Retention of Undergraduate Students with Disabilities at the University of Washington

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Contents

Abstract

Retention of individuals with disabilities in higher education is gaining importance as individuals with disabilities gain greater access to a higher education. This study examines data from the University of Washington student database to study the factors relating to retention and students with disabilities and to examine if predictors of retention differ between individuals with disabilities and those without disabilities. After using multiple imputation to estimate missing values, logistic regression looked at factors predicting retention. Overall individuals with disabilities graduated at approximately the same rates as other students and factors associated with retention did not significantly differ in the two groups. The only subgroup of disability associated with lower retention included individuals with psychological and emotional disorders. The result of individuals with disabilities graduating at approximately the same rate as those without disabilities is promising but better data from more universities needs to be studied for a clearer picture of predictors of retention for individuals with disabilities.

Chapter 1: Introduction

The need for a higher education is of increasing importance in the modern economy. The Census Bureau states median annual income (in inflation adjusted 2010 dollars) of a person who has less than a high school diploma as $18,413, whereas a person with a high school diploma or equivalent earns $26,349. Those who have some college, but less than a bachelor's degree (but may have an associates degree) earn $31,928 and having a bachelor's degree raises median income to $47,422. A professional or graduate degree increases median income to $62,618 (United States Census Bureau, 2010a).

The Government Accountability Office reports enrollment of individuals with disabilities in higher education has increased to 11% of the college student population and mirrors the general student population with regards to age, race and type of school attended (2009). However, individuals with disabilities are less likely to complete a higher education than those without disabilities. The Census Bureau (2010b) reports 27.6% of individuals with disabilities have less than a high school education, 34.2% have a high school diploma only, 25.1% have some college or up to an associate's degree and only 13.1% had a bachelor's degree or higher. Only 11.9% of individuals without disabilities have less than a high school education, 27.3% have just a high school diploma, 29.7% have up to an associates degree and 31.2% have obtained a bachelors degree or higher.

While access to a higher education is important, its also important to examine the reasons some students complete a degree and others do not. Tinto (1975) posits there is not only an academic but a social commitment necessary for successful completion towards a degree. The need for academic and social commitment for degree completion has been demonstrated extensively (Oseguera & Rhee, 2009; Rhee, 2008; Braxton & Lee, 2005; Braxton, Sullivan, &

Johnson, 1997). Individuals with disabilities, however, face great barriers to social acceptance (Hebl & Kleck, 2000; Fichten & Amsel, 1986; Royal & Roberts, 1987), and specifically lack of support from faculty and peers can increase challenges to completion of a degree (Government Accountability Office, 2009; Bruder & Mogro-Wilson, 2010). This absence of support is hypothesized to increase the strain on individuals with disabilities due to the extra stress added to the stress all undergraduate students face. This will make persistence to a degree less likely and will not assist in ending the economic or social inequity of individuals with disabilities. The interaction of social and academic factors makes retention of all students challenging, and adding the challenges of disability only compounds the challenges.

The lack of academic and social supports experienced by individuals with disabilities may be explained, in part by Erving Goffman's (1963) concept of stigma: a trait that causes a decline in an individual's social status and plays a major role in diminishing the status of those with disabilities in society. Ablon (2002) discussed sources of stigmatization within the context of disability. The first concern is the nature of the disability. Some disabilities, such as those with uncontrollable symptoms such as epilepsy or leprosy can cause significant disfigurement, and which may be perceived as dangerous, will carry a greater stigma. Some disabilities, such as those in which people may be believed to contribute to their own disability (such as drug abuse, carelessness, drunkenness, or a suicide attempt) may be seen more negatively in the eyes of society. Another factor may include feelings from one's family, friends, and society. The author also notes the attention given to physical perfection by the mass media. This may influence the negative attitudes and increased stigmatization of individuals with disabilities. A third issue is the nature of the stigmatized populace, since cultural, economic and other biases will influence the stigmatization of individuals with disabilities.

Fichten and Bourdon (1986) have demonstrated that able-bodied students attributed more undesirable traits upon students with disabilities than their non-disabled peers. Many of the traits given to individuals with disabilities were those traits opposite those of students without disabilities. Traits attributed to students with disabilities were so strong they even overrode sex-role stereotypes, as young adult males with disability were rated more equally with females with a disability than males without a disability. Sympathy, even when portrayed positively, was received negatively and made attitudes towards individuals with disabilities more negative. Traits attributed to individuals with disabilities were aloof-introverted, lazy-submissive, and ingenuous-unassuming, as opposed to their able-bodied participants, who were characterized as gregarious-extraverted, ambitious-dominant, and calculating-arrogant (Fichten & Bourdon, 1986). These traits were originally described in Wiggins (1979) who found the traits of gregarious-extraverted, ambitious-dominant, and calculating-arrogant were viewed as traits that are more positive while those of aloof-introverted, lazy-submissive, and unassuming-ingenuous, were more negative traits.

In addition Fichten and Bourdon (1986) demonstrated individuals without disabilities feel uncomfortable around those with disabilities and assess them more negatively than individuals without disabilities (Fichten & Bourdon, 1986; Budisch, 2004). Individuals without disabilities tend to feel uncomfortable around individuals with disabilities (Fichten & Bourdon, 1986) and have more negative thoughts when interacting with an individual with a disability as opposed to their non-disabled peers (Amsel & Fichten, 1988). All of these issues can socially exclude individuals with disabilities at a critical time in their life and impair their ability to succeed in a post-secondary environment. Consequently, these variables may operate as barriers to the social integration, participation and retention of students with disabilities in higher education settings.

Research Questions

The present research explores factors relating to retention of students with disabilities compared to their non-disabled peers. The first question is whether the retention rates of individuals with disabilities are different than their able-bodied peers, and if so what factors are associated with retention for individuals with disabilities? Many factors play a role in whether or not a student will complete a post-secondary degree. Since little research has explored if the rates of retention are different for individuals with disabilities than those without disabilities, this question has serious implications for theories related to student retention as well as policies and practices implemented in institutions now.

If there are differences found, the focus of research question 2 is on the role disability type plays in retention and what differences exist among individuals with disabilities. This serves the purposes of adding to the theory of retention for groups of students and informs post-secondary institutions on policies to improve retention for students with disabilities. If it is demonstrated individuals with disabilities face unique challenges to retention compared to individuals without disabilities, then further analysis will explore demographic, academic and financial issues influence retention.

Dissertation Organization

This dissertation begins with the next chapter reviewing current literature on retention in general and specifically individuals with disabilities. This will draw upon research done on populations of students with and without disabilities. The theories and frameworks and supporting evidence for these are explored. Chapter 3 looks at the methodology of the current study, including human subjects, data manipulation, missing data analysis and variable selection and data analysis techniques. Chapter 4 will look at the results of the data analysis. Chapter 5

will discuss the results of the study in relation to theories examined in Chapter 2, along with a short discussion on the implications for policy and practice for retaining students with disabilities at the University of Washington. This chapter will also discuss the limitations of the study, and offer suggestions on future direction of the research and what questions should be explored in those future research studies.

Chapter 2: Retention in Post-Secondary Institutions: State of the Evidence

While research on individuals getting into an institution of higher education is important, so is ensuring students have the ability to complete the degree(s) they are seeking. Researchers have examined why only certain students complete their degree. Conceptual models and studies supporting or contradicting those models to improve them are common and researchers are constantly looking at ways to predict who will complete a degree at a post-secondary institution. One prominent model used in retention research is the work of Tinto (1975). Tinto's (1975) work has limitations, although he has followed up on his own works recently Tinto (1982, 1986, 1994, 2012). Other works such as Braxton et al. (1997), Braxton and Lee (2005) codified Tinto's conceptual framework into propositions which give testable hypotheses of his work. One major limitation of his work is his inattention to the student's culture of origin--an extension explored in the research of Tierney (1999), Kuh and Love (2000), Museus and Quaye (2009). The literature specifically examining retention of individuals with disabilities is subsequently examined. This literature is not as well developed than the literature around students in general.

Definitions and Operationalization of Retention

Considering how retention is operationalized and how different terms are used to describe it is a necessary first step in examining conceptual models of retention. Berger and Lyon (2005) discuss the possible trajectories a student may take through the higher education system. These categories take into account institutional departure (leaving one institution) versus leaving the higher education system in general. Also, some of the reasons for leaving are voluntary such as changing institutions, and some are involuntary (Berger & Lyon, 2005).

Hagendorn (2005) notes several scenarios where a student may change paths during their academic career, as not all students will begin and stay at one institution. Examples include a

student who enrolls at two community colleges at one time and ultimately earns a degree from one of them. Also, a student may enroll in a college, but in the first year not complete any credits, then return the next year and stay until completion of the degree. A student may enroll in a community college, transfer to a larger university but not be successful at the new institution and thus return to the smaller institution to complete a degree. A student may also enroll in many courses and drop all but one, which may be a core course or simply a physical education course. Some students may enroll in remedial classes and have to return to those classes due to not mastering the material. A student may be removed due to a low grade point average (GPA) or judicially removed from the university due to unlawful behavior. The preceding examples note the complexities of analyzing retention and the paths students may take to a degree.

Conceptual Framework of Retention

Research into the reasons students do not complete their degree is extensive. Many conceptual frameworks have been proposed to examine the factors relating to retention in college. Braxton and Hirschy (2005) reviewed many of these conceptualizations but the authors acknowledge Tinto's work is the "most studied, tested, revised, and critiqued in the literature" (Braxton & Hirschy, 2005; p. 66). Tinto's (1975) interactionist theory has even been referred to as a paradigm of retention research by Braxton et al. (1997), which Kuhn (1970) defines "...to be universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners." (p. vii). However, Tinto's work is not universally accepted in its current form and has come under criticism for the limited discussion of the individual characteristics of students, such as cultural background, its limited consideration of different types of institutions such as community colleges, and its limitations with regards to

keeping up with emerging technologies which will influence the interactions of students and institutions.

Tinto (1975) proposed a conceptual model that looked at the interactions between the institution and the student and how these interactions will determine whether an individual will persist to graduation. Tinto derives his view of retention from Durkheim's (1951) views on suicide which argue an individual is more likely to take their own life if they are not sufficiently integrated into society. The first connection between the work of Durkheim (1951) and retention was proposed by Spady (1970) which was subsequently taken up here by Tinto (1975). Tinto (1975) sought to expand the concept of integration from a descriptive theory to a predictive theory of dropout. The principle is that individuals who are more integrated into the institution they are attending will be more likely to persist to a degree. The attributes of family background, individual attributes, and pre-college schooling influence the commitment an individual has to an institution, along with a commitment to obtain a degree (goal commitment). Academic and social integration are two components of integration into the college environment. While distinct, both are needed for integration into the institution and increase the chances of a student obtaining a degree.

Social integration is an interaction between the individual's characteristics such as background, values, commitments and those of other individuals in the social network. Social interactions occur as informal peer interactions, extracurricular activities and interactions with professors. An individual who is successful is likely to have support from peers and faculty. This could also lead to the student evaluating the costs (not only financial but effort, time, etc.) and benefits of college, potentially modifying their commitment to completing an education and to

the institution. Tinto (1975) argues greater social integration will lead to a greater likelihood of persistence in college.

Academic integration is measured by not only grades but by intellectual development while in college. The latter is defined by the norms of the academic system and the former being an individualistic measure. This leads back to the same commitments, which will help determine the dropout decision. This is referred to as the interactionist theory, which relies heavily on the interaction between a student and the institution (Tinto, 1975).

Beil and Reisen (1999) showed academic and social integration were significantly related to a commitment to remain in college, and there is likely a mediational influence of commitment to social and academic integration instead of a direct relationship, where commitment to remain in college predicts retention. The authors hypothesize some of the relationship of integration to retention is mediated through commitment to remain in college. The mediation hypothesis is demonstrated as integration becomes a non-significant predictor of retention when institutional commitment is added to their statistical model. Due to a high correlation between academic and social integration, the analyses were done separately, both with the same conclusions. The authors note their study did not separate goal commitment and institutional commitment, which should be examined in future research.

Empirical Evidence Related to Tinto's Theory

Braxton, Sullivan and Johnson (1997) examined Tinto's (1975) framework and created 15 propositions. Thirteen were core propositions and two were additional propositions not in Tinto's model, but related to his conceptual framework. The propositions below are the 13 from Tinto's model.

1) The characteristics a student enters an institution with will affect the level of institutional commitment.

2) Characteristics of students entering the institution will affect the level of initial commitment to the goal of graduating.

3) Students entry characteristics directly affect the student's likelihood to remain in college.

4) Initial commitment to the goal of graduation affects the level of academic integration.

5) Initial commitment to graduation from college affects the level of social integration.

6) Social integration will depend on the initial level of institutional commitment.

7) Academic integration will depend on the initial level of institutional commitment.

8) Greater academic integration will increase the level of commitment to the goal of graduation.

9) Greater level of social integration, greater level of subsequent commitment to institution.

10) Initial institutional commitment affects future institutional commitment.

11) Initial commitment to the goal of graduation will affect their subsequent goal to graduate.

12) Greater subsequent commitment to the goal of college graduation the more likely they are to continue in college.

13) The greater level of subsequent commitment to the institution greater likelihood of staying in college.

Two propositions which are not part of Tinto's model, but hypothesized by the authors as a dynamic part of persistence in college were added by Braxton et al. (1997):

14) Proposes a high level of commitment to the goal of graduation will compensate for low levels of institutional commitment.

15) Proposes academic and social integration are mutually interdependent and reciprocal in their influence on college persistence.

Braxton et al. (1997) examined the published literature on retention to see how many studies found support for these propositions. He looked at the number of tests supporting each proposition since sometimes a study would conduct multiple tests. These researchers looked at aggregate support, support across institution types and support between different student groups. Their analysis found medium support in multiple institution tests and strong support in single institutional tests for Proposition 14. Proposition 15 had not been tested at multiple institutions, but has strong support from single institutions. Three propositions (3, 12 and 13) are thought to directly influence the departure decisions. Propositions 8 and 9 are due to interactions between the academic and social aspects of the college or university setting (Braxton et al., 1997).

Braxton and Lee (2005) conducted a similar analysis as Braxton et al. (1997) to reflect the published literature added between the two works. The authors used a cut off of ten tests required to have sufficient evidence to make a decision on each proposition. If a proposition had ten tests then seven of those ten tests would need to support the proposition for it to be considered as playing a role in retention. The authors also looked at community colleges and resident universities separately to determine if there were institutional differences in factors related to retention. This work only analyzed the 13 propositions from Tinto's model. Propositions 5, 8, 9, 10, 11, and 13 are supported by a sufficient amount of research to be confident these propositions are playing a role in student retention within residential institutions. Proposition 1 is less clear, some studies show support for it while others don't; therefore more research into this proposition is warranted. Commuter colleges have been researched less than residential institutions, which suggest retention research in these institutions is less reliable. Community colleges serve a major purpose in society, justifying more research to examine

predictors of retention and how to maintain student's enrollment until graduation at these institutions.

Limits of Tinto's Model

Even though Tinto's (1975) theory is considered as one of the main frameworks for understanding student retention, many questions remain. Tinto noted the limitations of his own work, specifically how it does not take into account factors such as race, gender, socio-economic status, and student financial aid, and does not distinguish between those that lead to transfer as opposed to those who want to withdraw from education. The model also focuses on four year universities and does not take into account the role of two year colleges and disengagement from them (Tinto, 1982). While Tinto's model has limitations, the basic underlying principles of interaction between students and institutions holds up to empirical testing. The model does require expansion to take into account other factors relating to retention (Tierney, 1999; Kuh & Love, 2000; Saenz & Marcoulides, 1999; Museus & Quaye, 2009). Astin (2005) notes the outcomes of students are strongly related to their incoming characteristics, and the differences between institutions are strongly related to the different characteristics of the populations they serve. Given how the demographics of college students are changing, attention to the individual characteristics students bring is even more important (Reason, 2009).

Research has also looked at Tinto's model based on individual and institutional level characteristics. Oseguera and Rhee (2009) examined individual characteristics of students and found socio-economic status, high school GPA, SAT composite, living on campus, average high school GPA for the entire institution, and institutional selectivity are positively related to persistence in college. Variables inversely related to retention include financial concerns and intent to transfer. Finally, those of Asian descent were found to be positively related to

persistence, while Latino/a students were negatively related to persistence. Institutional variables inversely related to graduation were drop-out climate and transfer climate[1]. The authors emphasize a vast majority of the variation in retention is based on characteristics of the students, as described above, and not the characteristics of the institutions. Student level variables account for 58.2% of variation in drop out, out of 69.1% total variance explained by the model (Oseguera & Rhee, 2009).

Rhee (2008) examined students who were classified as stop-out, drop-out, and transfer and what predicted classification in each category. Stop-out was self-reported as taking a leave of absence, drop out were those who withdrew from school, and transfer was transferring before completing the program. Students who were classified as stop-out showed institutional selectivity, structural diversity (representation of students and faculty diversity) and diversity emphasis (students perceptions of how much emphasis the institution places on diversity), to be all positively related to stop-out. Student level variables of high school academic achievement, institutional commitment, social integration, academic integration, and ratio of financial aid are all inversely related to stop-out. For students classified as drop-out, no institutional variables were related to drop-out, but minority status, socio-economic status, age, high school academic achievement, institutional commitment, and academic integration were inversely related to drop-out. Institutional selectivity and diversity emphasis were inversely related to the likelihood of student drop-out. At the student level, minority students, women, and ratio of financial aid increased chances of a student transferring institutions. High school academic achievement, institutional commitment, social integration and academic integration were inversely related to transferring (Rhee, 2008).

[1] Dropout climate and transfer climate are measures of how likely students report their chances of dropping out or transferring to another institution.

Braxton, Hirschy, & McClendon (2004) posed the question of whether to revise or replace Tinto's theory. They conclude the latter as the best approach. In work by Braxton et al. (1997) no studies had been shown to support Tinto's model in relation to commuter colleges, although some researchers have found academic integration to be more important than social integration at commuter institutions than residential institutions (Pascarella & Chapman, 1983). Given the wide variety of institutions, a one size fits all model will not work to understand problems of retention. Braxton (2005) shows very little support for the interactionist model at commuter institutions, with one major problem being fewer studies focusing on those institution types. This poses a major challenge to the generalizability of Tinto's model at all institutions and reinforces the need to examine how institutional type affects retention and how the interactions between students and institution change.

Retention of Underrepresented Groups

Data from the National Center for Educational Statistics shows just how much the demographics of university settings have shifted. In 1976, 82.6% of enrolled college students were white, 9.4% African American, 3.5% Hispanic, 1.8% Asian\Pacific Islander, 0.7% two or more races, and 2% non-resident alien. This compares to 2010 where 60.5% of enrolled college students were white, 14.5% African American, 13.0% Hispanic, 6.1% Asian\Pacific Islander, 0.9% two or more races, and 3.4% non-resident alien. Individuals of all race groups have seen greater attendance of post-secondary institutions. Between 1976 and 2010 white students who completed high school and were between the ages of 18 and 24 went from 32.8% to 48.5% enrollment in a post-secondary institution. African Americans went from 33.4% to 46.3% and Hispanics from 35.9% to 43.7%. Reasons for retention of students from underrepresented populations (focusing here on African Americans, American Indian and

Hispanics) has shown similar needs including lack of finances, distance from cultural and family ties and lack of students with similar ethnic characteristics, and lack of academic preparation (Seidman, 2005). Rhee (2008) found that an institution with a focus on promoting structural diversity and a diversity emphasis decreased chances of stop out. Minority status and socioeconomic status were not significantly related to stop out but was significantly related to drop out, as was structural diversity and diversity emphasis at the institution.

Saenz and Marcoulides (1999) explored relationships between college experience and academic performance among minority students as measured by grade point average. These variables include level of father's education, self-understanding, friendships with students of different backgrounds, adequate financial resources, making practical applications of material learned in the classroom to environments outside the campus, talking with a professor about a course, advice from a friend about academic probation, participation in campus life, scanning notices of campus events, attendance at athletic events, use of the library for studying, attending campus fine art events and positive experiences with the educational equity program. These variables were shown to account for almost all of the variation in college experiences.

Influence of Culture and Retention

An area of similar concern to race is cultural differences between a persons place of origin and the institution they are attending, which Tinto's (1975) theory fails to take into account. Tierney (1999) asserts that it is inappropriate for Tinto to assume students must reject their cultural past and abandon their ethnic identities to succeed at predominately-white campuses and resistance to ethnic integration by mainstream society demonstrates how difficult true assimilation would be. Tierney (1999) views Tinto's model as requiring a student to undergo "cultural suicide" (1999, p.82), whereby the student is expected to make a clean break from

communities and cultures in which they were raised then integrate and assimilate into the dominant cultures of the colleges they attend (Tierney, 1999). Astin (2005) also noted the outcomes of students are strongly related to their incoming characteristics, and the differences between institutions are strongly related to the different characteristics of the population it serves. Given the demographics of college students are changing, attention to the individual characteristics students bring is even more important (Reason, 2009).

Kuh and Love (2000) examined Tinto's theory by looking at the role of culture in college persistence and deduced 8 propositions which apply to the cultural relationship to persistence. The propositions proposed are as follows:

1) The college experience is mediated through a student's cultural meaning-making system, which includes the decision to stay or leave.
2) The culture of origin mediates the importance of being in college and attaining a degree.
3) Knowledge of a student's culture of origin and immersion of cultures is needed to understand a student's ability to negotiate the institution's cultural setting.
4) There is an inverse relationship between persistence and the difference in the cultural of origin and the culture of immersion; the greater the distance between the two cultural institutions the less likely a student will persist.
5) Students whose cultural differences vary greatly from their culture of origin must become acclimated to the dominant cultures they are in or join one or more enclaves in their new institution.
6) The greater amount of time in a student's culture of origin the more cultural stress and the less likely they are to persist. The authors argue the more time spent in their culture of origin

the less time they will merge with the institutional culture and make persistence more difficult.

7) The extensity and intensity of the socio-cultural connections to academic programs and groups on campus will affect a student's decision to persist.

8) Students who belong to one or more enclaves or groups of cultural immersion are more likely to persist, especially if the group members place value on achievement and persistence.

In general, the first proposition looks at the role of the individual in understanding the institutional culture. Propositions 2 and 3 look at the cultural backgrounds of students and emphasizes those institutions which have a diverse set of students with varied cultural backgrounds. Propositions 4, 5 and 6 looks at cultural distance, which accounts for many of the challenges faced by students. The last two propositions address the issues of cultural connections in society (Kuh & Love, 2000).

Museus and Quaye (2009) modified the propositions of Kuh and Love (2000) to take into account their research. The authors used a semi-structured interview to examine cultural factors related to student persistence. While this study only included 30 participants, the authors did try to get a variety of students with respect to gender, race and progress towards the degree. Their modified propositions are:

1) Students will come in with varying cultural backgrounds and these cultural backgrounds shape their experiences.

2) A student's culture of origin will moderate the meanings attached to attending, engaging and completing a college degree. This includes what social groups they seek out and what emphasis they put on activities in a university setting.

3) Knowledge of students' cultures of origin are necessary to understand the ability of the students to navigate the cultural climate of their institution.

4) Students from minority cultures who attend a predominantly white institution and who live in a predominantly white culture will have less difficulty than those who live in a non-predominantly white culture due to the hardship of entering and exiting a white dominated culture.

5) Students must try to acclimate to the culture of the institution they attend, but the authors discuss the need for students to maintain strong cultural contacts with their communities of origin.

6) When an institution validates cultural minorities, there are fewer difficulties for cultural minorities and greater chances of persistence at the institution.

7) The quality and quantity of cultural contacts at an institution is positively related to their persistence at that institution.

8) Those who have cultural agents which emphasize cultural achievement, value educational attainment and validate their traditional cultural heritage are more likely to persist.

These updated propositions from Museus and Quaye (2009) conceptually fit Tinto's (1975) model, due to the interaction between an individual and their institution. When the institutions know and understand the cultural background of students, this knowledge can help establish a climate of comfort and integration within the institution. In propositions 6 through 8, an institution that validates and makes cultural agents available to students will increase the chances of successful integration into the institutional environment. This adds to the theory that an interactionist climate is related to persistence and should be a part of any conceptual framework of persistence. It also supports the assertion that cultural influences are required for a

model to accurately explain retention. Tierney's (1999) view that students should not have to cut cultural ties is very important, as Museus and Quaye (2009) argue that doing so can adversely influence persistence. Although integration into the institution should be encouraged, it should be done in a model that encourages a diverse cultural environment and not just the majority culture at the institution.

Technology and Social/Academic Integration

Technology is emerging as a way of social interaction. Considering social integration as being a key component of Tinto's (1975) theory, ways to communicate should also be examined. Mayer and Puller (2007) examined college students interactions on social media (specifically Facebook) and found students had a substantial amount of variation when it comes to the ability, parent education and political orientation of those individuals they interacted with on social media sites. The researchers did find the groups highly segmented by race, and this is consistent across different types of institutions studied. The interactions by race were more a matter of student preference and not based on any university policy, leading the authors to recommend ensuring the policies aimed at social integration be tied to increasing the preference of students to interact. Based on a sample of first year students, individuals with high levels of activity on Facebook have shown greater likelihood of persistence in college from a sample of first year students (Morris & Reese, 2009).

Instant messaging may also have a negative impact on grades by dividing time students will spend on school work and instant messaging, causing information overload (Junco & Cotten, 2011). Follow-up research has shown this pattern: increased use of some information and communication technologies (ICT) is negatively related to grades. Students using Facebook and text messaging were related to lower college grade point averages (GPAs) but a lower GPA was

not related to the use of e-mail, talking on the phone and searching the internet for subjects unrelated to class (Junco & Cotten, 2012). Contrary to the earlier findings of Junco and Cotten (2011), instant messaging was not related to GPA. The study by Junco and Cotten (2011) used self-report measures while Junco and Cotten (2012) used GPA which may be a more reliable measure of academic performance. The research above does make a strong argument that technology is being widely used by students and faculty. This shows a need for emphasis of technology and social media in retention research, especially its relationship to academic and social integration.

The influence of technology can also aid students in maintaining contact with individuals from their support networks. Mayer and Puller (2007) showed students on social media tend to associate with those of similar races, and Morris and Reese (2009) shows high social integration through social media. Technology can help individuals find those similar to themselves regarding culture, values, or other characteristics important to that person. These individuals may be at their university, home or both. This allows connections with individuals from their place of origin with similar cultural characteristics as advocated by Tierney (1999) and shown by Museus and Quaye (2009), Kuh and Love (2000) to be important in persistence.

Conclusions

The review of the literature, up to this point, shows a complex network of factors at work which influence whether or not someone will obtain a degree from a post-secondary institution. A preponderance of the research shows individual student characteristics play a role, but the relationships to the institution and certain institutional characteristics will also affect retention. One problem with looking at relationships within universities is the selection bias that exists for colleges. Since institutions of higher learning can decide who enters, they can select the students

they want, and therefore, the university can be as homogenous or heterogeneous as it sees fit. All of these challenges: integration, technology, and changing cultural demographics lead to the need for further research so policies are developed to ensure universities support students, as much as possible, in the completion of their degree

Chapter 3: Retention Among Individuals with Disabilities

Vincent Tinto's work (1975, 1982) has been the primary lens for studying student retention for years, with his model considered the paradigm for a theory of student retention (Braxton & Hirschy, 2005). Research has shown the role of student characteristics in retention research (Oseguera & Rhee, 2009; Rhee, 2008; Braxton & Lee, 2005; Braxton et al., 1997), and the neglecting of cultural influences and proposing remedies to these deficiencies (Tierney, 1999; Morris & Reese, 2009; Kuh & Love, 2000). Yet through all of this work individuals with disabilities are ignored as a major social group in the retention literature. Much of the focus on the higher education literature for individuals with disabilities has been on accommodations needed and the unique social challenges individuals with disabilities encounter.

Academic Integration

Academic integration has shown to be a powerful influence on whether an individual stays or drops out of a higher education institution (Tinto, 1975; Oseguera & Rhee, 2009; Rhee, 2008; Braxton & Lee, 2005; Braxton et al., 1997) and discussed more thoroughly above. Two areas which post challenges to academic integration for individuals with disabilities are accommodations and faculty interactions. While faculty interactions are an issue for all students, issues specific to individuals with disabilities may make these relationships even more difficult and have a negative impact on persistence.

Accommodations

Students with disabilities need assistance to be able to perform equally to their peers in an educational environment. Their disabilities may limit their ability to do tasks in the classroom and other activities of education which will mask their true capacity to learn the material being studied. This barrier may increase the chance of stress forcing the student with a disability out of

the university by lowering the goal commitment to succeed, as discussed in Tinto's (1975) initial model and works since then (Tinto, 1982). Reasonable accommodations for students with disabilities are mandated by both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 (1991). Institutions of higher education must provide basic accommodations required by law, although many institutions provide extra accommodations in addition. As opposed to primary and secondary school, a college student must be their own advocate and request accommodations. The individual must provide necessary medical documentation to the institution. In addition, the meaning of a "reasonable accommodation" is one that is still not clearly defined and may be subject to the perceptions of individuals within the offices providing services to students with disabilities.

Research by Amsel and Fichten (1990) demonstrates students with disabilities may be hesitant to ask for accommodations, even when those are a reasonable accommodation allowed under law. One view is the student with a disability, who is asking for special treatment, will fear standing out from their peers. The authors make suggestions to help students and professors with the accommodations process and much of this revolves around communication. Professors who have had students with disabilities in classes before are more likely to approve of accommodations, but students need to be prepared to approach professors and ask for specific accommodations and discuss the reasons for them. When problems arise in the classroom which have nothing to do with the presence of a disability, professors are still more hesitant to approach a student with a disability than a student without a disability (Amsel & Fichten, 1990).

The greater sensitivity towards students with disabilities poses a challenge to the ability of students with disabilities to get an education equal to that of their peers, even if given all accommodations needed. Since students with disabilities may be afraid to ask for assistance,

professors should discuss the class requirements and provide a time where students can meet with the professor to discuss special considerations, if necessary. Professors also need to be willing to engage students with disabilities in matters not relating to their disability, even though they may feel less comfortable doing so (Amsel & Fichten, 1990).

Faculty Interactions

Academic integration is also a major part of theoretical issues around retention (Tinto, 1975). A second component of academic integration is interactions with faculty. The Government Accountability Office (2009) reports that since faculty define the academic standards of their courses, they may feel that delivering accommodations may compromise their authority, academic standards, and/or values. Faculty members were, at times, unwilling to modify lectures or course materials to make them accessible, or provide commonly accepted accommodations such as longer time on exams. Faculty reported these to be fundamental alterations of their course. Faculty also reported lacking knowledge of helping students with disabilities, including those with medical or physical conditions. Disability services staff try to provide information during information sessions to members of the university community and written documentation to make clear the legal requirements of the institution (Government Accountability Office, 2009).

Social attitudes towards individuals with disabilities from undergraduates, graduate students, and faculty are usually admiration and pity. Among faculty, 29% feel admiration towards individuals with disabilities often, 54% occasionally, and 9% are never and not sure. Faculty feels pity 5% (often), 55% (occasionally), 33% (never), and 7% (not sure). Feelings of awkwardness/embarrassment are 3% (often), 58% (occasionally), 35% (never) and 5% (not sure). These numbers should concern university officials as these feelings may influence the

communications faculty will have with students. Many students and faculty expressed concern their actions may have been inappropriate and almost half indicated they were not eager about encountering people with disabilities. These concerns may be due to limited interactions with individuals with disabilities. Most faculty and graduate students did not think they should change anything for individuals with disabilities other than what is already being done, yet many faculty and graduate students reported needing better accessibility, support, accommodations, and transportation.

Social Interactions

In passing The Rehabilitation Act of 1973, Congress noted individuals with disabilities constitute one of the most disadvantaged groups in society. Individuals with disabilities continually encounter various forms of discrimination in such critical areas as employment, housing, public accommodations, education, transportation, communication, recreation, institutionalization, health services, voting, and public services. The law noted the policy of the United States Government and its subsidiaries is to provide the tools necessary to achieve equality of opportunity, full inclusion, and integration into society, employment, independent living, and economic and social self-sufficiency, for such individuals. In addition, it sought to implement policies to promote ”inclusion, integration, and full participation of the individuals;”. Section 504 of the Rehabilitation Act forbids discrimination towards individuals with disabilities by any entity or program receiving federal funds.

When the Americans with Disabilities Act of 1990 (1991) was passed, the findings about the status of individuals with disabilities were not very different from the Rehabilitation Act. Congress found that, historically, society has tended to isolate and segregate individuals with disabilities, and despite some improvements, such forms of discrimination against individuals

with disabilities continue to be a serious and pervasive social problem. In addition, Congress found individuals with disabilities continually encounter various forms of discrimination, including outright intentional exclusion, as well as the discriminatory effects of architectural, transportation, and communication barriers. Congress cited overprotective rules and policies, failure to make modifications to existing facilities and practices as barriers to inclusion. Exclusionary qualifications, standards, criteria, segregation, and relegation to lesser services, programs, activities, benefits, jobs, or other opportunities are also imposed on individuals with disabilities (Americans with Disabilities Act of 1990, 1991).

As demonstrated earlier, social integration plays a major role in college retention conceptual models (Tinto, 1975). Research supports the connection of social integration and persistence (Oseguera & Rhee, 2009; Rhee, 2008; Braxton & Lee, 2005; Braxton et al., 1997). Social exclusion and, at times, hostility towards individuals with disabilities may make the academic environment more challenging for individuals with disabilities to succeed.

People commonly feel uncomfortable around those with disabilities and the strategies for dealing with these social interactions are not always helpful to the long term goal of ending the stigma of a disability (Hebl & Kleck, 2000). In one study related to this issue, Fichten and Amsel (1986) looked at how people perceive individuals with disabilities. The researchers utilized undergraduate psychology students to assign certain traits to interactions the researchers arranged, a male and female, one with a disability (wheelchair bound) and another without a disability. The participants were then asked to assign traits to the individuals they interacted with. Students rated females more desirable than males, and fewer desirable traits to students with disabilities than those without disabilities. Also an interaction effect was significant that showed less desirable traits attributed to male individuals with disabilities than females with a

disability. A second study was reported in the same paper where students responded to surveys asking about their attitudes towards individuals with disabilities, age, and gender. The analysis developed from both studies showed the traits given to students with disabilities are more negative than those without disabilities. Sympathy, even though it was portrayed positively in the study materials, was rated negatively and further harmed participants attitudes towards individuals with disabilities. Traits attributed to individuals with disabilities were aloof-introverted, lazy-submissive, and ingenuous-unassuming, as opposed to their able-bodied participants, who were characterized as gregarious-extroverted, ambitious-dominant, and calculating-arrogant (Fichten & Amsel, 1986).

Gender differences also play a role in how individuals with disabilities and those without disabilities interact. Men are more likely to rate a limp and epilepsy as more visible than females. In addition, females were more likely to rate facial birthmarks more visible than males. Females across the age groups were more likely to rate individuals with disabilities more positively and make friends with them. When examining the interaction between disability and gender, there were no statistical differences in acceptability. Finally, males were more likely to rate disabilities more severely than females; it is thought males responded more adversely to the loss of physical abilities than females (Royal & Roberts, 1987).

Social integration is important to whether a student will persist to a degree in higher education (Tinto, 1975; Oseguera & Rhee, 2009; Rhee, 2008; Braxton & Lee, 2005; Braxton et al., 1997). Social exclusion and negative attitudes towards those with disabilities (Fichten & Amsel, 1986; Royal & Roberts, 1987) will add further barriers to individuals with disabilities obtaining a degree, preventing access to economic, social and cultural capital which accompanies a higher education.

Conclusions and Future Directions

Barriers to completing a higher education exist for all students, yet there are added challenges for people with disabilities. It is important to understand how a disability may interact with existing barriers all students face to completing a college degree. For example, most students face issues surrounding funding for college, but since individuals with disabilities have less income than those without disabilities (United States Census Bureau, 2010a), there may be a greater struggle for individuals with disabilities than most students. If there is a good understanding of these issues then programs directed at mitigating these challenges can be developed and implemented.

Purpose of the Study and Research Questions

In this study I examine socioeconomic and high school achievement variables related to retention of individuals with disabilities and how the relationships between retention and disability are different from the relationships between retention and individuals without disabilities. I examine eight subgroups of individuals with disabilities per the classification system used in the state of Washington (see appendix A). The groups include Blind/Visual, Chronic Health, Deaf/Hearing Learning Disability, Mobility, Neurological/CNS, Psychological/Emotional, and Speech/Language. The analysis is conducted using data from the student database of the University of Washington. The analysis examines what demographic, academic and financial factors are associated with whether or not a student remains in school to the completion of their degree. The purpose is to not only compare those with disabilities to those without disabilities but also examine these relationships for individuals with different types of disabilities.

This study is exploratory in nature and, while the data may provide some guidance on retention among individuals with disabilities, its conclusions will need to be assessed with caution. The sample does not look at the role of accommodations in retention, as this data is unavailable to the researcher. In addition, for those who dropped out it's not possible to determine why individuals did not get a degree. The research questions here only focus on associations for persistence in one institution.

Research Questions:

1: What differences, if any, exist between individuals with disabilities and individuals without disabilities regarding whether or not an individual persists to a degree?

2: What socio-economic and high school achievement factors are significantly related to whether or not a person with a disability persists to a degree or not?

3: What are the differences, if any, between different subgroups of disabilities regarding obstacles to persistence to a degree?

Chapter 4: Methods

This study is an analysis of data collected at the University of Washington. These analyses of de-identified data were approved by the University's Institutional Review Board. The data were obtained from official university records. Data was retrieved from 1999 to 2012 for all students with disabilities (N=1,646) and a random sample of students without disabilities N=5,234). Only students who had pursued an undergraduate degree were included. Professional, graduate, and non-matriculated students were not included. This was done since the literature around student retention has focused on students achieving an undergraduate degree. The outcome variable was whether or not a student was retained and obtained a bachelor's degree. Disability status, gender, and race were obtained from official university records. Race groups in the data set include Hawaiian -Pacific Islander, African American, Asian, Caucasian, Hispanic, International, Native American, and Not Indicated. For the purposes of this study international students were not included.

High school GPA and standardized test scores were obtained from official university records. Test scores from ACT and SAT were standardized so they could be on the same metric. If a student reported both scores the standardized test scores were averaged between the two reported scores.

The financial aid measures were obtained from the de-identified Free Application for Federal Student Aid Form. These financial measures were (1) whether the student and parent or student only reported income information, (2) the family total income and (3) expected contribution of the student or family. Family total income (FTI) which includes most taxed and untaxed income not including need based employment such as work study. The data set included a variable of adjusted gross income but family total income captures all of the sources of the

family and the correlation of the two variables is very high (r = 0.9856), so total family income will be used to be used as a proxy of economic resources of the family. Finally the expected family contribution a student is expected to contribute to their education will be used. This variable is an index of income, family size and parent age. All of this data was obtained from the FAFSA forms.

Statistical Analysis

The outcome variable of this study is a binomial variable, with the value of one as completion of a degree. A logistic regression will be used to determine whether or not significant relationships exist between the predictor variables and the outcome. The model will be fitted using R statistical software (Team & R Development Core Team, 2010). Model fit will be assessed by the chi-square significance test of the model and the z statistics of the predictors to determine statistical significance. The proportion of variance explained will be determined using Nagelkerke R squared coefficient (Nagelkerke, 1991). The equation below is adapted from Nagelkerke (1991).

$$\frac{1 - \{L(0) - L(\beta)\}^{\frac{2}{N}}}{1 - L(0)^{\frac{2}{N}}} \quad (1)$$

In equation 1 L(0) refers to the log likelihood of the null model and L(β) refers to the likelihood of the alternative model. Nagelkerke (1991) notes the denominator of this equation is the maximum r^2 and the numerator is the r^2 from the model, since without the r^2 max as a denominator the r^2 would not be on a scale of 0 to 1. Nagelkerke (1991) uses the example of a binary outcome variable where both values are half of the sample, the r^2 value based just on the numerator would be 0.75, and would not be appropriate proportion of variance explained value.

Missing Data Imputation

Multiple measures including high school GPA, standardized test scores and financial aid data contained missing data. Missingness of the test scores showed about the same proportion of missing data with 32.26% of those with disabilities having observed data and 30.72% of those without disabilities having observed data for test scores.

The financial aid data contained the most missing data with approximately 70% of the data missing. When looking at proportions of missingness, those without disabilities had 27.2% of financial aid data observed while those with disabilities had 37.97% of data observed.

Multiple imputations were utilized to account for the missing data. The imputation model used here is an expectation maximization bootstrap (EMB) algorithm. It will take each imputation and fill in the missing cells with multiple bootstrapped samples. It will then run the expectation maximization algorithm (EM) on these multiple bootstrap samples to create one imputed dataset (Honaker, King, & Blackwell, 2011). Typically this only requires a few imputations unless the missiness is very large (Honaker et al., 2011), this data set does have a large sample of missingness so work by Graham (2012) will be used to guide the number of imputed data sets. The R package Amelia II (Honaker et al., 2011) was used to create the imputed set and combine results using Rubin's rules (Rubin, 1987).

Chapter 5: Results

The results below show the characteristics of the sample. Since the speech and language category was so small (4 participants), it was removed from the analysis. The means tables below show means after estimating values for missing data.

Participant Characteristics

The final sample includes a total of 6,880 participants. The data includes 73 individuals categorized as having a Blind/Visual disability, 295 categorized as a Chronic Health, 80 with a Deaf/Hearing disability, 638 individuals with a Learning Disability, 257 individuals with a Mobility disability, 117 individuals had a Neurological/CNS disability, and 186 were categorized as having a Psychological/Emotional disability. 5,234 participants reported no disability. The University could only use one category for each student even if they had multiple disabilities so these may not reflect the true co-morbidity of disability status of the students in the sample. The categorization of disability is found in Appendix A provided to the University by the Higher Education Coordinating Board. Table 1 shows the overall percent of the sample that completed their degree.

Table 1: Degree Completion Rates

	N	%
Yes	5535	80.45%
No	1345	19.55%

Table 2: Descriptive Statistics of Participant Characteristics

		N	%
Disability	No Disability/Unknown	5234	76.08%
	Blind/Visual	73	1.06%
	Chronic Health	295	4.29%
	Deaf/Hearing	80	1.16%
	Learning Disability	638	9.27%

	Mobility	257	3.74%
	Neurological/CNS	117	1.70%
	Psychological/Emotional	186	2.70%
Race	African American	275	3.99%
	Native American	96	1.40%
	Asian	1222	17.76%
	Caucasian	4189	60.89%
	Hawaiian/Pacific	34	0.49%
	Hispanic	291	4.23%
	Not Indicated (Race)	773	11.23%
Gender	Female	3737	54.38%
	Male	3133	45.62%
Whose AGI	Student	1096	53.39%
	Student and Parent	956	46.59%

Table 3: Frequency Counts of Participants Stratified by Gender

Gender		Female	Male
	No Disability/Unknown	2842	2383
	Blind/Visual	35	38
	Chronic Health	188	106
	Deaf/Hearing	51	29
	Learning Disability	308	330
	Mobility	135	122
	Neurological/CNS	65	52
	Psychological/Emotional	113	73

Ethnicity		African American	Native American	Asian	Caucasian	Hawaiian/Pacific Islander	Hispanic	Not Indicated (Race)
	No Disability/Unknown	166	54	1084	3129	28	216	557
	Blind/Visual	9	3	3	47	0	1	10
	Chronic Health	20	7	28	176	1	17	46
	Deaf/Hearing	2	3	10	54	0	3	8
	Learning Disability	46	15	43	424	2	29	79
	Mobility	10	5	23	170	3	12	34
	Neurological/CNS	7	4	10	74	0	3	19
	Psychological/Emotional	15	5	21	115	0	10	20

Whose Income Reported		Student and Parents	Student Only
	No Disability/Unknown	741	686
	Blind/Visual	7	18
	Chronic Health	48	83
	Deaf/Hearing	10	20
	Learning Disability	102	147
	Mobility	13	44
	Neurological/CNS	20	32
	Psychological/Emotional	15	66

Descriptive Statistics

Table 2 show the number and percent of individuals in the different categories. Overall, fewer individuals with disabilities have completed a degree (76.46%) compared to individuals without disabilities (81.3%). Table 3 breaks down the retention percentages by disability group.

Table 4: Percentage of Students Retained by Disability Group

No Disability/Unknown	81.30%
Blind/Visual	75.34%
Chronic Health	78.31%
Deaf/Hearing	80.00%
Learning Disability	79.62%
Mobility	84.82%
Neurological/CNS	74.36%
Psychological/Emotional	62.90%

Table 4 shows the mean family total income for different disability groups. Overall individuals with disabilities have less economic resources ($52,062.30) than their non-disabled counterparts ($61,633.01).

Table 5: Family Total Income by Disability Group

No Disability/Unknown	$61,633.01
Blind/Visual	$51,226.94
Chronic Health	$53,374.38
Deaf/Hearing	$73,209.17
Learning Disability	$61,725.01
Mobility	$34,473.66
Neurological/CNS	$51,561.99
Psychological/Emotional	$32,686.88

Table 5 shows the mean expected family contribution to their college education among different disability groups. Overall, individuals with disabilities are expected to pay about the same ($12666.41) than their non-disabled counterparts ($13,633.87).

Table 6: Expected Family Contribution by Disability Group

No Disability/Unknown	$13,633.87

Blind/Visual	$9,306.46
Chronic Health	$15,112.30
Deaf/Hearing	$19,310.29
Learning Disability	$14,346.56
Mobility	$8,921.33
Neurological/CNS	$12,303.47
Psychological/Emotional	$6,888.13

Overall, individuals with disabilities come into the University with a lower mean GPA (3.49) than their non-disabled counterparts (3.63) although much variation exists among the groups of individuals with disabilities as shown in Table 6.

Table 7: High School GPA by Disability Category

No Disability/Unknown	3.634
Blind/Visual	3.505
Chronic Health	3.564
Deaf/Hearing	3.670
Learning Disability	3.368
Mobility	3.601
Neurological/CNS	3.375
Psychological/Emotional	3.653

Missing Data Analysis

In the observed data, race group membership and disability status were not missing. The variable Gender had only ten individuals with missing values and was included in the imputation algorithm. The proportion of missing for the high school measures and socioeconomic status measures in the data is shown in Table 7. The number of imputations needed to be large due to the amount of missingness in these variables, a table from Graham (2012) noted those with 70% of missing data needed 100 imputations. The final decision of 100 imputations was made as this would allow for many estimates of the missing values to account for the large amount of missingness while not sacrificing computing efficiency. To ensure the maximum amount of

observed information is used in the imputation process, variables with complete cases were placed in the algorithm, the exception being the dummy variable of whether a person has a disability or not.

The program Amelia II by Honaker et al. (2011) was used to conduct the multiple imputations. The imputed data sets were created from within R statistical software (R Core Development Team, 2010) and then, via a loop, each model was estimated on each data set. This analysis ran a logistic regression, also saved the chi-square estimates and Nagelkerke estimates for each model. The parameter estimates were combined using Rubin's rules (Rubin, 1987) via another function in the package Amelia II. The information returned was a single set of parameter estimates and standard errors, taking into account the error within the models but also the variation among the different data sets. A ratio of the parameter estimates to their standard errors allowed a z statistic to be calculated and significance testing on the parameters. The chi-square values and the Nagelkerke r^2 values were reported in the Tables 9 and 10.

Table 8: Proportion of Data Missing

Gender	0.0015
High School GPA	0.6209
Standardized Test Scores	0.6893
Whose Income Reported	0.7018
Family Total Income	0.7018
Expected Family Contribution	0.7018

Logistic Regression

Logistic regressions using degree completion as the outcome variable were performed to answer the research questions. Research question one examined whether or not individuals with disabilities are different than their peers without disabilities with regards to retention rates. The estimates below are the statistics derived from Rubin's Rules (Rubin, 1987) for aggregating the parameter estimates of the 100 imputations. The χ^2 values and Nagelkerke r^2 values of each

model were saved and the mean, standard deviation, minimum and maximum from all 100 models are reported. Overall there was little variation in the χ^2 values showing model fit not changing much with the different imputations. Correlations of the financial aid variables and the outcome along with disability status are shown in Table 8.

Table 9: Correlation of Retention and Disability Status with Financial Aid Variables

	Retention	Student Income	FTI	EFC	Disability Status
Retention	1.00				
Student Income	-0.03	1.00			
Family Total Income (FTI)	0.08	-0.51	1.00		
Expected Family Contribution (EFC)	0.08	-0.38	0.82	1.00	
Disability Status	0.09	-0.16	0.06	0.02	1.00

Table 10: Logistic Regression Model Results - Disability/No Disability and High School GPA

	Disability Status		Gender		Race Predictors		No Interactions		With Interactions	
(Intercept)	1.25	***	1.38	***	1.46	***	-2.33	***	-1.79	
Male			-0.28	***	-0.27	***	-0.20	**	-0.20	**
Not Indicated (Race)					-0.20		-0.14		-0.13	
Native American					-0.71	**	-0.70	**	-0.70	**
Hispanic					-0.19		-0.07		-0.07	
Hawaiian/Pacific Islander					-0.31		-0.16		-0.16	
Asian					-0.01		0.07		0.07	
African American					-0.35		0.08		0.07	
High School GPA							0.98	***	0.82	***
Standardized Test Scores							0.02		0.03	
Student Income Only Reported							0.25	*	0.25	*
Family Total Income							0.00		0.00	
Expected Family Contribution							0.00		0.00	
Disability Status	-0.22	**	-0.22	**	-0.19	**	-0.07		0.72	
Disability Status - High School GPA									-0.23	
χ^2 Mean	9.71		30.08		48.33		212.95		214.84	
χ^2 SD	0.00		0.28		0.28		33.90		34.23	
χ^2 Min	9.71		29.38		47.64		157.01		157.59	
χ^2 Max	9.71		30.70		48.97		310.92		313.03	
Nagelkerke r^2 Mean	0.00		0.01		0.01		0.05		0.05	
Nagelkerke r^2 SD	0.00		0.00		0.00		0.01		0.01	
Nagelkerke r^2 Min	0.00		0.01		0.01		0.04		0.04	
Nagelkerke r^2 Max	0.00		0.01		0.01		0.07		0.07	

Note: $\chi 2$ value for Disability status model significant at $p<0.025$, others significant at $p < 0.005$ level,* $p < .05$, ** $p < .01$, *** $p < .001$.

The high correlation between expected family contribution and family total income r = 0.82 may be influencing the results of the logistic regression. The last set of models analyzes only the family total income variable as it's the best proxy for the financial assets available to the student. This will give better insight into the relationship financial aid has on retention.

The results of the models analyzing disability status are shown in Table 9. The first model examined disability status and retention and disability status was significant ($\beta = -0.22$, $p < 0.001$, OR=0.8). The second model added gender as a predictor, gender ($\beta = -0.28$, $p < 0.001$, OR=0.75) and disability status ($\beta = -0.22$, $p < 0.001$, OR=0.80) remained a significant predictor of degree completion. The next model added race predictors (with white as the reference group) and only Native American was significant in that model ($\beta = -0.71$, $p < 0.01$, OR=0.49), as well as gender ($\beta = -0.27$, $p < 0.01$, OR=0.76) and disability ($\beta = -0.19$, $p < 0.01$, OR=0.83) remaining statistically significant. The fourth model examined the additional effect of adding standardized test scores and financial aid variables to the equation. In this "No interaction model", Gender was inversely related to degree completion ($\beta = -0.2009$, $p < 0.01$, OR=0.81) as well as Native American ethnicity ($\beta = -0.70$, $p < 0.01$, OR=0.49) status was inversely related to degree completion. High School GPA was related to degree completion ($\beta = 0.9803$, $p < 0.001$, OR=2.67), as was only the student reporting income as opposed to students and parents ($\beta = 0.245$, $p < 0.05$, OR=1.28). Disability status is no longer making a statistically significant contribution to the prediction of degree completion. In the final model labelled "Interaction Model", testing the interaction of disability status and high school GPA, the interaction was not statistically significant indicating that GPA was associated with degree completion to the same extent in individuals with and without a disability. Only a small portion of the variance was explained with the mean Nagelkerke r^2 at about 5%.

Table 11: Logistic Regression Model Results - Disability Categories and High School GPA

	Disability Status		Gender Added		Race Predictors Added		No Interactions		With Interactions	
(Intercept)	1.47	***	1.61	***	1.66	***	-2.52	**	-2.51	***
Male			-0.29	***	-0.28	***	-0.22	**	-0.21	**
Not Indicated (Race)					-0.20		-0.14		-0.14	
Native American					-0.70	**	-0.69	**	-0.69	**
Hispanic					-0.19		-0.05		-0.05	
Hawaiian/Pacific Islander					-0.36		-0.19		-0.17	
Asian					0.00		0.08		0.08	
African American					-0.33		0.14		0.15	
High School GPA							1.05	**	1.05	***
Standardized Test Scores							0.04		0.04	
Student Income Only Reported							0.27	*	0.27	*
Family Total Income							0.00		0.00	
Expected Family Contribution							0.00		0.00	
Blind/Visual	-0.35		-0.34		-0.28		-0.20		-0.85	
Chronic Health	-0.19		-0.21		-0.18		-0.15		-2.10	
Deaf/Hearing	-0.08		-0.11		-0.09		-0.23		0.69	
Learning Disability	-0.11		-0.09		-0.06		0.20		-0.01	
Mobility	0.25		0.26		0.28		0.34		-0.72	
Neurological/CNS	-0.40		-0.41		-0.38		-0.11		2.98	
Psychological/Emotional	-0.94	***	-0.96	***	-0.94	***	-1.00	***	-1.62	
Blind/Visual - High School GPA									0.20	
Chronic Health - High School GPA									0.56	
Deaf/Hearing - High School GPA									-0.25	
Learning Disability - High School GPA									0.06	
Mobility - High School GPA									0.31	
Neurological/CNS - High School GPA									-0.92	

Psychological/Emotional - High School					0.17
χ^2 Mean	41.40	63.36	81.03	258.84	269.60
χ^2 SD	0.00	0.29	0.29	35.55	35.79
χ^2 Min	41.40	62.63	80.32	197.22	205.58
χ^2 Max	41.40	64.00	81.70	366.48	378.59
Nagelkerke r^2 Mean	0.01	0.01	0.02	0.06	0.06
Nagelkerke r^2 SD	0.00	0.00	0.00	0.01	0.01
Nagelkerke r^2 Min	0.01	0.01	0.02	0.05	0.05
Nagelkerke r^2 Max	0.01	0.01	0.02	0.08	0.09

Note: χ2 value significant at $p < 0.005$ level,* $p < .05$, ** $p < .01$, *** $p < .001$.

The next analysis step was to look at the association of specific disability subcategories with degree completion and the results are, shown in Table 10. The first model examined disability category and retention and only psychological and emotional disability was significantly related to degree completion ($\beta = -0.94$, $p < 0.001$, OR = 0.39). The second model added gender as a predictor, gender ($\beta = -0.29$, $p < 0.001$, OR = 0.75) and as before only psychological and emotional disability was a statistically significant ($\beta = -0.96$, $p < 0.001$, OR = 0.39) predictor of degree completion. The next model added race predictors and only Native American was significant in that model ($\beta = -0.70$, $p < 0.01$, OR = 0.50), as well as gender ($\beta = -0.29$, $p < 0.01$, OR = 0.75) and psychological and emotional disability ($\beta = -0.94$, $p < 0.01$, OR = 0.39) remaining statistically significant. The fourth model "No Interaction", examined the effect of adding standardized test scores and financial aid variables. Gender (male) remained inversely related to degree completion ($\beta = -0.22$, $p < 0.0$, OR = 0.80) as well as Native American ethnicity ($\beta = -0.69$, $p < 0.01$, OR = 0.50) status being inversely related to degree completion. High School GPA was related to degree completion ($\beta = 1.05$, $p < 0.001$, OR = 2.86), as was only the student reporting income as opposed to students and parents ($\beta = 0.27$, $p < 0.05$, OR = 1.31) and psychological and emotional disability ($\beta = -1.0$, $p < 0.01$, OR = 0.39). The final model, "With Interaction" found that none of the interactions of GPA with disability category were statistically significant; indicating that the association of high school GPA with degree completion was similar for individuals with and without a specific disability.

The results show that the model fit of the different imputed data sets is rather stable. The range of Nagelkerke r^2 values is about 4% in all models and the standard deviation of the chi square values is small relative to the mean.

To examine the effect of the high correlation between two of the financial aid variables, the models were rerun with just family total income to see if the financial relationship was being divided among the three predictors. As shown in Table 11, Family total income was significantly related to retention in both the models without ($\beta = 2.369e-06$, $p < 0.01$, OR = 1.0) and with the interaction ($\beta = 3.033e-06$, $p < 0.05$, OR = 1.0). There is no significant difference of the effect of family total income between those with disabilities and those without disabilities. Nagelkerke r^2 demonstrates about 4.4% of the variance is being explained in these models.

Table 12: Logistic Regression Model Results - Disability/No Disability and Family Total Income

	No Interactions		With Interactions	
(Intercept)	-2.02	**	-2.06	**
Male	-0.20	**	-0.21	**
Not Indicated (Race)	-0.14		-0.14	
Native American	-0.69	**	-0.70	**
Hispanic	-0.07		-0.07	
Hawaiian/Pacific Islander	-0.20		-0.19	
Asian	0.02		0.02	
African American	0.06		0.06	
High School GPA	0.95	***	0.96	***
Standardized Test Scores	0.03		0.03	
Family Total Income	0.00	**	0.00	*
Disability Status	0.04		0.08	
Disability Status - Family Total Income			0.00	
$\chi 2$ Mean	194.69		196.05	
$\chi 2$ SD	30.82		30.84	
$\chi 2$ Min	133.58		136.84	
$\chi 2$ Max	269.23		269.94	
Nagelkerke r^2 Mean	0.04		0.04	
Nagelkerke r^2 SD	0.01		0.01	
Nagelkerke r^2 Min	0.03		0.03	
Nagelkerke r^2 Max	0.06		0.06	

Note: $\chi 2$ value significant at $p < 0.001$ level,* $p < .05$, ** $p < .01$, *** $p < .001$.

The significant relationship of family total income with degree completion remains in the models controlling for individual disability subcategories ($\beta = 2.237e-06$, $p < 0.05$) as shown in

Table 12, and remains significant when interactions of family total income and disability subcategory ($\beta = 2.09e-06$, $p < 0.05$,OR=1.0), but none of the subcategories of disability are significantly related to retention when compared to those without a disability.

Table 13: Logistic Regression Model Results – Disability Categories and Family Total Income

	No Interactions		With Interactions	
(Intercept)	-2.20	**	-2.20	**
Male	-0.22	**	-0.22	**
Not Indicated (Race)	-0.14		-0.14	
Native American	-0.68	**	-0.68	**
Hispanic	-0.05		-0.06	
Hawaiian/Pacific Islander	-0.23		-0.23	
Asian	0.03		0.03	
African American	0.12		0.12	
High School GPA	1.02	***	1.02	***
Standardized Test Scores	0.05		0.05	
Family Total Income	0.00	*	0.00	*
Blind/Visual	-0.16		-0.32	
Chronic Health	-0.11		-0.03	
Deaf/Hearing	-0.16		-0.32	
Learning Disability	0.22		0.17	
Mobility	0.39	*	0.36	
Neurological/CNS	-0.09		-0.13	
Psychological/Emotional	-0.94	***	-0.93	***
Blind/Visual - Family Total Income			0.00	
Chronic Health - Family Total Income			0.00	
Deaf/Hearing - Family Total Income			0.00	
Learning Disability - Family Total Income			0.00	
Mobility - Family Total Income			0.00	
Neurological/CNS - Family Total Income			0.00	
Psychological/Emotional - Family Total Income			0.00	
$\chi 2$ Mean	238.85		245.75	
$\chi 2$ SD	32.05		32.05	
$\chi 2$ Min	171.66		183.56	
$\chi 2$ Max	313.95		319.61	
Nagelkerke r^2 Mean	0.05		0.06	
Nagelkerke r^2 SD	0.01		0.01	

Nagelkerke r^2 Min	0.04	0.04
Nagelkerke r^2 Max	0.07	0.07

Note: $\chi 2$ value significant at $p < 0.001$ level,* $p < .05$, ** $p < .01$, *** $p < .001$.

Chapter 6: Discussion

This study examined whether or not individuals with disabilities complete degrees at the same rate as their non-disabled peers and what factors, if any, differentially predict degree completion for individuals with disabilities and those without disabilities. This study used archival data from 1999 (when the current system of categorizing individuals with disabilities was put in place), to 2006. No individuals were analyzed after 2006 so individuals who were still progressing to their degree were not considered drop outs (as this data was obtained in 2012). The variables of race, gender, high school GPA, standardized test scores and disability status were analyzed in four models. The first model used a binary variable to test the association of disability with degree completion controlling for all of the other variables. Since high school GPA was a strong predictor of degree completion itself, an interaction was tested in the second model with disability and high school GPA yet it did not reveal significant results either. When analyzing students with disabilities based on disability category, the only disability group which showed significant (negative) relationship with degree completion was those with psychological/emotional disabilities. Including interactions of disability category with high school GPA showed no significant relationship to any disability group interacting with high school GPA to retention. In the following sections, I discuss each of these findings. I conclude the chapter with recommendations for both policy and practice.

Disability and Retention

In the sample analyzed, disability status was a significant predictor of degree completion, even when gender and race category were controlled. After controlling for high school GPA, there was no difference in degree completion of individuals with and without a disability status.

When looking at subgroups of disability only individuals with psychological or emotional disabilities were significantly less likely to persist to degree completion.

Descriptive statistics did show disparities in many of the variables analyzed when it came to subcategories of disability. While overall high school GPA of individuals with disabilities was lower than those without a disability, subgroups of disability demonstrated great variation. Specifically, individuals categorized as having a neurological or central nervous system impairment and learning disability had the lowest incoming HS GPA in this study (3.375 and 3.368 respectively). Similar findings show individuals with disabilities with fewer financial resources than their non-disabled counterparts: $52,062.30 to $61,633.01, respectively. Findings indicated variation among disability groups on this measure, with the lowest income from those with mobility impairments ($34,473.66) and psychological/emotional disabilities ($32,686.88). Those with a hearing disability come in with the most financial resources with a family total income of $73,209.17. The reasons for the disparities are not clear from these data. It could be these groups have more access to financial resources from family or other sources, or may be able to find work more easily. It's also possible there is a selection bias–individuals with higher incomes may come to the University of Washington because of its status as a major research institution. Individuals who are mobility impaired and have psychological or emotional disabilities may have incomes so low they are able to attend the University of Washington based on government assistance programs. Vocational Rehabilitation programs were enacted by the Rehabilitation Act of 1973 to assist individuals with disabilities to gain access to a higher education. Prospective students with disabilities who have low incomes may be eligible for this and other social welfare programs.

General Degree Completion

It is not uncommon for students to take a trajectory in higher education in which they may earn a degree through more than one institution (Berger & Lyon, 2005). The present study does not allow for a determination of why an individual did not persist to a degree if they were classified as not retained. It is possible for individuals to transfer to other schools, to leave and come back or just in general drop out. This research study was not able to determine whether or not a student dropped out of college or whether they went to another institution to finish their degree or its possible they could come back to finish their degrees.

College Preparation

The strongest and most consistent predictor of retention was shown to be high school GPA. Rhee (2008) has demonstrated high school achievement is a predictor of stop out, drop out and transferring to another institution. This finding was supported in this analysis as a strong relationship between high school GPA with persisting to completion for both individuals with and without a disability.

Furthermore Osegura and Rhee (2009) have shown that on an institutional level high school GPA as well as the high school GPA of individual students was predictive of dropout. The present study supports this claim as the estimates in the regression models are inversely related to being retained. This is especially concerning for individuals with disabilities as they come in with a lower GPA and therefore may not be as well prepared for college.

The major question here is what about high school GPA is leading students to higher rates of retention at college. For example, is it that these students are intellectually more prepared, or is it that social or academic behaviors learned in high school that allows them to acclimate to the academic rigors of college? A study that follows students from high school through college or a study that has the ability to investigate the pre-college environment of

students would help us understand this relationship. Questions of how much parents helped and encouraged completion of a high school and subsequently college education, socio-economic status of the high school, and types of classes taken during high school (remedial, typical or advanced) may help explain why high school GPA is consistently strongly related to college retention.

Financial Considerations

The results of the present study support some relationships found in previous research. The circumstances of whether a student reported parents' income in addition to their own was statistically significant in some of the models. Also when only having family total income in the model as the sole financial aid variable, it is statistically significantly related to retention but a very low estimate makes the effect size weak. Again, the reason for this relationship isn't clear and warrants further investigation. Since Oseguera and Rhee (2009) demonstrated financial concerns were related to drop out rates for college students, the lack of statistical significance of other financial aid variables of students in general cannot be discounted in theory of college retention. Lack of significance could be a product of the methodological challenges and limitations of this study rather than a disconfirmation of financial considerations in college retention.

Demographics

One surprise in the present findings was the lack of a strong relationship between ethnicity and degree completion. Only those self-reported as Native American were consistently less likely to be retained to a degree. Gender was a strong and consistent predictor of retention with those of male gender being less likely to complete a degree. The challenges that face individuals whose culture differs from the predominant culture in the institution is discussed

extensively in the literature. This has been demonstrated by Seidman (2005), who discussed the barriers to retention of underrepresented populations, including lack of finances, distance from cultural and family ties, the paucity of individuals with similar culture characteristics, as well as academic preparation as being significantly related to retention. Efforts to include culture in the framework of Tinto (1975) has been noted by Tierney (1999), who asserts Tinto is assuming students reject their cultural past and integrate into the dominant culture of the institution. The work of Tierney (1999) gives reason for exploring relationship such as race as a proxy for examining cultural aspects of retention, given the lack of variables to directly measure cultural influence on retention.

An institution itself can influence whether minority students will persist to a degree. For example, Rhee (2008), demonstrated that the lack of structural diversity and diversity emphasis in an institution was significantly related to stop out of college; minority status and socioeconomic status was also related to drop out. The institution studied in this research, the University of Washington, puts a strong emphasis on diversity. The University has offices for minority affairs and disability, Native American offices under Native Life & Tribal Relations, Q Center for individuals who are of minority sexual orientation, the womens center, disability services, and faculty diversity[2]. Underrepresented minorities at the University of Washington are defined as Black, Hawaiian and Pacific Islander, Latino and Native American) as well as students of color (which includes the groups mentioned before as well as Asian students). The University reports the proportion of African American students at Seattle campus has gone from 2.6% to 3.4% from autumn 2001 to autumn 2013. Those of Asian descent went from 19.8% to 24.9%. Hawaiian and Pacific Islander went from 0.5% to 1%. Latino students went from 3.6% to 6.9%. International students have gone from 2.9% to 14.1%. Native American Students have

[2] information taken from http://www.washington.edu/diversity/

gone from 1.1% to 1.3%. The two groups who have proportionally declined as part of the student body has been those who are White or not indicated at 66.5% in 2001 to 45.8% in 2013, and Filipino students went from 3% to 2.6% (UW Office of Minority Affairs & Diversity Assessment Unit, 2013).

Other campuses of the University of Washington have shown similar changes. University of Washington at Bothell changed the proportion of African American students changed from 2.1% to 6.4% in the same time period as above. Those of Asian descent went from 13.2% to 23.8%. Hawaiian and Pacific Islander went from 0.3% to 1.7%. Latino students went from 2.5% to 8.3%. International students have gone from 2.2% to 7.3%. Native American Students have gone from 1% to 1.3%. Filipino students increased percentage as opposed to Seattle trend changing from 2.5% to 8.3%. White or not indicated students are the only group to decline from 76.2% in 2001 to 48.2% in 2013 (UW Office of Minority Affairs & Diversity Assessment Unit, 2013).

Finally data on the changing demographics of University of Washington at Tacoma show that African American students changed from 5.1% to 9%. Those of Asian descent went from 9.2% to 15.7%. Hawaiian and Pacific Islander went from 0.4% to 2.5%. Latino students went from 3.6% to 9.3%. International students have gone from 0.3% to 3.9%. Native American Students have gone from 0.3% to 3.9%. Filipino students also increased percentage as opposed to the Seattle campus trend changing from 1.6% to 2.8%. White or not indicated students are the only group to decline from 78.7% in 2001 to 54.7% in 2013 (UW Office of Minority Affairs & Diversity Assessment Unit, 2013).

These statistics show the University of Washington takes seriously admitting individuals of underrepresented populations into the university in all three of its campuses. Institutional

commitment both academic and social domains of life is key to Tintos (1975) theories of retention for which most retention research is founded upon, so an institution committed to diversity would only seem to help in this respect. As noted before by Rhee (2008), an institutional commitment to diversity and structural diversity are predictors of retention, giving empirical credibility to this hypothesis

Methodological Challenges

This study has significant limitations which limit the generalizability of the results to theory, policy or practices. The many challenges are due to the limited access to data and the quality of the data. There were problems related to other potential predictors where zeroes were used as structural zeroes but also used to denote missing data. For this reason some variables could not be included in these analyses such as years of classes taken in different subjects in high school (e.g. number of years of math classes during high school).

Data were also not available for the social integration variables mentioned in the theoretical literature.

Measurement of Disability Type

The categorization system used by the university (designed and required to be reported to the Higher Education Coordinating Board (CITE)) is ineffective at classifying and properly identifying disability conditions, and determining how these may impact an individual's ability to persist to a degree. For example, one category is "central nervous system impairment" and another is "mobility impairment". If a person has a spinal cord injury she or he is very likely to be mobility impaired. There is no way to specify whether an individual falls into more than one category. In addition to some disability conditions falling into more than one category, some individuals will have multiple diagnoses. In other cases, one diagnosis may be a complication of

another disability. This dilutes the ability to determine how much impact a disability might have, and does not allow examination of the extent to which multiple diagnoses influence retention. Using broad categories instead of functional assessments needed for college work is insufficient to determine if there is a level playing field with students with disabilities and whether accommodations are meeting those deficits. This is due to a diagnoses being too vague and not giving sufficient information on what barriers a student faces. Having a functional limitation system would give a measure of barriers an individual with a disability may encounter in an institution of higher education.

One example of a more useful way of categorizing disability conditions is the International Classification of Functioning, Disability and Health from the World Health Organization (2001; ICF). This framework provides a template where it looks at the functional capacities of an individual and gives a scale through which those functions are measured. It talks about limitations of 0-4% as no problem, 5%-24% as a mild problem, 25%-50% as moderate problem, 50-95% as a severe problem, and 95%-100% as a complete problem. Complete problem is total limitation in that domain. These are not exhaustive lists but suggested terms in the ICF (World Health Organization & Organization, 2001). These assessments are done by the appropriate clinicians, for example a general practitioner is unlikely to be able to judge emotional or psychological limitations but can judge physical limitations. In this type of functional approach to defining and categorizing disability conditions, the functions needed for college would be tested, such as reading, writing, walking, etc. These functions could then be quantified into groups. This methodological improvement would afford the ability to not only look at what limitations may influence retention but also the extent to which the more

impairments a person has decreases chances of retention. This is not something the current coding system allows since a student cannot be placed into more than one category.

Missing Data Analysis

As more variables were added to the model the percent of missing data increased. This required multiple imputation methods to be used to estimate values in the variables. the analysis does take into account the between and within imputations. Multiple imputation was conducted by a software package called Amelia II (Honaker et al., 2011). This imputation method required a large number of imputations but did allow for estimation of the missing values. Using rules set forth by Rubin (1987), the estimates were combined into one set of parameter estimates and one set of standard errors for each model estimated across all of the imputations

While maximizing the amount of observed data is critical, missing data is a concern for all researchers. While the conclusions of this study would be amplified by a greater quantity of observed data, usage of multiple imputation does show its utility in research where missing data can make analyses more difficult. The default for statistical programs is to delete any case which does not have observed values for all of the variables in the model. This not only limits the amount of information in the model but it discards actual observed values which can lead to a loss of power in the analysis (Graham, 2012). An example of the loss of power is if a researcher asks 10 questions to 10 people in a survey, there are 100 possible observations. If 5 of the participants leave just one question (but not the same question) blank, a list wise deletion would remove half of participants from the study, thus analyzing only 50% of the data when 95% of the data is actually observed by the researcher. Therefore multiple imputation is not only estimating the missing values but the adding the benefit of ensuring the maximum amount of observed values is utilized by the models. Graham (2012) notes listwise deletion will not be problematic

when the number of missing cases is smaller but this small example is used for illustrating the reasoning behind multiple imputation. The present study benefited from multiple imputation since the amount of missing data was high on some variables the lack of power with listwise deletion in the more complex models would be considerable.

Future Research

The varying degree of significance in the models is a testament to the need for more research into this area. Two types of studies are proposed. Each has different benefits related to the improvement of theory but also limitations. First is a mixed methods study with a strong qualitative component. The sample should include a group of individuals with different types of disabilities and a comparison group of individuals without disabilities with similar characteristics. In addition participants in the study need to represent the different types of student tracks through higher education system, using definitions of Berger and Lyon (2005) and Hagendorn (2005), including those who start from high school and stay until graduation, those who may take breaks between matriculation and graduation, individuals who change institutions or those who decide or are forced not to be able to continue to a degree at all. The study should examine what characteristics are the same and what characteristics are different between the types of students in the scenarios suggested and other scenarios which may come up in the participation recruitment process. This study can also collect quantitative data on what factors led to them leaving an institution of higher education, educational history, demographics, financial resources, attitudes towards higher education, and other questions which may come up during the construct development phase. The limits to this type of study include likelihood it would have a small sample size and so the ability to extrapolate to a larger population would be

difficult. Also the time and training to do the interviews would mean a significant allocation of resources to conduct this study.

A long term study would be a true longitudinal study of students entering institutions of higher education and tracking them to see which ones remain in the institution until graduation. Ideally there would be multiple institutions involved in this research with a variety of institutions including community colleges to selective four year universities. The large number of variables being tested should be measured and measured properly. This includes common variables such as standardized test scores, high school classes and GPA, along with GPA while progressing through the university.

Conclusions

This study gives some insights into how individuals with disabilities progress through the higher education system. In general individuals with disabilities are retained at approximately the same rate as individuals without disabilities. Although the descriptive statistics of the different groups suggests there are disparities in preparedness for college as measured by high school GPA and disability status, this was not statistically significant. Further analysis should still explore these discrepancies and see if there are unforeseen challenges among individuals with disabilities and if these factors are related to individuals with disabilities at other institutions. It is a positive sign that individuals with disabilities are retained at similar rates as their peers; it is a credit to the University of Washington and society's push to assist individuals with disabilities into the modern economy. Nevertheless, the nonsigificant differences in retention observed in the present study does not imply that important great disparities do not remain. Much work remains to be done, not only at the University of Washington, but across the nation to maximize the access retention and success of vulnerable student populations in higher education.

References

Ablon, J. (2002). The nature of stigma and medical conditions. *Epilepsy and Behavior, 3 (6S2),* 2–9.

Amsel, R. & Fichten, C. S. (1990). Interaction between disabled and nondisabled college students and their professors: A comparison. *Journal of Postsecondary Education and Disability, 8 (1),* 125–140.

Amsel, R. & Fichten, C. S. (1988). Effects of Contact on Thoughts About Interaction with Students Who Have a Physical Disability. *Journal of Rehabilitation, 54 (1),* 61–65.

Astin, A. W. (2005). Making sense out of degree completion rates. *Journal of College Student Retention: Research, Theory & Practice, 7 (1),* 5–17.

Beil, C., Reisen, C., Zea, M. C., & CapIan, R. C. (1999). A longitudinal study of the effects of academic and social integration and commitment on retention. *Journal of Student Affairs Research and Practice, 37 (1),* 376–385.

Berger, J. B. & Lyon, S. C. (2005). Past to present: A historical look at retention. In A. Seidman (Ed.), College student retention: formula for student success (pp. 1–30). Westport, CT: American Council on Education and Praeger Publishers.

Braxton, J. M. & Hirschy, A. S. (2005). Theoretical developments in the study of college student departure. In A. Seidman (Ed.), College student retention: formula for student success. Westport, CT: American Council on Education and Praeger Publishers.

Braxton, J. M. & Lee, S. D. (2005). Toward reliable knowledge about college student departure. In A. Seidman (Ed.), College student retention: formula for student success (Chap. 5, pp. 107–127). Westport, CT: American Council on Education and Praeger Publishers.

Braxton, J. M., Hirschy, A. S., & McClendon, S. A. (2004). Understanding and Reducing College Student Departure: ASHE-ERIC Higher Education Report. Hoboken, NJ: Jossey-Bass. Retrieved from http://www.amazon.com/Understanding- Reducing- College-Student-Departure/dp/0787972827

Braxton, J. M., Sullivan, A. S., & Johnson, R. (1997). Appraising Tinto's Theory of College Student Departure. In J. Smart (Ed.), Higher education handbook of theory and research (12th ed., Vol. 12, pp. 107–164). New York: Agathon.

Bruder, M. B. & Mogro-Wilson, C. (2010). Student and Faculty Awareness and Attitudes about Students with Disabilities. *Review of Disability Studies: An International Journal, 6 (2),* 3–13.

Budisch, K. (2004). Correlates of College Students' Attitudes Toward Disabilities. UW-L *Journal of Undergraduate Research, 7,* 1–5.

Durkheim, E. (1951). Suicide: A study in sociology (J. A. Spaulding & G. Simpson, Trans.). Glencoe, Il: The Free Press. Retrieved from http://www.bahaistudies.net/asma/suicide-durkheim.pdf

Fichten, C. S. & Amsel, R. (1986). Trait attributions about college students with a physical disability: Circumplex analyses and methodological issues. *Journal of Applied Social Psychology, 16 (5),* 410–427.

Fichten, C. S. & Bourdon, C. V. (1986). Social Skill Deficit or Response Inhibition: Interaction Between Disabled and Nondisabled College Students. *Journal of College Student Personnel, 27 (4),* 326–33.

Goffman, E. (1963). Stigma: Notes on the Management of Spoiled Identity. New York City: Simon & Schuster.

Government Accountability Office. (2009). Higher education and disability Education needs a coordinated approach to improve its assistance to schools in supporting students. Washington, D.C.

Graham, J. W. (2012). Missing Data: Analysis and Design (Statistics for Social and Behavioral Sciences). New York: Springer.

Hagendorn, L. S. (2005). How to define retention: A new look at an old problem. In A. Seidman (Ed.), College student retention: formula for student success (Chap. 4, pp. 89–105). American Council on Education and Praeger Publishers.

Hebl, M. R. & Kleck, R. E. (2000). The social consequences of physical disability. In The social psychology of stigma (pp. 419–439). The Guilford Press.

Honaker, J., King, G., & Blackwell, M. (2011). Amelia II: A program for missing data. *Journal of Statistical Software, 45 (7),* 1–47. Retrieved from http://www.icesi.edu.co/CRAN/web/packages/Amelia/vignettes/amelia.pdf

Junco, R. & Cotten, S. R. (2011, February). Perceived academic effects of instant messaging use. *Computers & Education, 56 (2),* 370–378. doi:10.1016/j.compedu.2010.08.020

Junco, R. & Cotten, S. R. (2012). No A 4 U: The relationship between multitasking and academic performance. *Computers & Education, 59,* 505–514.

Kuh, G. D. & Love, P. G. (2000). A cultural perspective on student departure. In J. M. Braxton (Ed.), Reworking the student departure puzzle. Nashville, TN: Vanderbilt University Press

Kuhn, T. S. (1970). The structure of scientific revolutions (Second). Chicago: The University of Chicago Press.

Mayer, A. & Puller, S. L. S. (2007). The Old Boy (and Girl) Network: Social Network Formation on University Campuses. *Journal of Public Economics, 92 (June),* 329–347.

Morris, J. & Reese, J. (2009). Facebook Usage as a Predictor of Retention at a Private 4-Year Institution. *Journal of College Student Retention, 11 (3),* 311–322.

Museus, S. D. & Quaye, S. J. (2009). Toward an intercultural perspective of racial and ethnic minority college student persistence. *The Review of Higher Education, 33 (1),* 67–94. doi:10.1353/rhe.0.0107

Nagelkerke, N. J. D. (1991). A note on a general definition of the coefficient of determination. *Biometrika, 78 (3),* 691–692.

Rehabilitation Act of 1973, 29 U.S.C. 701. (1973).

Americans with Disabilities Act of 1990, 42 U.S.C. 12101 et seq. (1991).

Oseguera, L. & Rhee, B.-S. (2009). The influence of institutional retention climates on student persistence to degree completion: A multilevel approach. *Research in Higher Education, 50,* 546–569.

Pascarella, E. T. & Chapman, D. W. (1983). A multiinstitutional, path analytic validation of Tinto's model of college withdrawal. *American Educational Research Journal, 20 (1),* 87–102.

Reason, R. D. (2009, October). Student Variables that Predict Retention: Recent Research and New Developments. *Journal of Student Affairs Research and Practice, 46 (3),* 482–501. doi:10.2202/1949-6605.5022

Rhee, B.-S. (2008). Institutional climate and student departure: A multinomial multilevel modeling approach. *The Review of Higher Education, 31 (2),* 161–183.

Royal, G. P. & Roberts, M. C. (1987). Students' Perceptions of and Attitudes Toward Disabilities: A Comparison of Twenty Conditions. *Journal of Clinical Child & Adolescent Psychology, 16 (2),* 122–132.

Rubin, D. B. (1987). Multiple Imputation for Nonresponse in Surveys. New York: Wiley. Saenz, T. & Marcoulides, G. (1999). The relationship between college experience and academic performance among minority students. *International Journal of Educational Management, 14 (4-5),* 199–207.

Seidman, A. (2005). Minority student retention: Resources for practitioners. *New directions for institutional research, (125),* 284. doi:10.1002/ir.136

Spady, W. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange, 1 (1), 64–85.* Retrieved from http://www.springerlink.com/index/Y29216W34Q1W4150.pdf

Team, R. D. C. & R Development Core Team. (2010). R: A Language and Environment for Statistical Computing. Vienna Austria: R Foundation for Statistical Computing.

Tierney, W. G. (1999). Models of minority college-going and retention: Cultural integrity versus cultural suicide. *Journal of Negro Education, 68 (1),* 80–91.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45 (1),* 89–125.

Tinto, V. (1982). Limits of theory and practice in student attrition. *The Journal of Higher Education, 53 (6),* 687–700. Retrieved from http://www.jstor.org/stable/10.2307/1981525

Tinto, V. (1986). Theories of student departure revisited. In J. C. Smart (Ed.), Higher education: handbook of theory and research (2nd ed., Vol. 2, pp. 359–384). New York: Agathon Press.

Tinto, V. (1994). Leaving college: Rethinking the causes and cures of student attrition.(2nd). Chicago: University Of Chicago Press.

Tinto, V. (2012). Completing College: Rethinking Institutional Action. Chicago IL.: University Of Chicago Press.

United States Census Bureau. (2010a). Educational Attainment. Retrieved from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS%5C 10%5C 1YR%5C S1501%5C&prodType=table

United States Census Bureau. (2010b). Selected economic characteristics for the civilian noninstitutionalized population by disability status. Washington, D.C.: United States Bureau of the Census. Retrieved from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS%5C 10%5C 1YR%5C S1811%5C&prodType=table

UW Office of Minority Affairs & Diversity Assessment Unit. (2013). State of Diversity at UW-All Campuses. University of Washington. Seattle.

Wiggins, J. S. (1979). A psychological taxonomy of trait-descriptive terms: The interpersonal domain. *Journal of Personality and Social Psychology, 37 (3),* 395–412.

World Health Organization & Organization, W. H. (2001). International Classification of Functioning, Disability and Health (ICF). Geneva, Switzerland: Author.

Appendix A:

Categorization of Individuals with Disabilities in State of Washington Higher Education System

Attachment A

DISABILITY DATA CATEGORIES AND EXAMPLES

DISABILITY DATA CATEGORIES	EXAMPLES
1 DEAF/HEARING	• **Deaf** (Documented need for interpreter and other services, meets definition of profound hearing loss) • **Severe Hearing Loss** (Documented need for adaptive equipment/note taker, etc., but not interpreter)
2 MOBILITY	• **Limited Gait or Range of Motion in lower and/or upper extremities** (amputee, hemiplegic, brace/crutch user, arthritis) • **Paraplegic** (wheelchair user, spinal cord injury or other condition limiting use of lower extremities, etc.) • **Quadriplegic** (wheelchair user, spinal cord injury or other condition limiting use of upper & lower extremities)
3 SPEECH/ LANGUAGE	• **Speech or Language Disorder** (stutterer, laryngectomy, articulation or fluency disorder, aphasia, dysphasia, dysarthria, dyspraxia, etc.)
4 LEARNING DISABILITY	• **Attention Deficit Disorder** (medical/psychological documentation of ADD) • **Dyslexia or Processing Deficits** (appropriate documentation for specific learning disability)
5 BLIND/VISUAL	• **Blind** (no light perception or by definition of legal blindness) • **Visual Disorders** other than blind (nystagmus, strabismus, cataracts, etc.)
6 CHRONIC/ACUTE HEALTH	• **Cancer** (Hodgkin's, leukemia, carcinoma, etc.) • **Cardiovascular/Pulmonary** (cardiac diseases, hypertension, atheriosclerosis, thrombosis, chronic bronchitis, asthma, emphysema, etc.) • **Orthopedic Conditions** (arthritis, osteoporosis, ankylosing spondylitis, degenerative disk, fractures, etc.) • **Organ, Blood, Gastrointestinal, Connective Tissue, Immune Disorders** (renal disease, diabetes, Lupus, CFS, HIV/AIDS, anemia, sickle cell, Crohn's Disease, fibromyallgia, diverticulosis, allergies, etc.)
7 NEUROLOGICAL/ CENTRAL NERVOUS SYSTEM	• **Motor Neuron** (cerebral palsy, seizures, multiple or amyotrophic sclerosis, Tourette Syndrome, Parkinson's, migraine, polio, Peripheral neuropathies, muscular dystrophy, etc.) • **Acquired Brain Injury** (head injury/trauma to brain from external or internal force such as: concussion, contusion, CVA, aneurysm, meningitis, abscess, brain tumor, etc.) • **Developmental Disability**
8 PSYCHOLOGICAL/ EMOTIONAL	• **Mental Disorders** (disorders diagnosed according to DSM-IV classifications such as: autism, schizophrenia, bi-polar, personality disorders, depression, anxiety, eating disorders, etc.)

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