADD- DISTYPTBI	ADD	COM	DHOH	LD	MED	MOB	PDD	PSY	TBI	VIS	Other	NR/MIS SING
NO : ENTER	0	0	0	0	0	0	0	0	0	0	0	0
YES : ENTER	1	1	1	1	1	1	1	1	1	1	1	1
DISTYPENUM												

DISDISCLOS	Actual Date	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year +	Missing /Invalid
ENTER		1	2	3	4	5	6	7	99

GRADEVER	No	Yes			
Enter	0	1			
GRADYEAR	Never	Within 4 yrs	Within 5 yrs	Within 6 yrs	Within 8 years
ENTER	0	4	5	6	7
GRADE4YEAR	No	Yes			
Enter	0	1			
GRADE6YEAR	No	Yes			
Enter	0	1			

Comments:

Entered \_\_\_\_\_ 2nd Check \_\_\_\_\_ Independent  
 Rater \_\_\_\_\_