Student Success at Postsecondary: An Exploration of Characteristics and Integration of Students

with Learning Disabilities and their Peers

by

Lauren Denise Goegan

A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Psychological Studies in Education

Department of Educational Psychology
University of Alberta

Abstract

Each year, millions of students begin their postsecondary education. These students come to postsecondary campuses with diverse backgrounds, interests in what to study, motivations for attending a postsecondary institution, expectations for what to anticipate for their first year and so forth. The Association of American Colleges and Universities (2019) highlights that these college bound students are more diverse than ever. Indeed, one group of students increasing in numbers on campus is individuals with a Learning Disability (LD). Yet despite increasing numbers on campus, students with LD remain less likely to complete their postsecondary education than their peers. A lack of postsecondary degree can further exacerbate already lower rates of employment and negative outcome associated with having a LD when compared to the general population (PACFOLD, 2007). Therefore, it is important to determine how best to support all students, but especially students with LD, in reaching their academic pursuits. In this dissertation, I describe two studies that sought to better understand the factors that support student academic success. The results stand to provide more information to researchers and postsecondary institutions to better assist students as well as to improve theoretical applications and research for both groups of students.

Study One. In the first study, I examined predictors of academic success utilizing the Inputs-Environment-Outcomes model of Astin (I-E-O model; 1993) by running a structural equation model (SEM). I obtained secondary data from the Higher Education Research Institute (HERI) that annually surveys freshman students in the Fall and Spring semesters of their first-year of postsecondary education thereby producing a one-year longitudinal design. I accessed data from 5,002 typically-developing students who completed the survey in Fall 2014 and Winter 2015. Based on the available data, I identified two input student characteristics: self-perceptions

of academic ability and drive to achieve. I used items measuring academic and social student integration as the indicators of environment. For outcomes I included three measures of academic success (a) grade point average (GPA), (b) acquisition of skills and competencies, and (c) satisfaction. I investigated the connections between these components of the model using a cross-validation design on random half-samples which demonstrated a good fit χ^2 $p < .001$, CFI = .97, RMSEA = .04, Standard RMR = .04. Perceived academic ability had a positive direct effect on GPA and acquisition of skills and competencies but not satisfaction. Drive to achieve had no direct relationships with these outcomes. Academic integration positively predicted all three outcomes, while social integration was not associated with grades. In the discussion I highlight potential academic and social supports that postsecondary institution can offer students to increase their academic success.

Study Two. In the second study, I drew a different sample from the same HERI database (i.e., data collected in Fall 2014 and Winter 2015) and examined the I-E-O model using SEM and a multi-group comparison component to examine students with LD and their non-LD peers. I extracted responses from 398 students (199 students with LD, and 199 non-LD students) and used the same I-E-O items as Study One in the data analysis. I investigated the connections between the models and compared those connections for students with LD and non-LD students. Similar connections between the components of the I-E-O model were obtained for all students; however, two associations were stronger for those with LD than the non-LD students. The connection between social integration and the outcome variables acquisition of skills and competencies and satisfaction were stronger for those with LD. The final model demonstrated good fit χ^2 $p = .08$, CFI = .96, RMSEA = .04. In the discussion I highlight possible supports that postsecondary institutions can offer specific to those students with LD.

Conclusion. Overall, my dissertation provides evidence to support the use of the I-E-O model when examining first-year students at postsecondary institutions. I also highlight important results from both studies and how those results can inform the creation or adaptation of various services offered by postsecondary institutions to support these students. Finally, I consider applications for research and theory, highlighting considerations for ways to increase the rigor of research with LD populations and the frequency of students with LD having opportunities to participate in research.

Preface

This dissertation includes original work by Lauren Denise Goegan. The project presented in this dissertation received research ethics approval from the University of Alberta Research Ethics Board: "Academic Success for Students in Postsecondary Education: The Role of Student Characteristics and Behaviours," No. Pro00085240, October 5, 2018.

Chapter 2 of this dissertation, "Academic Success for Students in Postsecondary Education: The Role of Student Characteristics and Integration" was published by the *Journal of College Student Retention: Research, Theory & Practice*. I was responsible for the design of the study, obtaining secondary data from the Higher Education Research Institute (HERI), as well as the manuscript development. L. M. Daniels was the supervisory author. She was responsible for supporting the design of the study, data analysis, and manuscript development.

Chapter 3 of this dissertation, "Students with LD at Postsecondary Education: Supporting Academic Success and the Role of Student Characteristics and Integration" was published in *Learning Disabilities Research & Practice*. I was responsible for the design of the study, obtaining secondary data from HERI, as well as the manuscript development and revision. L. M. Daniels was the supervisory author. She was responsible for supporting the design of the study, data analysis, and manuscript development.

Dedication

For all my fellow members of the "LD Club."

I dedicate this dissertation to you.

You have brains in your head.
You have feet in your shoes.
You can steer yourself
any direction you choose.

Oh the Places You'll Go
by Dr. Seuss

Acknowledgements

I'd like to take this opportunity to acknowledge some important people for their encouragement and contributions to my dissertation and by extension my doctoral degree. You all were important pieces that helped shape the path for my academic journey.

Thank you to my mentor and academic supervisor, Dr. Lia Daniels. I am grateful for your guidance, support, and unending patience. You have been such an incredible supervisor and mentor to me over the past five years, and I am so thankful to have had you at my side for this journey. You are my role model for the teacher, researcher, and supervisor I aspire to be one day. Thank you for always being there when I needed your help or advice. I will greatly miss our talks on the way to Starbucks and our "Finish-line Fridays."

I would like to thank the members of my supervisory committee, Dr. Denyse Hayward and Dr. Damien Cormier, for their supportive and valuable feedback during the course of my dissertation. Your contributions strengthened my work. I'd also like to thank Dr. Cheryl Poth and Dr. Heather Brown for their time on my committee. Your feedback helped set the course for my dissertation research. I would like to thank Dr. Nancy Spencer-Cavaliere for serving on my committee and Dr. Allyson Hadwin for serving as my external reviewer for this dissertation.

I would also like to acknowledge the financial support of the Social Science and Humanities Research Council (SSHRC) and the additional funding provided by the University of Alberta, in particular, the Killam Trustees. I appreciated the funding these scholarships afforded me so I was able to focus on my research and doctoral studies. I would also like to acknowledge the Higher Education Research Institute (HERI) and their Cooperative Institutional Research Program (CIRP) for providing me with the data for this dissertation. Without them, this dissertation research truly would not have been possible.

STUDENT SUCCESS AT POSTSECONDARY viii

I would like to thank my ACME family: Amanda, Bryce, Devon, Erin, Gabby, Julia, Jona, Katherine, Lily, and Lindsey. You wonderful women have been an amazing support system for me throughout my doctoral studies. I've learned so much from all of you and will have fond memories of the ACME days while I wear my ACME swag for years to come. I will be passing on the baking torch for our monthly lab meetings now, and wish you all the best as you continue in your studies and professional careers. I also need to acknowledge Kelly from my original research lab family. Kelly, you have always been an amazing friend and support through not only my Master's but PhD as well.

I would like to thank my fantastic family who have supported me throughout my academic journey. To my parents, Vince and Lorrie, for us this journey really started back in elementary school when I was first diagnosed with a learning disability, and the psychologist suggested I would never go to university. Your encouragement and support were instrumental in her words never being more than one person's wrong opinion. I continue to live by the Goegan motto "Goegans aren't quitters" and the values of effort and determination you instilled in me that helped me grow into the person I am today. To my sister Erica, thank you for always being just a phone call away.

To my husband David, thank you for coming on this journey with me and moving to Edmonton. You uprooted your life in Victoria to be my rock in Edmonton and I am so grateful for that every day. You saw all the tears and triumphs along this journey and your understanding and constant support throughout this whole process keep me strong. You keep me laughing when times were tough and were always in my corner cheering me on. I could have not done this without you.

Table of Content

CHAPTER THREE: STUDENTS WITH LD AT POSTSECONDARY EDUCATION:

SUPPORTING ACADEMIC SUCCESS AND THE ROLE OF STUDENT

List of Tables

List of Figures

CHAPTER ONE: GENERAL INTRODUCTION

According to the National Center of Educational Statistics (2019) almost twenty million Americans were expected to attend a college or university in the Fall of 2019. These students come to postsecondary campuses with diverse characteristics related to how they perceive themselves as learners (e.g., their drive to achieve). In addition, students vary in how well they are able to integrate into the postsecondary environment, both academically and socially. As students make their way through their schooling, they might view academic success in different ways. For example, some students focusing on grades, while others might focus on acquiring important knowledge and skills for their future employment. With these various differences across students at postsecondary institutions, it is important to examine how best to support diverse learners in achieving their academic pursuits.

While all students need support, one group increasing in prominence on university campuses is students with a Learning Disability (LD; Eckes & Ochoa, 2005; Gregg & Scott, 2000) and these students may need additional or different supports than their peers. LD is a broad diagnostic category that can include a variety of disabilities that impact how individuals acquire, organize, retain, understand or use information (LDAC, 2015). These challenges can impact students' success in their postsecondary studies. Perhaps not surprisingly, while more students with LD are attending postsecondary institutions now more than ever before, these students have lower rates of completing their postsecondary education than their peers (Bolt et al., & Morlock, 2011; Kurth & Mellard, 2006). Therefore, research is needed to examine the postsecondary experiences of students with LD to determine avenues for potential supports and services to aid them in their academic pursuits.

In this two-paper dissertation, I utilize the Inputs-Environment-Outcomes model of Astin (I-E-O; 1993) as the framework from which I examine the postsecondary experiences of students in general and students with LD. Specifically, I focus on examining the connections between the components of the I-E-O model with a general student population (Study One) and then examine the similarities and differences in these connections for students with LD and their peers (Study Two).

The dissertation has four distinct sections. The first section is a General Introduction, where I provide context on the importance of attending postsecondary for young people with or without LD, and introduce and operationalize the I-E-O model. I begin with outcomes that, for the purposes of this dissertation, are considered indicators of academic success and thus called as such for brevity. I then discuss inputs, which I operationalize as specific malleable student characteristics. I also describe environmental variables focusing on both academic and social integration. Throughout, I discuss relevant research in the area. I conclude with a visual of the conceptual model to be used in the two studies. In sections two and three, I present two free-standing manuscripts describing the studies I undertook to meet the requirements for this dissertation. Finally, section four is a General Discussion in which I consider the results across both manuscripts and give suggestions for supporting students and conducting future theory-based research.

Students with Learning Disabilities at Postsecondary Institutions

Although first-year students are often considered a homogenous group united by their "freshman" status, their diversity should not be ignored. In particular, there is a growing number of students with LD at postsecondary institutions (Eckes & Ochoa, 2005; Gregg & Scott, 2000) with different challenges that can impact their success. For example, the largest group of

individuals with LD tends to have difficulties with reading and processing language. In particular, they struggle with the phonological aspect of language that requires them to be able to analyze, produce, and manipulate speech sounds of spoken words (Hatcher et al., 2002). Such challenges can impact word reading, reading fluency, and spelling (Gregg et al., 2008; Kemp et al., 2008; Lindstrom, 2007; Trainin & Swanson, 2005), which could impede their success because university courses have high demands for reading and writing in coursework.

Personal Reflection and Purpose

During my time working at the Disability Resource Center (DRC) at the University of Victoria while I completed my Master's program, I saw many of the challenges students with LD experienced firsthand as they began their postsecondary education. I worked for many years in the Learning Assistance Program (LAP) supporting students who were often in their first-year of studies and needing assistance in developing the skills and strategies necessary to be a successful postsecondary student. I worked one-on-one or in groups with students with various disabilities, but often times I was assigned to students with LD. Being a student with LD myself, I was able to take my personal experiences and combine it with the knowledge and skills I was developing in my Master's program to support my assigned students. The students I worked with were motivated to learn in their courses but realized they needed some extra support to do so. I wondered what characteristics made students successful, and how the postsecondary environment could support them better. I wanted to support these students in their academic journeys, which fueled my interested to explore and understand how best to support their success at postsecondary. Moreover, I was encouraged by the number of students with LD who enrolled each year, even though many of these students did not continue with their postsecondary pursuits

through to graduation. In short, my personal experiences and frontline work were in many ways the underlying push for all of my graduate work.

Data on Learning Disabilities at Postsecondary

The data support my anecdotal perspective. While it may seem progressive that more students with LD are attending postsecondary institutions, they are less likely to complete their education than their peers (Bolt, et al., 2011; Kurth & Mellard, 2006). Indeed, the National Centre for Learning Disabilities identified that while students with LD enter postsecondary education at a similar rate compared to the general population, only 41% will complete their studies compared to 52% of the general population of students (Cortiella & Horowitz, 2014). These rates are particularly troublesome for first-year students as over 80% of students in general who dropout are in their first-year of studies (Freeman, 2009).

The consequences of not completing postsecondary education are numerous. For example, individuals who do not obtain a degree earn less over the course of their lifetime (Avery & Turner, 2012); have lower job satisfaction and worse health outcomes (Barrow et al., 2013); and were less likely to be employed full-time compared to individuals with a degree (Frank, et al., 2015). These negative outcomes could be exacerbated by the challenges already experienced by individuals with LD. For example, research outlined by the Learning Disabilities Association of Canada (LDAC; PACFOLD, 2007) found that individuals with LD were more likely to be unemployed and earn less than the total population. Therefore, it is important to examine the academic experiences of students with LD and their non-LD peers, particularly in their first-year of studies, in order to best recognize how to support their academic success at postsecondary institutions. As such, the focus of my research is to provide important information on how to support students with LD succeed in completing their postsecondary education.

Academic Success and Postsecondary Education

In order to help students be successful during their postsecondary education pursuits, researchers and administrators need to know what success is to students. When students are asked to define academic success, they provide a variety of perspectives. In 2007, Osters and Roberts surveyed undergraduate students and found seven themes surrounding definitions of academic success. Most frequently mentioned was the theme of "doing my best", which included achieving personal goals and being satisfied with one's accomplishments. In a similar investigation, Yazadjian and colleagues (2008) determined that while students' definitions of success were multifaceted, generally they fell into three main themes: good grades, social integration (e.g., sense of connection to the university), and one's ability to navigate the postsecondary environment independently. Jennings and associates (2013) found that academic achievement (i.e., getting good grades) was the dominant theme in students' definitions of academic success, while other definitions included a social and residential life (e.g., making friends), life management (e.g., balancing academic and social life) and academic engagement (e.g., desire to learn). Overall, the findings reviewed here suggest that there are many different ways that students define success when it comes to their postsecondary experiences.

Researchers admit that the term "academic success" is often used as a general catch-all phrase that can include a wide variety of student outcomes (Krumrei et al., 2013; Robbins et al., 2004; York et al., 2015). In an extensive review of the literature, Kuh and colleagues (2006) produced a report entitled "What Matters to Student Success: A Review of the Literature." In their report, academic success was defined as "academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational outcomes and post-college performance"

highlighting the multifaceted nature of success (p. 7). More recently, York and colleagues (2015) conducted a literature review on defining and measuring academic success, building on the previous work of Kuh and colleagues (2006). While the section on measurement is beyond the scope of this dissertation, their assessment of the literature identified six key components of success: (a) academic achievement, (b) acquisition of skills and components, (c) attainment of learning outcomes, (d) satisfaction, (e) persistence, and (f) career success.

Each of these components have positives and negatives when evaluating them as indicators of academic success. I will use academic achievement as an example to highlight ways in which any indicator of success contains both pros and cons. Academic achievement, which consists of grades or grade point averages (GPA), is the most commonly used indicator of academic success in research (Lounsbury et al., 2009; York et al., 2015). The main advantage of grades is that they are widely seen as an objective measure of success, as students who have higher grades are considered to be more successful. However, grades face a number of challenges when considered an objective measure of success including, the inconsistency in how grades are assigned to students (Brookhart et al., 2016; Fuller et al., 2011; Kaplan, 2016) and differences across departments or disciplines (Beatty et al., 2015; Stricker et al., 1992; Willingham et al., 2002). Indeed, GPA is not representative of the same criteria across students, therefore, interpreting success utilizing grades alone provides an incomplete image of the academic picture. Researchers should utilize multiple measures of academic success to provide a more nuanced understanding. Therefore, in my research I have decided to include multiple measures of academic success to provide a more complete picture.

Inputs and Environment Factors Important for Success

Although many indicators of academic success come together as parts of the puzzle,

Astin proposed that "any educational assessment project is incomplete unless it includes data on

student inputs, student outcomes, and the educational environment to which the student is

exposed" (see Figure 1.1; Astin & Antonio, 2012, p. 19). The combination of these factors that

begins with inputs, then the environment, and ending with outcomes like success, are known as

the I-E-O model (Astin, 1993). More specifically, inputs refer to personal characteristics that

students bring with them to their postsecondary institutions (Astin, 1993). Additionally, the

environment "encompasses everything that happens to a student during the course of an

educational program" (i.e., their lived experiences; Astin & Antonio, 2012, p. 87). Finally,

outcomes refer to the student's "resultant characteristics" (Sam et al., 2013, p. 284), that the

educational program is attempting to develop. As reviewed above, I consider various indicators

of academic success as the outcomes in this model.
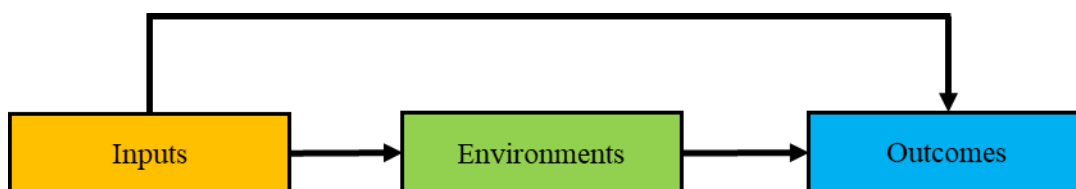
Figure 1.1: Astin's I-E-O Model

Astin's I-E-O model has been very influential in the field of education. Indeed, based on

a Google Scholar search, his 1993 book titled *What Matters in College* has been cited over

13,000 times (Google Scholar search of March 13, 2020). For decades researchers have used his

model as an overarching framework for their work, operationalizing the components of the

model in specific ways based on their unique investigations (e.g., Keup, 2006; Miller, 2019; Van Horne et al., 2018). For example, Hu and Kuh (2003) adapt the environment component into two levels, the student level (i.e., individual experiences) and institutional level (i.e., institutional environmental climate). They maintain the original structure of the model while adding the institutional level component to link directly to the environment in the middle (i.e., the student level) and outcomes, which they conceptualized as gains. Next, I review my specific conceptualizations of inputs and environment.

Inputs

Inputs are the personal characteristics that students bring with them to postsecondary including demographic information, educational background, degree aspirations, financial status, career choice, life goals, reasons for attending college, academic self-concept, achievement aspirations and expectancies, parental education and goal commitment, (Astin, 1993; Astin & Antonio 2012; House, 2002; Robbins et al., 2004; Thurmond et al, 2002; Sam et al., 2013). From this perspective, disability status as a personal characteristic would be considered an input. However, when disability status is considered an input researchers and administrators may inadvertently ignore other inputs which may be malleable and therefore offer chances for improvement.

For the purposes of this dissertation, I have chosen to focus on malleable psychosocial inputs for both students with and without LD. I avoided focusing on traditional and demographic predictors because they tend to be more stable and long-standing (Krumrei et al., 2013; Robbins et al., 2004), which is not conducive with my goal of providing recommendations for supports and services for students. Psychosocial predictors are more malleable, and therefore adaptable to intervention and support. For this dissertation, I will focus on psychosocial factors related to self-

views, that is, student's beliefs and evaluations of themselves (Morin, 2017), for both students with and without LD thereby showing that students with LD have room for growth as well.

Researchers have found psychosocial factors to have significant relationships with academic outcomes at postsecondary institutions (e.g., Fong et al., 2017; Richardson et al., 2012; Robbins et al., 2004). For example, Robbins and colleagues (2004) conducted a meta-analysis to examine various factors that predicted academic success as measured by GPA and persistence. They found that student academic self-efficacy and achievement motivation were strong predictors of GPA and also had moderate relationships with persistence. Keup (2006) examined self-rated academic ability and drive to achieve, along with demographics and other student and institutional characteristics, to predict college GPA and self-assessed cognitive development. Self-rated academic ability was one of the stronger predictors of college GPA, while drive to achieve was identified as an important predictor for cognitive development. Interestingly, Hen and Goroshit (2012) found that students with LD report lower academic self-efficacy, but no difference in GPA in comparison with their non-LD undergraduate peers. Therefore, I believe that more research is needed to examine student characteristics and various forms of academic success outcomes for students with LD and their peers.

Environment

Postsecondary institutions represent an environment where students must learn to integrate themselves both to new academics and new social contexts in order to be successful (Budny & Paul, 2003). Following the dual perspective on environment, in this dissertation, environment is operationalized in connection to the work of Tinto and his Student Integration Model. Tinto's work has also been very influential. Based on a second Google Scholar search, his 1987 book titled *Leaving college: Rethinking the causes and cures of student attrition* has

been cited over 18,000 times, demonstrating that for decades researchers have been influenced

by his work (Google Scholar search of March 12, 2020).

Tinto considered postsecondary environments as having two systems – academic and

social. Academic integration can involve attending class and learning how to navigate the

academic requirements of courses (Chrysikos et al., 2017; Tinto, 1975). If a student is unable to

effectively academically integrate at postsecondary, the student would receive low grades and

may potentially be asked to leave their program (Tinto, 1975). On the other hand, social

integration can involve participating in extracurricular activities like clubs or interactions with

peers. If a student is unable to effectively socially integrate, they might feel disconnected from

others and would choose to leave, perhaps lacking a sense of belonging on campus (Tinto, 1975).

The importance of integration at postsecondary institutions is highlighted in research. For

example, Woolsey (2003) found that initial social adjustment significantly predicted student's

degree completion. Additionally, Ishitani (2016) found that academic integration had a positive

and significant effect on students first-year persistence. However, there is limited research on

this topic when it comes to students with LD. In general, students with LD report lower levels of

academic and social integration in postsecondary environments (DaDeppo, 2009; DuPaul et al.,

2017). Therefore, more research is needed to examine academic and social integration and

various forms of academic success outcomes for students with LD. This information may be

useful in the development of supports and services for students with LD.

In my time working with students with LD, I have seen their challenges integrating into

the academic environment. My work with these students included providing them with multiple

strategies for their academic tasks such as time management, reading, writing, studying and note-

taking. While I did not talk with students about their social integration explicitly, at times they

did mention not having friends in their classes, or having difficulty making new friends in a new city. From my experiences, it seemed as though these students experienced challenges with academic and social integration during their first-year of postsecondary education, but I was unable to determine if these challenges were common for students completing their first-year, or if there was something unique for students with LD. Therefore, within my research, I was interested in exploring this area.

Overview of the Two Studies in this Dissertation

Based on the review above, students with LD are entering postsecondary institutions in larger numbers than ever before, yet they are not completing their degrees at the same rate as their non-LD peers (Bolt et al., 2011; Kurth & Mellard, 2006). Examining the success of these students can be difficult as there is no one clear definition of success even though GPA tends to be the default measure of academic success. Therefore, I believe that to accurately examine academic success more than one indicator is required.

Furthermore, I believe there are multiple inputs (i.e. student characteristics) and environmental components (e.g., integration) that influence outcomes related to success (see Figure 1.2). Recognizing that success comes in many forms, I have included three measures of academic success within my dissertation (a) current GPA, (b) acquisition of knowledge and skills and (c) overall satisfaction. Inputs can be categorized into two groups: those that are fixed (e.g., demographics and traditional predictors) and those that can change over time (e.g., psychosocial predictors; Robbins et al., 2004). I believe inputs that can change over time are better suited to educational research than stable traits. As such, I operationalize inputs as students' self-reported perceived academic ability and drive to achieve. I have drawn from the work of Tinto for the environment component of my model, and examine both the academic and social integration that

students experience during their first-year of postsecondary studies. This combination of

variables represents under researched variables for students with LD, who are often supported

only according to their documented disability and not from a broader psychological perspective.
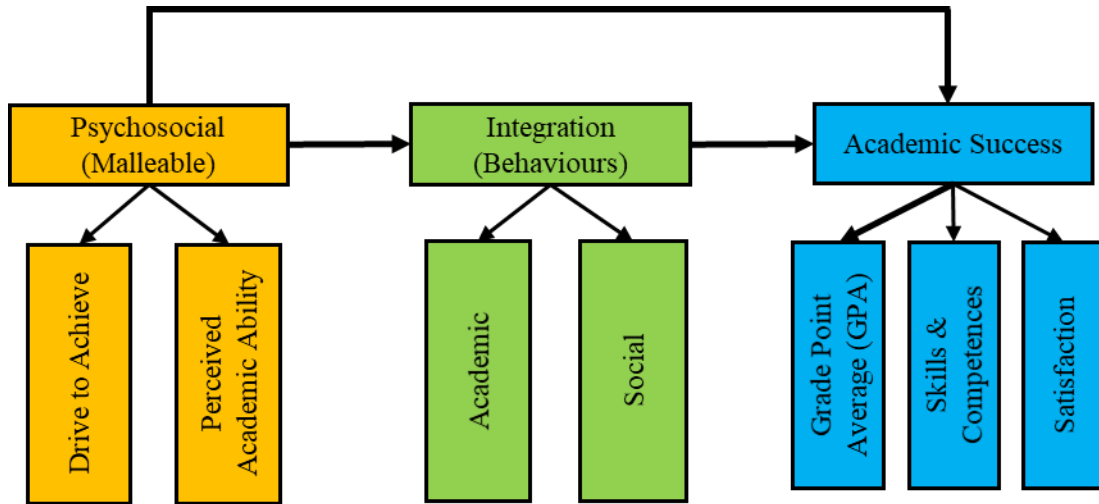
Figure 1.2: Astin's I-E-O Model Conceptualized

Research Questions

My research questions for the two studies are:

1) How are student input characteristics related to the indicators of academic success after
   their first-year of studies?

2) How does student academic and social integration relate to the indicators of academic
   success after their first-year of studies?

3) To what extent do academic and social integration mediate the relationship between the
   student input characteristics and indicators of academic success?

4) Are these relationships moderated by a student identifying as having LD?

Data Sources and Analyses

Both studies relied on secondary data that I accessed through the Higher Education Research Institute (HERI) and their Cooperative Institutional Research Program (CIRP). I have put all available items in Appendix A ($n = 303$) and further indicated which specific items I requested ($n = 127$) and then actually used in analysis ($n = 27$). By accessing this database I was able to enact a short term one-year longitudinal design. In the first paper, I tested my operationalized I-E-O model using structural equation modeling (SEM) in a sample of 5,002 typically developing first-year students. As stated above, inputs included the student's self-perceptions of academic ability and drive to achieve. The environment was assessed based on student academic and social integration. Outcomes included the three measures of academic success. I investigated the connections between these components using a cross-validation design, randomly separating the sample in half and examining the model twice to determine the stability of the connections between components within the model. From the results, I was able to identify important relationships in the model that could provide valuable information to support students with their postsecondary pursuits.

In the second paper, I replicated my operationalized I-E-O model using SEM to test for multi-group comparisons between 199 students with LD and 199 non-LD peers. Similar connections between the components of the model were obtained for all students; however, there were two associations that were stronger for students with LD than their peers. The final model demonstrated good fit χ^2 $p = .08$, CFI $= .96$, RMSEA $= .04$. The connection between social integration and the outcome variables of acquisition of skills and competencies and satisfaction were stronger for students with LD. The discussion highlights possible supports that

postsecondary institutions can offer specific to students with LD based on these two differences in the model.

Conclusion

Cumulatively, these two studies allow me to comment on some important components to supporting academic success for first-year students with and without LD. In each study, I discuss possibilities for supporting students during their studies at postsecondary institutions based on the significant associations I found between components in the model. It is my hope that these studies will provide valuable information to researchers, administrators, and faculty members who are trying to support students during their academic journeys. The ultimate goal of my research was to provide information that can be utilized by personnel at postsecondary institutions to design and implement supports and services offered. The results obtained in my studies have provided me with important information that can be utilized to serve this purpose. In the General Discussion, I return to implications for theory and research to advance this type of research for LD and non-LD students.

References

Astin, A. W. (1991). *Assessment of Excellence*. Macmillan.

Astin, A. W. (1993). *What Matters in College? Four Critical Years Revisited* (1st ed.). Jossey-Bass.

Astin, A. W. & Antonio, A. L. (2012). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. Rowman & Littlefield.

Avery, C., & Turner, S. (2012). Student Loans: Do College Students Borrow Too Much-Or Not Enough? *Journal of Economic Perspectives*, *26*(1), 165-92. https://doi.org/10.1257/jep.26.1.165

Barrow, L., Brock, T., & Rouse, C. E. (2013). Postsecondary education in the United States: Introducing the issue. *The Future of Children*, *23*(1), 3-16. https://doi.org/10.1353/foc.2013.0006

Beatty, A. S., Walmsley, P. T., Sackett, P. R., Kuncel, N. R., & Koch, A. J. (2015). The reliability of college grades. *Educational Measurement: Issues and Practice*, *34*(4), 31-40. https://doi.org/10.1111/emip.12096

Bolt, S. E., Decker, D. M., Lloyd, M., & Morlock, L. (2011). Students' perceptions of accommodations in high school and college. *Career Development for Exceptional Individuals*, *34*(3), 165-175. https://doi.org/10.1177/0885728811415098

Brookhart, S. M., Guskey, T. R., Bowers, A. J., McMillan, J. H., Smith, J. K., Smith, L. F., Stevens, M. T. & Welsh, M. E. (2016). A Century of Grading Research Meaning and Value in the Most Common Educational Measure. *Review of Educational Research*, 86(4), 1-79. http://uknowledge.uky.edu/edp_facpub

Budny, D. D., & Paul, C. A. (2003). Working with Students and Parents to Improve the

      Freshman Retention. *Journal of STEM Education: Innovations & Research*, *4*.

Chrysikos, A., Ahmed, E., & Ward, R. (2017). Analysis of Tinto's student integration theory in

      first-year undergraduate computing students of a UK higher education

      institution. *International Journal of Comparative Education and Development*, *19*(2/3),

      97-121. https://doi.org/10.1108/IJCED-10-2016-0019

Cortiella, C., & Horowitz, S. H. (2014). The state of learning disabilities: Facts, trends and

      emerging issues. New York: National Center for Learning Disabilities.

      http://www.hopkintonsepac.org/wp-content/uploads/2015/12/2014-State-of-LD.pdf

DaDeppo, L. M. (2009). Integration factors related to the academic success and intent to persist

      of college students with learning disabilities. Learning Disabilities Research & Practice,

      24(3), 122-131. https://doi.org/10.1111/j.1540-5826.2009.00286.x

DuPaul, G. J., Pinho, T. D., Pollack, B. L., Gormley, M. J., & Laracy, S. D. (2017). First-year

      college students with ADHD and/or LD: differences in engagement, positive core self-

      evaluation, school preparation, and college expectations. *Journal of Learning*

      Disabilities, 50(3), 238-251. https://doi.org/10.1177/0022219415617164

Eckes, S. E., & Ochoa, T. A. (2005). Students with disabilities: Transitioning from high school

      to higher education. *American Secondary Education*, *33*(3), 6-20.

      https://doi.org/142.104.201.65

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). Psychosocial

      factors and community college student success: A meta-analytic investigation. *Review of*

      Educational Research, *87*(2), 388-424. https://doi.org/10.3102/0034654316653479

Frank, K., Frenette, M., & Morissette, R. (2015). *Labour Market Outcomes of Young*

Postsecondary Graduates, 2005 to 2012. Statistics Canada.

http://www.statcan.gc.ca/pub/11-626-x/11-626-x2015050-eng.pdf

Freeman, (2009, September 20). *1 in 6 first-year university students won't make the grade.* The

Star. https://www.thestar.com/news/canada/2009/09/20/1_in_6_firstyear_university_

students_wont_make_the_grade.html

Fuller, M. B., Wilson, M. A., & Tobin, R. M. (2011). The national survey of student engagement

as a predictor of undergraduate GPA: a cross-sectional and longitudinal examination.

Assessment & Evaluation in Higher Education, *36*(6), 735-748.

https://doi.org/10.1080/02602938.2010.488791

Gregg, N., Bandalos, D. L., Coleman, C., Davis, J. M., Robinson, K. & Blake, J. (2008). The

validity of a battery of phonemic and orthographic awareness tasks for adults with and

without dyslexia and attention deficit/hyperactivity disorder. *Remedial and Special

Education*, *29*(3), 175-190. https://doi.org/10.1177/0741932508315951

Gregg, N., & Scott, S. S. (2000). Definition and documentation: Theory, measurement, and the

courts. *Journal of Learning Disabilities*, *32*(4), 5-13.

https://doi.org/10.1177/002221940003300104

Hatcher, J., Snowling, M. J., & Griffiths, Y. M. (2002). Cognitive assessment of dyslexic

students in higher education. *British Journal of Educational Psychology, 72*, 119-133.

https://doi.org/10.1348/000709902158801

Hen, M., & Goroshit, M. (2012). Academic Procrastination, Emotional Intelligence, Academic

Self-Efficacy, and GPA: A Comparison Between Students With and Without Learning

Disabilities. *Journal of Learning Disabilities*, *47*(2), 116-124.

https://doi.org/10.1177/0022219412439325

Van Horne, S., Lin, S., Anson, M., & Jacobson, W. (2018). Engagement, satisfaction, and

　　belonging of international undergraduates at US research universities. *Journal of*

　　International Students, *8*(1), 351-374. https://doi.org/10.5281/zenodo.1134313

House, J. D. (2002). The independent effects of student characteristics and instructional activities

　　on achievement: An application of the input-environment-outcome assessment

　　model. *International Journal of Instructional Media*, *29*(2), 225.

Hu, S., & Kuh, G. D. (2003). Maximizing what students get out of college: Testing a learning

　　productivity model. *Journal of College Student Development*, *44*(2), 185-203.

　　https://doi.org/10.1353/csd.2003.0016

Ishitani, T. T. (2016). Time-varying effects of academic and social integration on student

　　persistence for first and second years in college: National data approach. *Journal of*

　　College Student Retention: Research, Theory & Practice, *18*(3), 263-286.

　　https://doi.org/10.1177/1521025115622781

Keup, J. R. (2006). Promoting new-student success: Assessing academic development and

　　achievement among first-year students. *New Directions for Student Services*, *2006*(114),

　　27-46. https://doi.org/10.1002/ss.205

Jennings, N., Lovett, S., Coba, L., Swingle, L. & Lindkvist, H. (2013). "What would make this a

　　successful year for you?" How students define success in college. *Liberal Education*,

　　99(2). p. 1-11. http://repository.wellesley.edu/scholarship/3/

Kaplan, A. (2016, August). *Research on Motivation and Achievement: Infatuation with*

　　Constructs and Losing Sight of the Phenomenon. Paper presented at the biennial meeting

　　of the International Conference on Motivation, Thessaloniki, Greece.

Kemp, N., Parrila, R. K. & Kirby, J. R. (2008). Phonological and orthographic spelling in high-

      functioning adult dyslexics. *Dyslexia*, 15, 105-128. https://doi.org/10.1002/dys.364

Krumrei-Mancuso, E. J., Newton, F. B., Kim, E., & Wilcox, D. (2013). Psychosocial factors

      predicting first-year college student success. *Journal of College Student

      Development*, *54*(3), 247-266. https://doi.org/10.1353/csd.2013.0034

Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2006). *What matters to

      student success: A review of the literature.* Commissioned report for the National

      Symposium on Postsecondary Student Success: Spearheading a Dialog on Student

      Success. Washington, DC: National Postsecondary Education Cooperative.

Kurth, N., & Mellard, D. (2006). Student Perceptions of the Accommodation Process in

      Postsecondary Education. *Journal of Postsecondary Education and Disability*, *19*(1), 71-

      84. http://files.eric.ed.gov/fulltext/EJ844625.pdf

Learning Disabilities Association of Canada (LDAC; 2015, March). *Official Definition of

      Learning Disabilities.* http://www.ldac-acta.ca/learn-more/ld-defined/official-definition-

      of-learning-disabilities.

Learning Disabilities of Canada, Putting a Canadian Face on Learning Disabilities (LDAC,

      PACFOLD; 2007). *Executive Summary of Putting a Canadian Face on Learning

      Disabilities Study (PACFOLD)*.

      http://pacfold.ca/download/WhatIs/en/executiveSummary.pdf

Lindstrom, J. H. (2007) Determining appropriate accommodations for postsecondary students

      with reading and written expression disorders. *Learning Disabilities Research &

      Practice*, *22*(4), 229-236. https://doi.org/10.1111/j.1540-5826.2007.00251.x

Lounsbury, J. W., Fisher, L. A., Levy, J. J., & Welsh, D. P. (2009). An investigation of character strengths in relation to the academic success of college students. *Individual Differences Research, 7*, 52-69.

Miller, A. C. S. (2019). *Training for the Future: College Student Employee Persistence through Engagement and Development* (Doctoral dissertation). University of La Verne, La Verne, California.

Morin, A. (2017). *Toward a glossary of self-related terms*. Frontiers in Psychology, 8, 1-9. https://doi.org/10.3389/fpsyg.2017.00280

National Center for Educational Statistics (2019). *Fast Facts: Back to School Statistics*. https://nces.ed.gov/fastfacts/display.asp?id=372#College_enrollment

Osters, S. & Roberts, D. (2007). Academic success – How do students define it? Presentation at the Southern Association for College Student Affairs (SACSA)/ National Association of Student Personnel Administrators (NASPA) Region III/ Texas Association of College & University Student Personnel Association (TACUSPA) Joint Student Affairs Conference, Dallas, Texas

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological bulletin*, *138*(2), 353. https://doi.org/10.1037/a0026838.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, *130*(2), 261-288. https://doi.org/10.1037/0033-2909.130.2.261

Sam, R., Souriyavongsa, T., Zain, A. N. M., Jamil, H., Wu, X., & Sovath, S. (2013).

    Conceptualizing Institutional Policies for Students' Academic Success in Cambodian

    Universities: What Matters for Policy?.*Asian Social Science*, *9*(10), 283-294.

Stricker, L. J., Rock, D. A., Burton, N. W., Muraki, E., & Jirele, T. J. (1992). Adjusting college

    grade-point average for variations in grading standards. *ETS Research Report Series*, (2).

Thurmond, V. A., Wambach, K., Connors, H. R., & Frey, B. B. (2002). Evaluation of student

    satisfaction: Determining the impact of a web-based environment by controlling for

    student characteristics. *The American journal of distance education*, *16*(3), 169-190.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent

    research. *Review of educational research*, *45*(1), 89-125.

    https://doi.org/10.3102/00346543045001089

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition*.

    University of Chicago Press

Tinto, V. (1999). Taking retention seriously: Rethinking the first year of college. NACADA

    journal, 19(2), 5-9. https://www.nacadajournal.org/doi/pdf/10.12930/0271-9517-19.2.5

Trainin, G. & Swanson, H. L. (2005). Cognition, metacognition, and achievement of college

    students with learning disabilities. *Learning Disabilities Quarterly*, *28*(4), 261-272.

    http://www.jstor.org/stable/4126965

Willingham, W. W., Pollack, J. M., & Lewis, C. (2002). Grades and test scores: Accounting for

    observed differences. *Journal of Educational Measurement*, *39*(1), 1-37.

    https://doi.org/10.1111/j.1745-3984.2002.tb01133.x

Woosley, S.A. (2003). How important are the first few weeks of college? The long term effects

    of initial college experiences. *College Student Journal*, *37*(2), 201-207.

Yazedjian, A., Toews, M. L., Sevin, T., & Purswell, K. E. (2008). " It's a Whole New World": A

    Qualitative Exploration of College Students' Definitions of and Strategies for College

    Success. *Journal of College Student Development*, *49*(2), 141-154.

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success.

    Practical Assessment, Research & Evaluation, *20*(5), 1-20.

    http://www.pareonline.net/getvn.asp?v=20&n=5

Appendix A

Items Available, Requested and Used for this Dissertation

Items Requested from The Freshman Survey (TFS):

Enrolment
Are you currently a full-time or part-time student?

1 = Not enrolled   2 = Part-time   3 = Full-time

First Year
What year did you first enter your 1st college?

1 = 2014 or 2015   2 = 2013   3 = 2012   4 = 2011   5 = 2010 or earlier

Sex
Your sex:

1 = Male   2 = Female

Age
How old will you be on December 31 of this year?

1 = 16 or younger	2 = 17	3 = 18	4 = 19
5 = 20	6 = 21-24	7 = 25 to 29	8 = 30 to 39
9 = 40 to 54	10 = 55 or older		

High School Grades
What was your average grade in high school?

1 = D	2 = C	3 = C+	4 = B-
5 = B	6 = B+	7 = A-	8 = A or A+

SAT and ACT Scores
What were your scores on the SAT and/or ACT?

SAT Critical Reading   SAT Mathematics
SAT Writing   ACT Composite

Citizenship
Citizenship Status:

1 = None of the above   2 = International student (i.e., F-1 or M-1 visa)
3 = Permanent resident (green card)   4 = U.S. citizen

Ethnicity
Are you: (Mark all that apply)

1 = Not marked   2 = Marked

Item Available	Requested	Used
White/Caucasian	✓	✓
African American/Black	✓	✓
American Indian/Alaska Native	✓	✓
Asian American/Asian	✓	✓
Native Hawaiian/Pacific Islander	✓	✓
Mexican American/Chicano	✓	✓
Puerto Rican	✓	✓
Other Latino	✓	✓
Other	✓	✓

Disability Status
Do you have any of the following disabilities or medical conditions?

1 = No   2 = Yes

Item Available	Requested	Used
Learning disability (dyslexia, etc.)	✓	✓
Attention deficit hyperactivity disorder (ADHD)		
Autism spectrum/Asperger's syndrome		
Physical disability (speech, sight, mobility, hearing, etc.)		
Chronic illness (cancer, diabetes, autoimmune disorders, etc.)		
Psychological disorder (depression, etc.)		
Other		

Major
Please indicate your intended major using the codes provided on the attached fold out.

1 Art, fine and applied   2 English (language and literature)
3 History   4 Journalism/Communication
5 Classical and Modern   6 Media/Film Studies
7 Music   8 Philosophy
9 Theatre/Drama   10 Theology/Religion
11 Other Arts and Humanities   12 Biology (general)
13 Animal Biology (zoology)   14 Ecology & Evolutionary
15 Marine Biology   16 Microbiology
17 Molecular, Cellular, & Develop. Biology   18 Neurobiology/Neuroscience
19 Plant Biology (botany)   20 Agriculture/Natural Resources
21 Biochemistry/Biophysics   22 Environmental Science
23 Other Biological Science   24 Accounting
25 Business Admin. (general)   26 Entrepreneurship

27 Finance
28 Hospitality/Tourism
29 Human Resources Management
30 International Business
31 Marketing
32 Management
33 Computer/Management
34 Real Estate
35 Other Business
36 Elementary Education
37 Music/Art Education
38 Physical Education/Recreation
39 Secondary Education
40 Special Education
41 Other Education
42 Aerospace/Aeronautical/Astronautical Eng.
43 Biological/Agricultural Engineering
44 Biomedical Engineering
45 Chemical Engineering
46 Civil Engineering
47 Computer Engineering
48 Electrical/Electronic Communications Eng.
49 Engineering Science/Eng. Physics
50 Environmental/Environmental Health Eng.
51 Industrial/Manufacturing Engineering
52 Materials Engineering
53 Mechanical Engineering
54 Other Engineering
55 Clinical Laboratory Science
56 Health Care Administration/Studies
57 Health Technology
58 Kinesiology
59 Nursing
60 Pharmacy
61 Therapy (occupational, physical, speech)
62 Other Health Profession
63 Computer Science
64 Mathematics/Statistics
65 Other Math and Computer Science
66 Astronomy & Astrophysics
67 Atmospheric Sciences
68 Chemistry
69 Earth & Planetary Sciences
70 Marine Sciences
71 Physics
72 Other Physical Science
73 Anthropology
74 Economics
75 Ethnic/Cultural Studies
76 Geography
77 Political Science (gov't., inter. relations)
78 Psychology
79 Public Policy
80 Social Work
81 Sociology
82 Women's/Gender Studies
83 Other Social Science
84 Architecture/Urban Planning
85 Criminal Justice
86 Library Science
87 Security & Protective Services
88 Military Sciences/Technology/Operations
89 Other
90 Undecided

Income
What is your best estimate of your parents' total income last year?
Consider income from all sources before taxes.

1 = Less than $10,000
2 = $10,000 to 14,999
3 = $15,000 to 19,999
4 = $20,000 to 24,999
5 = $25,000 to 29,999
6 = $30,000 to 39,999
7 = $40,000 to 49,999
8 = $50,000 to 59,999
9 = $60,000 to 74,999
10 = $75,000 to 99,999
11 = $100,000 to 149,999
12 = $150,000 to 199,999
13 = $200,000 to 249,999
14 = $250,000 or more

Acts
Since entering this college, how often have you:

1 = Not at all   2 = Occasionally   3 = Frequently

Item Available	Requested	Used
Attended a religious service		
Been bored in class	✓	
Demonstrated for a cause (e.g., boycott, rally, protest)		
Studied with other students	✓	
Smoked cigarettes		
Drank beer		
Drank wine or liquor		
Felt overwhelmed by all you had to do		
Felt depressed		
Performed volunteer work		
Asked a professor for advice after class		
Worked on a local, state, or national political campaign		
Socialized with someone of another racial/ethnic group		
Come late to class	✓	
Posted on a course-related on-line discussion board		
Performed community service as part of a class		
Act: Discussed religion		
Discussed politics		
Maintained a healthy diet		
Had adequate sleep		
Helped raise money for a cause or campaign		
Publicly communicated your opinion about a cause (e.g., blog, email, petition)		

Habit of Mind
How often in the past year did you:

1 = Not at all   2 = Occasionally   3 = Frequently

Item Available	Requested	Used
Ask questions in class	✓	
Support your opinions with a logical argument	✓	
Seek solutions to problems and explain them to others	✓	
Revise your papers to improve your writing	✓	
Evaluate the quality or reliability of information you received	✓	
Take a risk because you felt you had more to gain	✓	
Seek alternative solutions to a problem	✓	
Look up scientific research articles and resources	✓	

	Requested	Used
Explore topics on your own, even though it was not required for a class	✓	
Accept mistakes as part of the learning process	✓	
Seek feedback on your academic work	✓	
Work with other students on group projects	✓	
Integrate skills and knowledge from different sources / experiences	✓	

Reasons

In deciding to go to college, how important to you was each of the following reasons?

1 = Not Important   2 = Somewhat Important   3 = Very Important

Item Available	Requested	Used
To be able to get a better job	✓	
To gain a general education and appreciation of ideas	✓	
To make me a more cultured person	✓	
To be able to make more money	✓	
To learn more about things that interest me	✓	
To get training for a specific career	✓	
To prepare myself for graduate or professional school	✓	

Self Ratings

Rate yourself on each of the following traits as compared with the average person your age. We want the most accurate estimate of how you see yourself.

1 = Lowest 10%   2 = Below Average   3 = Average
4 = Above Average   5 = Highest 10%

Item Available	Requested	Used
Academic ability	✓	✓
Artistic ability		
Competitiveness		
Computer skills		
Cooperativeness		
Creativity		
Drive to achieve	✓	✓
Emotional health		
Leadership ability		
Mathematical ability		
Physical health		
Popularity		
Public speaking ability		
Risk-taking		
Self-confidence (intellectual)	✓	
Self-confidence (social)	✓	

Self-understanding		
Spirituality		
Understanding of others		
Writing ability		

Strengths

Think about your current abilities and tell us how strong or weak you believe you are in each of the following areas:

1 = A Major Weakness   2 = Somewhat Weak   3 = Average
4 = Somewhat Strong   5 = A Major Strength

Item Available	Requested	Used
General knowledge	✓	
Knowledge of a particular field or discipline	✓	
Knowledge of people from different races/cultures		
Understanding of the problems facing your community		
Understanding of national issues		
Understanding of global issues		
Critical thinking skills	✓	
Problem-solving skills	✓	
Ability to manage your time effectively		
Foreign language ability		
Interpersonal skills		

Goals

Indicate the importance to you personally of each of the following:

1 = Not Important   2 = Somewhat Important
3 = Very Important   4 = Essential

Item Available	Requested	Used
Becoming accomplished in one of the performing arts (acting, dancing, etc.)		
Becoming an authority in my field	✓	
Obtaining recognition from my colleagues for contributions to my special field	✓	
Influencing the political structure		
Influencing social values		
Raising a family		
Being very well off financially	✓	
Helping others who are in difficulty		
Making a theoretical contribution to science		
Writing original works (poems, novels, etc.)		
Creating artistic work (painting, sculpture, etc.)		

	Requested	Used
Becoming successful in a business of my own		
Becoming involved in programs to clean up the environment		
Developing a meaningful philosophy of life	✓	
Participating in a community action program		
Helping to promote racial understanding		
Keeping up to date with political affairs		
Becoming a community leader		
Improving my understanding of other countries and cultures		
Adopting 'green' practices to protect the environment		

Hours Per Week
Since entering this college, how much time have you spent during a typical week doing the following

1 = None	2 = < 1 hr/wk	3 = 1-2 hrs/wk
4 = 3-5 hrs/wk	5 = 6-10 hrs/wk	6 = 11-15 hrs/wk
7 = 16-20 hrs/wk	8 = Over 20 hrs/wk	

Item Available	Requested	Used
Studying/homework	✓	
Socializing with friends	✓	
Talking with teachers outside of class		
Exercise or sports		
Partying	✓	
Working (for pay)		
Volunteer work		
Student clubs/groups		
Watching TV		
Household/childcare duties		
Reading for pleasure	✓	
Playing video/computer games		
Online social networks (Facebook, Twitter, etc.)	✓	

Items Requested from The Your First College Year (YFCY) Survey:

Services
Since entering this college, how often have you utilized the following services:

1 = Not at all	2 = Occasionally	3 = Frequently

Item Available	Requested	Used
Study skills advising	✓	
Financial aid advising		
Student health services		

Student psychological services		
Writing center	✓	
Disability resource center	✓	
Career services	✓	
Academic advising	✓	

Current GPA
What is your overall grade average (as of your most recently completed academic term)?
1=I did not receive grades in my courses

1 = D	2 = C	3 = C+	4 = B-
5 = B	6 = B+	7 = A-	8 = A or A+

Habit of Mind
How often in the past year did you:

1 = Not at all 2 = Occasionally 3 = Frequently

Item Available	Requested	Used
Ask questions in class	✓	
Support your opinions with a logical argument	✓	
Seek solutions to problems and explain them to others	✓	
Revise your papers to improve your writing	✓	
Evaluate the quality or reliability of information you received	✓	
Take a risk because you felt you had more to gain	✓	
Seek alternative solutions to a problem	✓	
Look up scientific research articles and resources	✓	
Explore topics on your own, even though it was not required for a class	✓	
Accept mistakes as part of the learning process	✓	
Seek feedback on your academic work	✓	
Work with other students on group projects	✓	
Integrate skills and knowledge from different sources / experiences	✓	

Ease
Since entering this college, how has it been to:

1 = Very Difficult 2 = Somewhat Difficult 3 = Somewhat Easy 4 = Very Easy

Item Available	Requested	Used
Understand what your professors expect of you academically	✓	✓
Develop effective study skills	✓	✓
Adjust to the academic demands of college	✓	✓
Manage your time effectively	✓	✓
Develop close friendships with other students	✓	

Self Ratings
Rate yourself on each of the following traits as compared with the average person your age. We want the most accurate estimate of how you see yourself.

1 = Lowest 10%   2 = Below Average   3 = Average
4 = Above Average   5 = Highest 10%

Item Available	Requested	Used
Academic ability	✓	
Artistic ability		
Competitiveness		
Computer skills		
Cooperativeness		
Creativity		
Drive to achieve	✓	
Emotional health		
Leadership ability		
Mathematical ability		
Physical health		
Popularity		
Public speaking ability		
Risk-taking		
Self-confidence (intellectual)	✓	
Self-confidence (social)	✓	
Self-understanding		
Spirituality		
Understanding of others		
Writing ability		

Satisfaction
Please rate your satisfaction with this institution on each of the aspects of college life below:

1 = Can't Rate/Don't Know   2 = Very Dissatisfied   3 = Dissatisfied
4 = Neutral   5 = Satisfied   6 = Very Satisfied

Item Available	Requested	Used
Amount of contact with faculty		
Racial/ethnic diversity of faculty		
Racial/ethnic diversity of student body		
Class size		
Interaction with other students		
Relevance of coursework to everyday life		
Relevance of coursework to future career plans		
Overall quality of instruction		

Respect for the expression of diverse beliefs		
Availability of campus social activities		
Your social life		
Overall sense of community among students		
Overall college experience	✓	✓

Opinions

Please indicate the extent to which you agree or disagree with the following statements:

1=Strongly Disagree   2=Disagree   3=Agree   4=Strongly Agree

Item Available	Requested	Used
I have felt discriminated against at this institution because of my race/ethnicity, gender, sexual orientation, or religious affiliation		
I see myself as part of the campus community	✓	✓
Faculty showed concern about my progress		
There is a lot of racial tension on this campus		
I have been able to find a balance between academics and extracurricular activities	✓	
The admission/recruitment materials portrayed this campus accurately		
Faculty empower me to learn here		
If asked, I would recommend this college to others		
At least one staff member has taken an interest in my development		
I feel valued at this institution	✓	✓
Faculty believe in my potential to succeed academically		
My college experiences have exposed me to diverse opinions/cultures/values		
Staff encouraged me to get involved in campus activities		
In class, I have heard faculty express stereotypes based on race/ethnicity, gender, sexual orientation, or religious affiliation		
Staff recognize my achievements		
Faculty encouraged me to meet with them outside of class		
I am interested in seeking information about current social and political issues		
I feel a sense of belonging to this campus	✓	✓
At least one faculty member has taken an interest in my development		
I feel I am a member of this college	✓	✓
I have effectively led a group to a common purpose		
It's important for me to be thinking about my career path after college	✓	
I have a clear idea of how to achieve my career goals	✓	

Acts
Since entering this college, how often have you:

1 = Not at all   2 = Occasionally   3 = Frequently

Item Available	Requested	Used
Attended a religious service		
Been bored in class	✓	
Demonstrated for a cause (e.g., boycott, rally, protest)		
Studied with other students	✓	
Smoked cigarettes		
Drank beer		
Drank wine or liquor		
Felt overwhelmed by all you had to do		
Felt depressed		
Performed volunteer work		
Asked a professor for advice after class		
Worked on a local, state, or national political campaign		
Socialized with someone of another racial/ethnic group		
Come late to class	✓	
Posted on a course-related on-line discussion board		
Performed community service as part of a class		
Act: Discussed religion		
Discussed politics		
Maintained a healthy diet		
Had adequate sleep		
Helped raise money for a cause or campaign		
Publicly communicated your opinion about a cause (e.g., blog, email, petition)		

Campus Satisfaction
Please rate your satisfaction with this institution on each of the aspects of college life below.

1 = Can't Rate/No Experience   2 = Very Dissatisfied   3 = Dissatisfied
4 = Neutral   5 = Satisfied   6 = Very Satisfied

Item Available	Requested	Used
Amount of contact with faculty		
Racial/ethnic diversity of faculty		
Racial/ethnic diversity of student body		
Class size		
Interaction with other students		
Relevance of coursework to everyday life	✓	
Relevance of coursework to future career plans	✓	
Overall quality of instruction		

	Requested	Used
Respect for the expression of diverse beliefs		
Availability of campus social activities		
Your social life		
Overall sense of community among students	✓	
Overall college experience	✓	✓

Contributions

Please rate your agreement with the following statements: This institution has contributed to my:

1 = Strongly Disagree   2 = Disagree   3 = Agree   4 = Strongly Agree

Item Available	Requested	Used
Intellectual and practical skills (including inquiry and analysis, critical thinking, and information literacy)	✓	✓
Knowledge of a particular field or discipline	✓	✓
Knowledge of people from different races/cultures		
Understanding of the problems facing your community		
Understanding of national issues		
Understanding of global issues		
Ability to conduct research		
Ability to work as part of a team		
Critical thinking skills	✓	✓
Problem-solving skills	✓	✓
Foreign language ability		

Goals

Indicate the importance to you personally of each of the following:

1 = Not Important   2 = Somewhat Important
3 = Very Important   4 = Essential

Item Available	Requested	Used
Becoming accomplished in one of the performing arts (acting, dancing, etc.)		
Becoming an authority in my field	✓	
Obtaining recognition from my colleagues for contributions to my special field	✓	
Influencing the political structure		
Influencing social values		
Raising a family		
Being very well off financially	✓	
Helping others who are in difficulty		
Making a theoretical contribution to science		
Writing original works (poems, novels, etc.)		
Creating artistic work (painting, sculpture, etc.)		

Becoming successful in a business of my own		
Becoming involved in programs to clean up the environment		
Developing a meaningful philosophy of life	✓	
Participating in a community action program		
Helping to promote racial understanding		
Keeping up to date with political affairs		
Becoming a community leader		
Improving my understanding of other countries and cultures		
Adopting 'green' practices to protect the environment		

Hours Per Week
Since entering this college, how much time have you spent during a typical week doing the following

1 = None	2 = < 1 hr/wk	3 = 1-2 hrs/wk
4 = 3-5 hrs/wk	5 = 6-10 hrs/wk	6 = 11-15 hrs/wk
7 = 16-20 hrs/wk	8 = Over 20 hrs/wk	

Item Available	Requested	Used
Attending classes/labs	✓	
Studying/homework	✓	
Socializing with friends	✓	
Exercise or sports		
Partying	✓	
Working (for pay)		
Student clubs/groups		
Household/childcare duties		
Commuting		
Online social networks (Facebook, Twitter, etc.)	✓	

Act in College
Since this college, indicate how often have you:

1 = Not at all	2 = Occasionally	3 = Frequently

Item Available	Requested	Used
Turned in course assignment(s) late	✓	
Contributed to class discussions	✓	
Discussed course content with students outside of class		
Skipped class	✓	
Received tutoring		
Worked on a professor's research project		
Turned in course assignments that did not reflect your best work	✓	
Had difficulty getting along with your roommate(s)/housemate(s)		

Received from your professor advice or guidance about your educational program		
Witnessed academic dishonesty/cheating		
Went home for the weekend		
Received advice/counseling from another student		
Fell asleep in class	✓	
Had difficulty getting the courses you need		
Instant messaged/texted during class	✓	
Worked with classmates on group projects: during class		
Worked with classmates on group projects: outside of class		
Accessed your campus' library resources electronically		
Made a presentation in class		
Used the institution's course catalog (paper or online)		

CHAPTER TWO: ACADEMIC SUCCESS FOR STUDENTS IN POSTSECONDARY

EDUCATION: THE ROLE OF STUDENT CHARACTERISTICS AND INTEGRATION

Abstract

Academic success is an important issue as employers are looking for individuals with a postsecondary education. There are many important indicators of success besides grades. We conceptualized academic success at postsecondary as grade point average (GPA), acquisition of knowledge and skills, and overall satisfaction and examined how each conceptualization was predicted by student characteristics (perceived academic ability and drive to achieve) and experiences (academic and social integration). Using a one-year longitudinal design, we found that perceived academic ability had a positive direct effect on GPA and acquisition of knowledge and skills but not satisfaction; whereas, drive had no direct relationships with the outcomes. Academic integration positively predicted all three indicators of success, but social integration was not associated with grades. Indirect effects were also noted. Our discussion highlights various actions that postsecondary institutions can take to support students and considers how researchers should conceptualize student success.

Introduction

19.9 Million Americans were expected to attend a college or university in the Fall of 2019 (National Center for Educational Statistics, 2019). These students came to postsecondary campuses with diverse backgrounds, goals for their time, and expectations for what to anticipate in the coming year to name just a few individual differences. With these multifaceted differences across students, it is important to determine how best to support students in their academic pursuits. To provide this support, researchers, administrators, and faculty members must, at a minimum, understand the characteristics that students arrive on campus with, such as their goals and beliefs, how students experience the postsecondary environment, such has how they integrate into the academic and social systems of the campus, and how students envision academic success for themselves whether it be grade point average (GPA) or acquiring skills and competencies. With these various components in mind it quickly becomes clear that there are many factors at play when it comes to student success at postsecondary.

Not completing postsecondary education can have many consequences. For example, Avery and Turner (2012) suggest that individuals who obtain bachelor's degrees will earn 50% more over the course of their lifetimes than individuals who only have a high school diploma. Furthermore, researchers have found that college graduates have higher job satisfaction and better health outcomes than those without a postsecondary degree (Barrow et al., 2013). Frank and colleagues (2015) found similar trends in Canada showing that between 2005 and 2012 individuals who graduated from postsecondary obtained higher earnings and were more likely to be employed full-time than those with only a high school education. This maybe of concern for men especially as they have lower rates of attending postsecondary institutions (U.S. Department of Education, 2017) and lower completion rates (Conger & Long, 2010). Therefore,

understanding the characteristics of students and their experiences on postsecondary campuses is important to support their success. The purpose of this study was to examine student characteristics and experiences as antecedents of several indicators of academic success.

Achieving Academic Success

For many people academic success is arguably the most important outcome of postsecondary education. Yet examining postsecondary success is difficult because success can be conceptualized, defined, and measured in many ways. There is no consistent definition of academic success within higher education research and some researchers suggest that the term is used as a general catch-all phrase for a wide variety of student outcomes (Krumrei et al., 2013; Robbins et al., 2004; York et al., 2015) including grades, GPA, satisfaction, learning and developing knowledge. Variability in definitions of academic success can be seen in qualitative research studies that asked students to define academic success (Jennings et al., 2013; Lizzo et al., 2002; Osters & Roberts, 2007; Strang, 2015) resulting in various notions of academic success related to a number of criteria or indices. This lack of singularly when it comes to the definition of academic success raises questions for researchers in terms of what indicators to collect, for administrators in terms of what outcomes to support, and for students' themselves as they wrestle with making sense of internally- and externally-imposed indicators of success.

Bordon and Holthaus (2018, p. 150) comment that while there is variability in how to define student success, in quantitative research it is largely equated to measures that are "readily available" which can include measures such as degree completion, time to degree, credits obtained, and grades. Indeed, grades or grade point averages (GPA) are the most commonly utilized indicator of academic success in research (Lounsbury et al., 2009; York et al., 2015). In fact, GPA was used to assess academic success in over half (54.5%) of the articles included in a

recent literature review of York and colleagues (2015). Students at postsecondary are often graded, and often discuss success in terms of grades (Jennings et al., 2013; Osters & Roberts, 2007). According to this indicator, men would be considered less successful than women at postsecondary because they tend to have lower GPAs on average (Conger & Long, 2010).

Although easily accessible, grades may not be as objective as they appear. For example, there is wide variability in how students are assigned grades (Brookhart et al., 2016; Fuller et al., 2011; Kaplan, 2016), in grading policies across differences departments or disciplines (Beatty et al., 2015; Stricker et al., 1992; Willingham et al., 2002), in the configuration of marks for each student giving rise to grades (Kaplan, 2016), and in the meaning of grades assigned according to a curve compared to absolute system. To the extent that there is error in grades, there is error in this indicator of success (Kaplan, 2016). Nonetheless, researchers, funders, administrators, parents, and students focus on grades because they give the appearance of being an "objective" measure of success and are highly relevant for students' progress through postsecondary (Kaplan, 2016).

Not dismissing the relevance of grades, other indicators of success that may be considered more subjective warrant consideration (Lizzo et al., 2002; Strang, 2015; York et al., 2015; Zepke & Leach, 2010). More subjective indicators can include students doing their best, achieving personal goals, satisfaction, (Osters & Roberts, 2007), enjoying social and residential life, and being academically engaged (Jennings et al., 2013) among others. Focusing on this sort of broader conceptualization of success, Kuh, Kinzie, Buckley, Bridges and Hayek (2006) identified academic success as "academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational outcomes and post-college performance," (p. 7). Building on Kuh et al.

(2006), York and colleagues (2015) conducted a literature review on defining academic success and identified six key components of success: (a) academic achievement, (b) acquisition of skills and components, (c) attainment of learning outcomes, (d) satisfaction, (e) persistence, and (f) career success. Arguably a number of criteria for examining academic success identified by these researchers are subjective, and we have chosen to focus on acquisition of knowledge and skills and satisfaction as two subjective indicators of academic success to investigate alongside grades.

Acquisition of Knowledge and Skills. Through the course of their studies, students are expected to develop knowledge and skills in their program, which can be seen in the learning objectives of their various courses. Nevertheless, there are many challenges when it comes to considering the knowledge and skills acquired by students, such as who decides which learning objectives are to be considered (Thurmond & Popkess-Vawter, 2003) and the challenge with multiple perspectives (Astin & Antonio, 2012). As such, one instructor might consider certain knowledge and skills essential to the student's learning while others may not. This places subjective value on the learning outcomes to be obtained and what is considered important for students to learn. As such, we examine the acquisition of knowledge and skills from the perspective of the students who have chosen to come to postsecondary. Furthermore, assessment of knowledge and skills is a continuous process throughout the student's degree and therefore we have opted to examine students' perceptions at the end of their first semester.

Satisfaction. Satisfaction is defined as the individual's enjoyment of their experiences as a student (Lent et al., 2007) and as such may be considered a subjective and multi-faceted indicator of success. In terms of measurement, for example, the Student Satisfaction Inventory (SSI) includes 11 categories of satisfaction (Bryant, 2006; Elliot & Healy, 2001); whereas, common job satisfaction scales have argued for the adequacy of single items (Dolbier et al.,

2005). Although course satisfaction is often positively associated with course grade, it has also

been shown to be positively associated with mastery orientation (Svanum & Aigner, 2011) and

previous levels of satisfaction (Grayson, 2004) suggesting that it is not simply a different

perspective on grades. Perhaps more so than grades or skills, students' feelings of satisfaction

may fluctuate in response to certain events in their academic life. As such, we have decided to

measure satisfaction as one's overall satisfaction, and measure this construct at the end of their

first-year of studies. The student is able to reflect on the positives and negatives and rate their

overall satisfaction.

Theoretical Framework: The Inputs-Environment-Outcomes Model

Not only are there many indicators of success, but there are countless variables that can

influence students' attainment of success. Astin suggests that "any educational assessment

project is incomplete unless it includes data on student inputs…and the educational environment

to which the student is exposed" (Astin & Antonio, 2012, p. 19). Based on the tenets of

reciprocal determinism (Bandra, 1978) Astin developed the Inputs-Environment-Outcomes (I-E-

O) model to examine these multiple components. For the purposes of this research, we

operationalize outcomes in terms of the three indicators of academic success described above,

namely GPA, acquisition of knowledge and skills, and satisfaction. Astin defines inputs as the

academic or personal experiences and characteristics that students bring with them to

postsecondary institutions. In contrast, the environment represents the "lived experiences" of

students while attending their postsecondary institution (Astin & Antonio, 2012, p. 87). As was

the case with academic success, there are many operationalizations of inputs and environments.

Researchers often use the I-E-O model to examine the experiences of students during

their postsecondary studies. For example, Keup (2006) included a variety of demographic and

background characteristics as inputs and a large number of variables as environment that were categorized as institutional characteristics and first-year experience and involvement. These components where used to predict academic success in terms of college GPA and self-assessed cognitive development in two regression analyses. Strayhorm (2008) also examined the I-E-O model, utilizing several fixed traits (e.g., sex and ethnicity) as inputs, and environment included various engagement items including faculty-student interactions to predict social and personal development of students in the regression analyses. Our work extends previous research by examining the I-E-O model utilizing structural equation modeling (SEM) to examine multiple dependent variables at once. This statistical approach also allowed us to examine the nuanced relationships between the components within the model. Below, we address how we have conceptualized the components of the I-E-O model.

Student Characteristics as an Antecedent of Academic Success

The list of inputs students bring with them to postsecondary education is extensive and includes various qualities such as demographic information, educational background, degree aspirations, financial status, disability status, career choice, life goals, reasons for attending college, academic self-concept, achievement aspirations and expectancies, parental education and goal commitment to name just a few major categories (Astin, 1993; Astin & Antonio, 2012; House, 2002; Thurmond et al., 2002; Sam et al., 2013). Bringing some order to this list, Robbins and colleagues (2004) suggest that most predictors of achievement can be classified as (a) traditional, (b) demographic, or (c) psychosocial. Traditional (e.g., high school grades, standardized test scores) and demographic (e.g., socioeconomic status, ethnicity, gender) predictors are the most common in research (Krumrei et al., 2013; Pritchard & Wilson, 2003) even though they are largely stable and long-standing characteristics that are unlikely or difficult

to change (Krumrei et al., 2013; Robbins et al., 2004). In contrast, psychosocial predictors have proven to be malleable, and therefore, are a promising category to consider as inputs.

Even within the single category, psychosocial variables are numerous and have been shown to have different relationships with indicators of success, including grades. Robbins and colleagues (2004) conducted a meta-analysis to examine psychosocial and study skill factors that predicted college students' GPA and persistence as measured by student retention. Two psychosocial predictors emerged as particularly strong. First, students' academic self-efficacy was the strongest predictor of GPA with a large effect size even greater than that of SAT scores. Second, students' motivation to achieve success was also an important predictor of GPA. Both of these factors also had moderate relationships with persistence suggesting a broader relationship with indicators of student success.

Subsequently, Richardson, Abraham and Bond (2012) found that performance self-efficacy, which was defined as the student's ability to draw on past experiences to formulate expectations for their performance on a task, had the highest correlation with GPA. More recently, Fong and colleagues (2017) examined various psychosocial factors and their connection to two measures of academic success: persistence and achievement. Similarly, relationships between self-perceptions in relation to academic achievement and persistence were positive. Schneider and Preckel (2017) conducted a meta-analysis, and found a large effect size for performance self-efficacy on achievement. These studies highlight the importance of self-beliefs when it comes to student success in terms of grades and persistence. Building on the importance of psychosocial variables in explaining success, we chose self-beliefs related to academic ability and drive to achieve as the student characteristics to be utilized as the inputs in our model.

Student Integration as Mediators to Academic Success

The list of variables that could be considered as part of students' experiences with the postsecondary environment is similarly extensive. Postsecondary institutions represent a new achievement environment to which students must adjust to what seems like a limitless list of things. Specifically, during the first-year of college students must learn how to navigate the rigorous pace of the academic environment as well as adjust to a new social surrounding (Budny & Paul, 2003). To examine the educational environment the student is navigating, we turn to Tinto's influential (1975, 1999, 2006) Student Integration Model.

Tinto's (1975) model was developed to examine the dropout behaviour of students at postsecondary. He drew from the work of Durkeim (1961) that examined suicide, and how individuals who are not sufficiently integrated into society are more likely to commit suicide. From this, Tinto considered postsecondary environments as having two systems – academic and social. Lack of integration into one or both of these systems, Tinto proposed, would result in student withdrawal (i.e., dropout) from their postsecondary studies. Academic integration can include researching in the library, attending class or labs, and interactions with faculty (Chrysikos et al., 2017; Tinto, 1975). Overall, these components involve the intellectual development of the student (Meeuwisse et al., 2010). Lack of academic integration may lead to low grades, and as a result, the student may be required to leave the institution (Tinto, 1975). Social integration can include interactions with peers, or being involved in extracurricular activities like clubs or sports (Chrysikos et al., 2017; Meeuwisse et al., 2010). Lack of social integration can lead to the student feeling disconnected from others on campus, again increasing their likelihood of leaving the institution (Tinto, 1975). Tinto referred to this as voluntary withdrawal, whereas lack of academic integration would result in forced withdrawal. If the

student is able to academically and socially integrate into the postsecondary environment, it is

suggested that they will have higher commitment and motivation to continue with their degree

(Arnekrans, 2014; Demetriou & Schmitz-Sciborski, 2011; Tinto 1975, 1999).

Of course, integration is not a perfectly linear process. The two types of integration could

overlap (Beekhoven et al., 2002) and as with the other constructs in the current investigation, that

leads to methodological complexities (Baxton et al., 1997). Nonetheless, the guidance afforded

by Tinto far outweighs the complexity. Thus, for the current study, we examined academic and

social integration independently. We conceptualize academic integration as the ease of

adjustment to postsecondary and social integration as sense of belonging.

Research by Woolsey (2003) examined students' social and academic experiences at

postsecondary. Students were surveyed within the first three weeks of their first-year regarding

their initial social (e.g., I feel that I fit in well at [university name]) and academic adjustment

(e.g., I am managing my time well). Academic success was measured based on degree

obtainment within five years. Degree completion was significantly related to both initial social

and academic adjustment, while only initial social adjustment significantly predicted degree

completion. Woolsey argued that academic adjustment was not significant as it would be

difficult for students to determine within the first three weeks. More recently Ishitani (2016)

examined the impact of academic and social integration on first-year persistence. Academic

integration was found to have a positive and significant effect on students first-year persistence

while social integration was not significant. However, academic integration was measured by

examining a number of items such as how often they participated in study groups, and talked

with faculty members outside of class which presumably could also have a social component.

Also of note, Ribera, Miller and Dumford (2017) examined sense of peer belonging (i.e., social

integration) and institutional acceptance (i.e., academic integration) of first-year students. They determined that while female students reported similar levels of peer belonging as male students, the female students also reported lower levels of institutional acceptance. In contrast to this, women have been shown to have higher levels of social integration than men and this translates into higher commitment (Jones, 2010).

The Current Study

Utilizing the Inputs-Environment-Outcomes (I-E-O) model of Astin (Astin & Antonio, 2012) as our theoretical model, we examine the connections between student psychosocial characteristics as inputs, student integration as environment, and indicators of academic success as outcomes. By design, the model suggests relationships between student characteristics and academic success are at least partially mediated by the interceding construct of student integration. Furthermore, logically, students' characteristics are hypothesized to begin the progression because the characteristics students bring with them to postsecondary will naturally influence their integration once they arrive, and the student integration will in turn impact students' resultant academic success (see Figure 2.1).

As such, our research questions were as follows: (1) How are student psychosocial characteristics at the start of the year (perceptions of academic ability and drive to achieve) related to three different indicators of student success (GPA, acquisition of knowledge and skills, and satisfaction) after their first-year of studies? (direct effects I→O), (2) How do student academic integration (ease of adjustment to postsecondary) and social integration (and sense of belonging) relate to three different indicators of student success after their first-year of studies? (direct effects E→O), (3) To what extend does student integration mediate the relationship

between the inputs and outcomes? (the indirect effects I→E→O). (4) Are these relationships
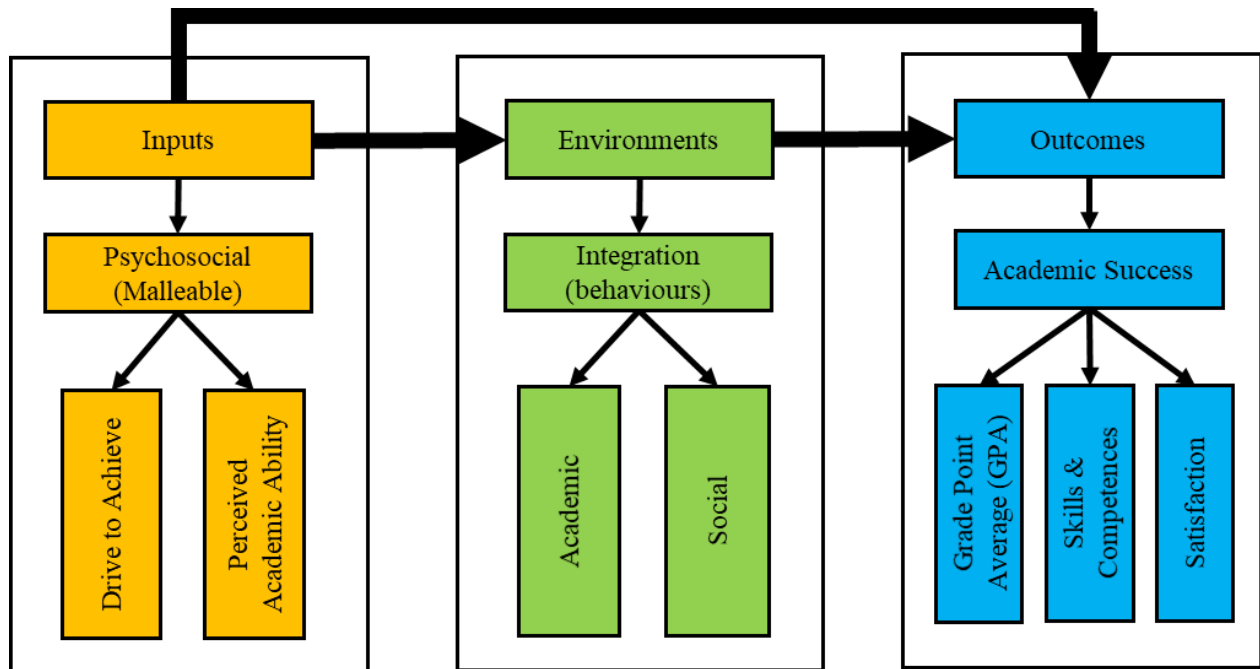
moderated by gender?

Figure 2.1: Astin's I-E-O Model Conceptualized

Method

In the present study we undertook a secondary analysis of American college students'

self-reported quantitative data that was collected by the Higher Education Research Institute

(HERI) through their Cooperative Institutional Research Program (CIRP). HERI has been

collecting data from postsecondary students for decades and allows non-affiliated researchers to

submit proposals requesting access to portions of their data. Their mission is to "inform

educational policy and promote institutional improvement through an increased understanding of

higher education and its impact on college students" (Higher Education Research Institute,

2017). Annually, HERI recruits college students to complete *The Freshman Survey* (TFS) in the

fall semester and the *Your First College Year* survey (YFCY) in the winter semester of their

first-year. Participants' responses to the two surveys are matched to create a longitudinal dataset

spanning one academic year.

The surveys include questions on a wide range of factors relevant to college students

including but not limited to demographics (e.g., sex, age, ethnicity), school experiences (e.g.,

how much time do you spent during a typical week studying), aspirations (e.g., what is the

highest academic degree that you intend to obtain), and opinions (e.g., should the death penalty

should be abolished). Participants complete the survey on their own time online or in class on

paper with pencil on an institution by institution bases. In our proposal we requested access to

specific items from the most recent surveys that we could use to operationalize various

components of the Inputs-Environment-Outputs model. HERI sent us a data file of our requested

items for matched participants on the 2014 TFS and 2015 YFCY, henceforth referred to as Time

1 and Time 2 in the present study. The University of Alberta Research Ethics board granted

ethical approval for the plan of analyses (Pro00085240).

Participants

The dataset provided by HERI consisted of 6,835 students. For this study we restricted

the sample to typically developing first-year young college students. Therefore, we removed

students who graduated from high school or began postsecondary in a year other than 2014 or

were over the age of 20 or if they identified as having a disability status. This left us with 5,796

students. An additional 596 students were also removed for incomplete data and 198 students

were randomly removed from the dataset and reserved for a separate analysis (see Goegan &

Daniels, 2020). Therefore, the final dataset consisted of 5,002 students who provided responses

at both the beginning and end of their freshman year.

Participants were from 39 postsecondary institutions across the United States. The students in this sample had an average age of 18.25, 34.8% identified as male, and 65.2% identified as female. Students came from families with an average income of between 60,000 to 74,999. When asked about their ethnicity, 67.9% identified as White/Caucasian, 19.8% Asian American/Asian, 6% African American/Black, 6% Mexican American/Chicano, 1.6% Puerto Rican, 1.5% Native Hawaiian/ Pacific Islander, 1.4% American Indian/Alaska Native, 5% Other Latino and 3.1% Other. Note that these percentages add up to greater than 100 as some individuals identified as more than one ethnicity (12.3%). Students also identified a number of intended majors, including: English, Biology, Environmental Science, Accounting, Business, Finance, Marking, Management, Education, Engineering, Nursing, Chemistry, Economics, Political Science, Psychology.

Measures

Demographics. To describe the sample, we requested access to four demographic variables collected at Time 1: age, sex, intended major, and average family income (as a measure of socioeconomic status; see Table 2.1). We also accessed students' high school GPA to include as a covariate in the main analyses.

Student Characteristics: Inputs. In order to assess the inputs component of the I-E-O model, we accessed two items from the Time 1 survey: perceived (a) academic ability and (b) drive to achieve. Participants responded to the stem: *Rate yourself on each of the following traits as compared with the average person your age. We want the most accurate estimate of how you see yourself.* Participants rated themselves on a scale from 1 (lowest 10%) to 5 (highest 10%) for each of these single items. Thus, higher scores indicate more perceived academic ability and drive to achieve respectively.

Table 2.1. *Descriptive Statistics of Study Variables (n = 5,002)*

Variable	# Items	Scales	Range	M	SD	Skew	Kurtosis
Inputs							
Age	1	Self reported number.	16-19	18.25	.47	.62	-.09
Sex	1	1 = male; 2 = female	1-2	1.65	.48	-.64	-1.59
Academic Ability	1	1 (lowest 10%) to 5 (highest 10%)	1-5	3.97	.69	-.13	-.38
Drive to Achieve	1	1 (lowest 10%) to 5 (highest 10%)	1-5	4.11	.82	-.64	-.04
High School GPA	1	1 (D) to 8 (A or A+)	1-8	6.77	1.16	-.90	.67
Environment							
Academic Integration	4	1 (very difficult) to 4 (very easy)	1-4	2.83	.65	-.06	-.36
Social Integration	4	1 (strongly disagree) to 4 (strongly agree)	1-4	3.06	.61	-.54	.67
Outcomes							
Current GPA	1	1 (D) to 8 (A or A+)	1-8	6.00	1.54	.72	.18
Knowledge and Skills	3	1 (strongly disagree) to 4 (strongly agree)	1-4	3.27	.47	-.11	.54
Overall Satisfaction	1	1 (very dissatisfied) to 5 (very satisfied)	1-5	4.04	.81	-.84	.97

Student Integration: Environment. We accessed eight items from the Time 2 survey and used them to create two variables related to the environment component of the I-E-O model. The first integration variable was *academic integration* to postsecondary education. To create the variable, we used students' response to four items following from the prompt: *Since entering this college, how has it been to* (a) understand what your professors expect of you academically, (b) develop effective study skills, (c) adjust to the academic demands of college, and (d) manage your time effectively. Responses were recorded on a scale from 1 (very difficult) to 4 (very easy). Scores presented in Table 2.1 were created by averaging participants scores across these four items ($\alpha = .82$). High scores on academic integration suggest the student found it easier to adjust to postsecondary education.

The second integration variable was students' *social integration.* To create the variable, we used students' responses to four items following from the prompt: *Please indicate the extent to which you agree or disagree with the following statements*, (a) I see myself as part of the campus community, (b) I feel valued at this institution, (c) I feel a sense of belonging to this campus, and (d) I feel I am a member of this college. Responses were recorded on a scale from 1 (strongly disagree) to 4 (strongly agree). Scores presented in Table 2.1 were created by averaging participants scores across these four items ($\alpha = .89$). A higher score on belonging indicated the student felt more belonging on campus.

Academic Success: Outcomes. We identified and accessed three relevant outcomes in the Time 2 survey: (a) current GPA, (b) acquisition of knowledge and skills, and (c) overall satisfaction. For current GPA, students were asked: *What is your overall grade average (as of your most recently completed academic term)?* Students responded on an eight-point scale from

1 (D) to 8 (A or A+). Thus, higher scores indicated higher academic achievement. To measure

knowledge and skills, students were provided with the following instructions: *Please rate your*

agreement with the following statements: This institution has contributed to my (a) intellectual

and practical skills (including inquiry and analysis, critical thinking, and information literacy),

(b) knowledge of a particular field or discipline and (c) problem-solving skills. Scores presented

in Table 2.1 were created by averaging participants' scores across these three items ($\alpha = .82$).

Higher scores indicate more perceived obtainment of knowledge and skills at their postsecondary

institution. To assess student overall satisfaction with their first-year of postsecondary education,

students responded to the single item: *Please rate your satisfaction with this institution on each*

of the aspects of college life listed below, and responded on a scale from 1 (very dissatisfied) to 5

(very satisfied) to the item overall satisfaction.

Rationale for Analyses

We conducted the analyses in five steps. First, we ran preliminary analyses on the full

sample which included descriptive statistics (see Table 2.1) and correlations among manifest

study variables (Table 2.2). This allowed us to obtain information about the students, observe

trends in the data, and assess the distribution of the variables. Second, we randomly divided the

sample into two separate groups ($n = 2,501$ x 2). Because a random half sample is still more than

adequately powered to run the analyses (Kline, 2011), the advantage of splitting the sample was

that we could conduct the main analyses twice for the purposes of cross-validation. Third, with

the first half of the sample, we utilized structural equation modelling with latent variables where

possible in AMOS 24.0 to answer our research questions regarding direct and indirect effects.

Fourth, we tested the model for gender invariance. Fifth, we repeated the analyses on the second

half of the sample for the purposes of cross-validation.

Table 2.2. *Correlation Matrix of Study Variables*

Variables	1	2	3	4	5	6	7	8	9
1. Age	-								
2. Sex	-.11**	-							
3. Academic Ability	-.02	-.10**	-						
4. Drive to Achieve	.03	.00	.30**	-					
5. High School GPA	-0.03	.11**	.47**	.25**	-				
6. Academic Integration	0.01	.01	.15**	.14**	.09**	-			
7. Social Integration	.03*	.04**	.09**	.11**	.09**	.23**	-		
8. Current GPA	-.00	.12**	.29**	.15**	.40**	.40**	.15**	-	
9. Knowledge & Skills	.03	.02	.15**	.12**	.13**	.25**	.48**	.17**	-
10. Overall Satisfaction	-.01	.08**	.11**	.12**	.12**	.30**	.49**	.24**	.47**

*$p \leq .05$, **$p \leq .01$

The structural equation modeling analyses were conducted on each random half sample separately as follows. First, we began the latent analysis by using confirmatory factor analysis to assess the adequacy of the measurement model of ease of adjustment, sense of belonging, and acquisition of knowledge and skills as latent variables. Second, we tested the structural model, which consisted of three latent variables and four manifest indicators of the remaining variables using maximum likelihood estimation. Specifically, we estimated a fully recursive model that included all possible paths between the inputs, environment, and outcome variables (Cortina, 2005). All variables were connected to all subsequent variables producing a unidirectional model (Kline, 2016). Additionally, we controlled for the influence of high school GPA to current GPA. In total we estimated 17 direct structural paths. We considered overall model fit to be adequate

when chi-square is non-significant (Garson, 2008; Schumacker & Lomax, 2004), the

comparative fit index (CFI) value is ≥ .90 (Kline, 2016; McDonald & Ho, 2002), the root mean

square error of approximation (RMSEA) value is < 0.06 (Garson, 2008; Hu & Bentler, 1999;

McDonald & Ho, 2002), and standardized root mean square residual (SRMR) is < .08 (Hu &

Bentler, 1999). Third, we tested the structural model for gender invariance using a chi-square

difference test (Byrne, 2001) and examining direct changes in CFI (Cheung, & Rensvold, 2002;

Putnick, & Bornstein, 2016). To do this, we constrained all structural paths to be equal between

male and female participants (Byrne, 2001; Byrne & Watkins, 2003). We examined the change

in goodness of fit between the unconstrained and constrained models. Any model in which the

CFI changed by < .01 was considered invariant across genders (Cheung, & Rensvold, 2002;

Putnick, & Bornstein, 2016). Fourth, we examined 6 indirect effects by running 1000

bootstrapped estimates of the model and examining the associated confidence intervals.

Results

Preliminary Analyses

We assessed normality of the data by examining histograms for the main study variables

and calculated the means, standard deviations (SD), skewness and kurtosis of each variable (see

Table 2.1). All study variables appeared to have adequate normality, with the exception of sex,

which was skewed slightly due to the overrepresentation of female students. However, this was

acceptable as more females attend postsecondary education than males (U.S. Department of

Education, 2017).

Correlations between all study variables are shown in Table 2.2, several of which are

highlighted here. The input variables of perceived academic ability and drive to achieve were

significantly positively correlated. As such, those who felt they had more academic ability also

felt they were more driven. The environment variables of academic integration and social

integration were also positively correlated. Additionally, the outcome variables of current GPA,

acquired knowledge and skills, and overall satisfaction where also all positively correlated.

Associations between the categories of I-E-O were also as expected. For example, current GPA

had the strongest correlations with high school GPA and academic integration, while acquisition

of knowledge and skills and overall satisfaction were most strongly correlated with each other (r

$= .47$) and sense of belonging ($r = .48$, $r = .49$ respectively). The positive associations within

each category of the I-E-O model provide some evidence of validity of the constructs while the

correlations between the inputs, environment and outcomes components of the model

foreshadow important relationships.

Structural Equation Modeling: Sample 1

Measurement Models. We tested the academic integration (four items), social

integration (four items), and acquisition of knowledge and skills (three items) variables together

in a single confirmatory factor analysis (CFA). The original CFA included all items outlined

above as indicators and resulted in a good fit to the data χ^2 $p < .001$, CFI $= .97$, RMSEA $= .04$,

SRMR $= .05$. The standardized regression weights ranged from .55 to .84 for the academic

integration items, from .74 to .88 for the social integration items, and from .68 to .84 for the

acquisition of knowledge and skills items. Therefore, all items were retained in the structural

analyses below.

Overall Assessment of Model Fit and Gender Invariance. The estimated model

(Figure 2.2) demonstrated good fit χ^2 $p < .001$, CFI $= .97$, RMSEA $= .04$, Standard RMR $= .04$.

Overall this suggests that the hypothesized model adequately describes the relationships between

inputs, environment and outcomes. According to a stringent chi-square difference test

measurement weights and intercepts were invariant across genders (p > .01). Although the chi-square difference test was significant for the structural weights (Byrne, 2001; See Table 2.3), CFI did not change by more than .01 thereby suggesting gender invariance at the structural level as well (Cheung & Rensvold, 2002; Putnick, & Bornstein, 2016). We concluded that the relationships between variables were invariant by gender and thus present the results for the full sample.

Table 2.3. *Model fit indices, tests of invariance of the measurement models and structural paths.*

| Sample 1 Model	χ^2	df	CFI	*RMSEA*	$\Delta \chi^2$
1. Baseline	698.03	170	.97	.04	
2. Invariance of loadings	717.79	182	.97	.03	19.77
3. Invariance of loadings and intercepts	729.17	195	.97	.03	31.14
4. Invariance of loadings, intercepts, and structural paths	781.37	208	.97	.03	83.34*
Sample 2 Model					
1. Baseline	690.78	170	.97	.04	
2. Invariance of loadings	716.12	182	.97	.03	25.34
3. Invariance of loadings and intercepts	728.43	195	.97	.03	37.65
4. Invariance of loadings, intercepts, and structural paths	774.66	208	.97	.03	83.89*

Note: *$p \leq .01$
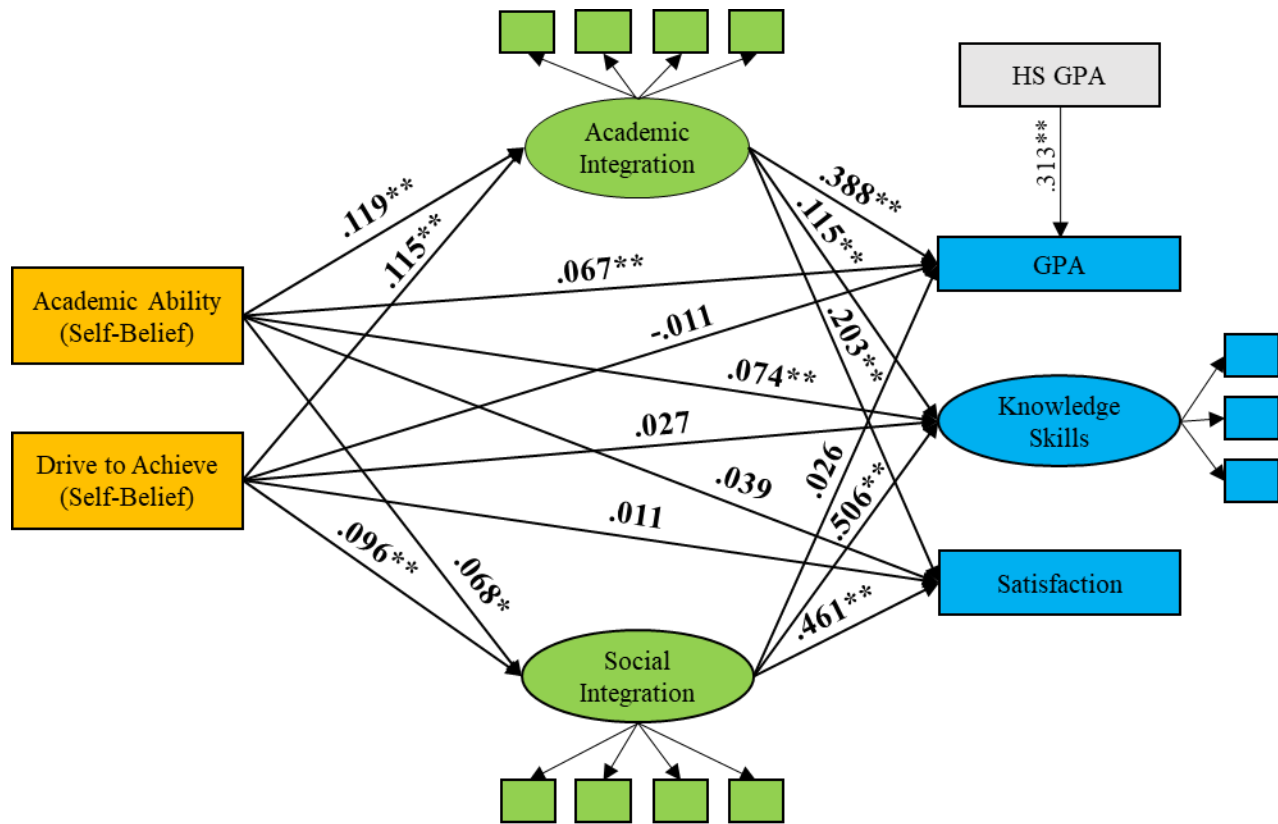
Figure 2.2: Structural Model and Standardized Regression Weights for First Sample

Direct Effects. The standardized path coefficients between all study variables in the model are presented in Figure 2.2. Perceived academic ability and drive to achieve where both significantly and positively related to academic and social integration. Perceived academic ability was positively related to GPA and knowledge and skills acquired but not students' overall satisfaction. For drive to achieve, none of the direct effects to outcome variables were significant. From integration to outcomes, academic integration was significantly related to all outcome variables; whereas, social integration was positively related to acquisition of knowledge and skills and overall satisfaction, but not GPA.

Indirect Effects. The specification of the model allowed us to examine indirect effects between the inputs and the outcomes through academic and social integration. Perceived

academic ability and drive to achieve both had significant positive indirect effects on all three

outcomes – students' GPAs, knowledge and skills acquired, and overall satisfaction – through

the integration variables (see Table 2.4). These results suggest that the inputs influenced the

outcomes directly and indirectly through students' integration resulting in a larger total effect

than when the role of the integration is neglected.

Table 2.4. *The First Sample, Test of Significance of Mediation*

Independent Variable	Mediating Variable	Dependent Variable	Original Sample: β standardized indirect effect	95% CI with bias correction (lower, upper)[a]	Bias-corrected p[a]
Academic Ability	Academic & Social Integration	GPA	.048	.030, .066	.001
Drive to Achieve	Academic & Social Integration	GPA	.047	.029, .070	.002
Academic Ability	Academic & Social Integration	Knowledge and Skills	.046	.024, .071	.002
Drive to Achieve	Academic & Social Integration	Knowledge and Skills	.062	.037, .085	.002
Academic Ability	Academic & Social Integration	Satisfaction	.053	.032, .079	.001
Drive to Achieve	Academic & Social Integration	Satisfaction	.068	.045, .092	.002

Note. [a] These values are based on bootstrap estimates.

Cross Validation Sample 2

We repeated the analyses on a separate sample of students ($n = 2501$). The CFA including the same items for academic integration, social integration, and acquisition of knowledge and skills resulted in a good fit to the data, χ^2 $p < .001$, CFI = .98, RMSEA = .04, SRMR = .04, and thus we retained all items. The standardized regression weights range, from .54 to .83 for the ease of adjustment items, from .74 to .87 for the sense of belonging items, and from .74 to .82 for the acquisition of knowledge and skills items. The estimated model (Figure 2.3) again demonstrated good fit χ^2 $p < .001$, CFI = .97, RMSEA = .04, Standard RMR = .04. The tests of invariance showed no significant gender differences when examining the measurement weights and intercepts according to a chi-square difference test (Byrne, 2001) and no differences for structural weights according to changes in CFI (Cheung & Rensvold, 2002; Putnick & Bornstein, 2016). Thus, the model was considered invariant across genders and the results are presented only once.

Direct Effects. Standardized path coefficients between all variables in the model are shown in Figure 2.3. With one exception, all direct effects were the same in terms of significance and similar in magnitude: Perceived academic ability and drive to achieve were both significantly positively related to the academic and social integration. Perceived academic ability was positively related to GPA and knowledge and skills acquired, but not to students' overall satisfaction with their postsecondary experience. As the exception, in the original sample drive to achieve did not relate to any outcomes, however, in this sample it was positively and significantly related to acquisition of knowledge and skills. Academic integration and the outcome variables were all significantly positively related. In contrast, social integration on

campus was again positively related to the knowledge and skills and overall satisfaction with postsecondary experience, but not GPA.
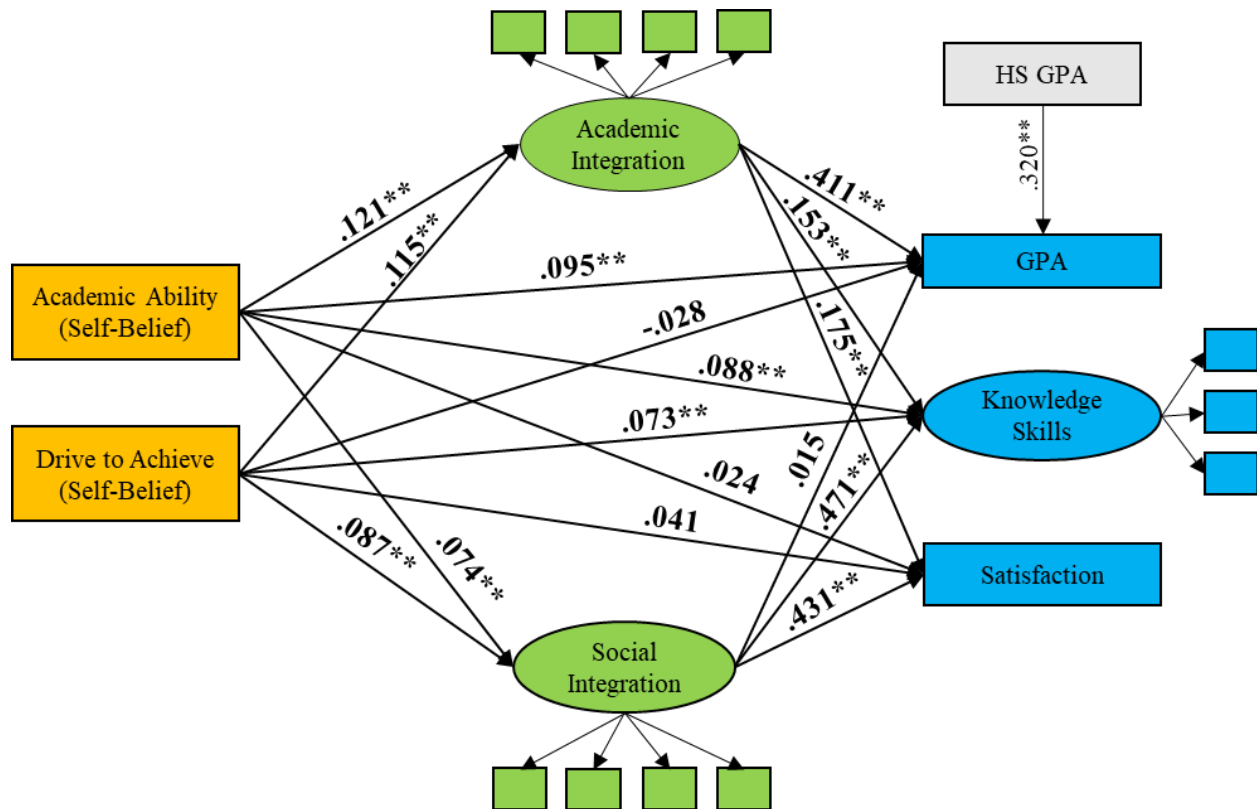

Figure 2.3: Structural Model and Standardized Regression Weights for Second Sample

Indirect effects. Perceived academic ability had a significant indirect effect on students' GPA, acquisition of knowledge and skills, and overall student satisfaction (see Table 2.5) through integration. Drive to achieve also had a significant indirect effect on all study outcome variables. These results indicate the overall stability of this model because all direct and indirect effects were the same as found in the first half of the sample with the exception of the direct effect between drive to achieve and acquisition of knowledge and skills.

Table 2.5: *The Second Sample, Test of Significance of Mediation*

Independent Variable	Mediating Variable	Dependent Variable	Original Sample: β standardized indirect effect	95% CI with bias correction (lower, upper)[a]	Bias-corrected p[a]
Academic Ability	Academic & Social Integration	GPA	.051	.033, .070	.002
Drive to Achieve	Academic & Social Integration	GPA	.048	.028, .067	.004
Academic Ability	Academic & Social Integration	Knowledge and Skills	.053	.030, .077	.002
Drive to Achieve	Academic & Social Integration	Knowledge and Skills	.059	.034, .081	.003
Academic Ability	Academic & Social Integration	Satisfaction	.053	.031, .076	.002
Drive to Achieve	Academic & Social Integration	Satisfaction	.058	.035, .080	.003

Note. [a] These values are based on bootstrap estimates.

Discussion

In this discussion, we focus on how our findings can expand the current understanding of supporting students during their postsecondary education. Specifically, we discuss (a) the importance of student perceptions of their academic ability and drive to achieve when they begin their postsecondary programs, (b) how integration, both academic and social, plays an important role in academic success, and (c) the importance of using multiple measures of academic success.

Student Characteristics are Important for Academic Success

Student perceptions of their academic ability and drive to achieve at the start of their postsecondary experience play a significant role in their academic success at the end of their first-year of postsecondary studies. For example, students' perception of their academic ability had a direct effect on the student's academic and social integration at postsecondary, their resulting GPA, and their acquired knowledge and skills. Furthermore, the indirect effects on all three outcomes through the integration variables were all significant suggesting an additive effect. Student's drive to achieve was also an important component in their academic success at the end of the first-year of a student's postsecondary studies. Indeed, drive to achieve also had a direct effect on the student's academic and social integration at postsecondary and to their acquisition of knowledge and skills. However, compared to perceptions of academic ability, drive to achieve was related to fewer indicators of academic success. Nevertheless, the indirect effects from drive to achieve on outcomes through the integration variables were all significant, again suggesting an additive effect by accounting for both student inputs and their integration.

Our results are consistent with previous research that has demonstrated the positive impact students' perception of their academic ability and drive to achieve can have on their academic success (e.g., Fong et al., 2017; Richardson et al., 2012 Robbins et al., 2004). However, it is important to note that this previous research has examined academic success in terms of GPA and persistence, and our research expands on this by examining acquisitions of knowledge and skills and satisfaction as measures of academic success.

It is important to note that these positive perceptions that students develop are done so before they enter into the postsecondary environment, and therefore, it is imperative for teachers and school personnel in the K-12 system to support these positive perceptions in their students.

The good news is that these characteristics are malleable and teachers can make a difference in their student's perceptions. One avenue to support these students is by utilizing mastery-oriented feedback (CAST, 2019). The universal design principles highlight the importance of increasing mastery-oriented feedback as this type of feedback emphasizes the importance of effort and persistence, wherein ability is not inherent or "fixed" which is important for positive learning practices and one's perception of their ability (CAST, 2019).

Integration is Important Too

Students' integration, both social and academic, was important for their academic success. Academic integration, conceptualized as the ease of their adjustments to the demands of postsecondary, had a significant direct effect on student GPA, acquisition of knowledge and skills, and their overall satisfaction at postsecondary. Perhaps not surprisingly, academic integration had the largest beta weight when it came to GPA. These students understand what their professors expect from them academically, develop effective study skills, and manage their time effectively. As such, they objectively do better at postsecondary. Social integration, conceptualized as the sense of belonging students developed over the first-year of their studies, also had a significant direct effect on their acquisition of knowledge and skills and their overall satisfaction at postsecondary, but not their GPA. Therefore, if students see themselves as part of the campus community, feel valued and that they have a sense of belonging on their campus, they endorse higher ratings on the more subjective components of academic success.

These results are consistent with the work of Tinto (1975, 1999), who suggested that the two systems (academic and social) at postsecondary have different consequences. Academic integration can be seen as the intellectual development of students (Meeuwisse et al., 2010), and therefore, it is not surprising that it was related to our outcomes of GPA and acquisition of

knowledge and skills. In particular, the connection to GPA is important as Tinto suggested that a lack of academic integration would lead to lower grades, and result in students possibly having to leave the institution due to unsatisfactory performance (1975). Academic integration did have the strongest beta weight to GPA, and the connection between the two cannot be ignored. On the other hand, social integration involves interactions with peers and participation in social activities on campus (Chrysikos et al., 2017; Meeuwisse et al., 2010). A lack of social integration is suggested to leave the students feeling disconnected from others, and as a result, they may be more likely to voluntarily leave (Tinto, 1975). In line with this theorizing our results showed the strong connection between social integration and overall satisfaction at postsecondary. It is interesting to note that acquisition of knowledge and skills was the most significant outcome related to social integration. One explanation for this could be the result of the overlap between the two types of integrations (Beekhoven et al., 2002). For example, if a student is studying with their friends, they are developing their sense of belonging while also learning course content.

Our findings highlight the importance of postsecondary institutions supporting students in their navigation of the campus environment, not only academically, but socially as well. One avenue in which this can be accomplished is through the development of writing centers and other academic supports available to assist students in learning academic expectations in social ways. Furthermore, postsecondary institutions often require students to take an introductory English class to support their development of writing skills necessary for postsecondary, and postsecondary institutions might want to consider if other introductory courses related to postsecondary demands should be taken by all incoming students. This is similar to the ideas of Tinto (1999) who suggested learning communities for first-year students. Learning communities could involve linked courses, creating freshman interest groups, or clustered courses and

coordinated studies so that first-year students are supported in their academic and social

integration (Tinto, 1999). Indeed, Tinto stated that "The first year of college should be

understood as a developmental year in which new students acquire the skills, dispositions and

norms needed to learn and grow throughout the college years" (p. 9).

If learning communities are not possible at an institutional level, instructors of first-year

courses could also encourage the use of study groups to help students connect, and perhaps,

depending on the size of the class, have opportunities for group work or discussion so students

can get to know one another. This strategy would help with both social and academic integration.

When it comes to social integration more explicitly, postsecondary campuses should be mindful

of social activities offered to students. For example, some campuses offer orientation weeks that

can offer a plethora of activities that can apply to all different students. Postsecondary

institutions might also want to consider the diversity of social clubs available on campus so that

students feel there are options that appeal to their interests and needs. Furthermore, it might be

beneficial to connect with local high schools to help students integrate on campus. For example,

postsecondary institutions could offer programs wherein high school students are welcomed to

campus and are able to be a student for a day. They could sit in courses they are interested in and

meet other likeminded students.

The Value in Multiple Measures of Academic Success

Researchers have examined the definition of academic success, and the general consensus

is that there is no one singular agreed upon definition (Krumrei, et al., 2013; Robbins et al.,

2004; York, 2015). By selecting different conceptualizations of success, our research found

different relationships with the student characteristics (i.e., inputs) and student integration (i.e.,

environment) variables. For example, the relationship between academic ability, and both the

outcomes of GPA and acquisition of knowledge and skills were significant, but the relationship between academic ability and satisfaction was not. When it comes to social integration, both outcomes of acquisition of knowledge and skills and overall satisfaction are significant, but the relationship between social integration and GPA was not. Furthermore, the relationships between the student characteristics or the integration variables are significant with multiple measures of academic success, however, the standardized beta-weights can vary significantly. Our results demonstrate that how researchers measure academic success will impact the findings obtained. Therefore, future research should utilize multiple measures of success, and success should be viewed more broadly than GPA and persistence.

Limitations and Future Directions

While our findings provide important insights that will support student attainment of academic success at postsecondary, there are three important limitations that should be mentioned. First, the use of secondary data poses a number of challenges. The surveys accessed by the CIRP contain single items rather than pre-existing scales. Indeed, secondary datasets typically have significant breadth of content, rather than depth of measurement (i.e., constructs often only have an item or two; Trzesniewski et al., 2011). Nevertheless, where possible, we have grouped similar items together, and analyzed a measurement model to examine the fit between our items and the construct of interest. However, there were a number of single items included in our analysis which could underrepresent the complexity of the constructs. That said, the face validity of the individual items selected was appropriate, and the relationships found in our study are consistent with others who have examined similar constructs. These constraints are offset by the fact that using secondary data allowed us to access a large number of participants that would not have been possible otherwise. Future research could examine a single university

with our model, and follow-up with interviews or focus groups that include various first-year students to provide additional information as to their experiences over the first-year of postsecondary studies.

A second limitation of our study was that the participants were a homogeneous group of first-year students, in the United States, coming right from high school, who did not identify having a disability. Future research could extend our model to different years of students, populations, countries, or routes to postsecondary such as gap-year or mature students. It may also be that as a more diverse set of students arrive on US campuses the results may be different for first-generation students, students with learning disabilities, or ethnic minorities. Testing the model with these groups would provide postsecondary institutions with important information as to the experiences of diverse students on their campuses.

A third limitation of our study was that there are potentially other inputs and environment variables that could have been included within our model. While our model demonstrated a number of significant relationships between the psychosocial predictors (inputs), integration (environment) and academic success (outcomes), it is possible that others variables could have provided additional information about the relationships between these constructs. Therefore, future research should consider potential additional constructs to include within the model.

Conclusion

In conclusion, our study provides valuable information about student success at postsecondary. Our results highlight that academic success is more complicated and nuanced than a singular measure, and researchers need to be mindful when selecting their instruments. Furthermore, our results highlight the importance of various student characteristics and integration for students when it comes to their success. The implications of the current results

suggest that postsecondary institutions should support the development of academic and social integration of students in their campuses. Furthermore, teachers in the K-12 system, particularly those in grade 12, should be mindful of psychosocial variables (i.e., perceived academic ability and drive to achieve) and how to encourage a positive mindset in their students. These areas provide avenues for future research to further investigate how to support academic success for students during their postsecondary education.

References

Arnekrans, A. K. (2014). Tinto's Student Integration Model & Diathesis Stress Model: Adverse

  Childhood Events, Resilience, & Retention in a First Year University Population.

  (Unpublished doctoral dissertation).

  https://etd.ohiolink.edu/!etd.send_file?accession=toledo1396182197&disposition=inline

Astin, A. W. & Antonio, A. L. (2012). *Assessment for excellence: The philosophy and practice*

  of assessment and evaluation in higher education. UK: Rowman & Littlefield.

Astin, A. W. (1993). *What Matters in College? Four Critical Years Revisited* (1st ed.). Jossey-

  Bass.

Avery, C., & Turner, S. (2012). Student Loans: Do College Students Borrow Too Much-Or Not

  Enough? *Journal of Economic Perspectives*, *26*(1), 165-92.

  https://doi.org/10.1257/jep.26.1.165

Bandura, A. (1978). The self system in reciprocal determinism. *American psychologist*, *33*(4),

  344-358. https://doi.org/10.1037/0003-066X.33.4.344

Barrow, L., Brock, T., & Rouse, C. E. (2013). Postsecondary education in the United States:

  Introducing the issue. *The Future of Children*, *23*(1), 3-16.

  https://doi.org/10.1353/foc.2013.0006

Braxton, J. M., Shaw Sullivan, A. V., & Johnson, R. M. (1997). Appraising Tinto's theory of

  college student departure. In J. C. Smart (Ed). Higher Education: *Handbook of Theory*

  and Research (pp. 107-164). Agathon Press Incorporated.

Beatty, A. S., Walmsley, P. T., Sackett, P. R., Kuncel, N. R., & Koch, A. J. (2015). The

  reliability of college grades. *Educational Measurement: Issues and Practice*, *34*(4), 31-

  40. https://doi.org/10.1111/emip.12096

Beekhoven, S., De Jong, U., & Van Hout, H. (2002). Explaining academic progress via

combining concepts of integration theory and rational choice theory. *Research in Higher

Education*, *43*(5), 577-600. https://doi.org/10.1023/A:1020166215457

Borden, V. M., & Holthaus, G. C. (2018). Accounting for Student Success: Academic and

Stakeholder Perspectives That Have Shaped the Discourse on Student Success in the

United States. *International Journal of Chinese Education*, *7*(1), 150-173.

https://doi.org/10.1163/22125868-12340094

Brookhart, S. M., Guskey, T. R., Bowers, A. J., McMillan, J. H., Smith, J. K., Smith, L. F.,

Stevens, M. T. & Welsh, M. E. (2016). A Century of Grading Research Meaning and

Value in the Most Common Educational Measure. *Review of Educational Research*,

86(4), 1-79. http://uknowledge.uky.edu/edp_facpub

Bryant, J. L. (2006). Assessing expectations and perceptions of the campus experience: The

Noel-Levitz Student Satisfaction Inventory. *New Directions for Community

Colleges*, (134), 25-35. https://doi.org/10.1002/cc.234

Budny, D. D., & Paul, C. A. (2003). Working with Students and Parents to Improve the

Freshman Retention. *Journal of STEM Education: Innovations & Research*, *4*.

Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications,

and programming*. Lawrence Erlbaum Associates Inc.

Byrne, B. M., & Watkins, D. (2003). The issue of measurement invariance revisited. *Journal of

Cross-Cultural Psychology, 34,* 155-175. https://doi.org/10.1177/0022022102250225

CAST (2019). *Universal Design for Learning Guidelines*. http://udlguidelines.cast.org/

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural equation modeling*, *9*(2), 233-255. https://doi.org/10.1207/S15328007SEM0902_5

Chrysikos, A., Ahmed, E., & Ward, R. (2017). Analysis of Tinto's student integration theory in first-year undergraduate computing students of a UK higher education institution. *International Journal of Comparative Education and Development*, *19*(2/3), 97-121. https://doi.org/10.1108/IJCED-10-2016-0019

Conger, D., & Long, M. (2010). Why Are Men Falling Behind? Gender Gaps in College Performance and Persistence. *The Annals of the American Academy of Political and Social Science,627*, 184-214. http://www.jstor.org/stable/40607412

Demetriou, C., & Schmitz-Sciborski, A. (2011). Integration, motivation, strengths and optimism: Retention theories past, present and future. In *Proceedings of the 7th National Symposium on student retention* (pp. 300-312). https://pdfs.semanticscholar.org/909d/94498abfe9d8606994c319509f43ac6b06fa.pdf

Dolbier, C. L., Webster, J. A., McCalister, K. T., Mallon, M. W., & Steinhardt, M. A. (2005). *Reliability and validity of a single-item measure of job satisfaction*. American Journal of Health Promotion, *19*(3), 194-198.

Elliott, K. M., & Healy, M. A. (2001). Key factors influencing student satisfaction related to recruitment and retention. *Journal of marketing for higher education*, *10*(4), 1-11. https://doi.org/10.1300/J050v10n04_01

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). Psychosocial factors and community college student success: A meta-analytic investigation. *Review of Educational Research*, *87*(2), 388-424. https://doi.org/10.3102/0034654316653479

Frank, K., Frenette, M., & Morissette, R. (2015). *Labour Market Outcomes of Young*

    Postsecondary Graduates, 2005 to 2012. Statistics Canada.

    http://www.statcan.gc.ca/pub/11-626-x/11-626-x2015050-eng.pdf

Fuller, M. B., Wilson, M. A., & Tobin, R. M. (2011). The national survey of student engagement

    as a predictor of undergraduate GPA: a cross-sectional and longitudinal examination.

    Assessment & Evaluation in Higher Education, *36*(6), 735-748.

    https://doi.org/10.1080/02602938.2010.488791

Garson, G. (2008). *Path analysis Lecture Notes*.

    https://www.scribd.com/document/323656506/Garson-2008-PathAnalysis-pdf

Goegan, L. D. & Daniels L. M. (2020). Students with LD at Postsecondary: Supporting Success

    and The Role of Student Characteristics and Integration. *Learning Disabilities Research*

    & Practice, 35(1), 45-56. https://doi.org/10.1111/ldrp.12212

Grayson, J. P. (2004). The Relationship Between Grades and Academic Program Satisfaction

    Over Four Years of Study. *Canadian Journal of Higher Education*, *34*(2), 1-34.

Guiffrida, D. A., Lynch, M. F., Wall, A. F., & Abel, D. S. (2013). Do reasons for attending

    college affect academic outcomes?: A test of a motivational model from a self-

    determination theory perspective. *Journal of College Student Development*, 54(2), 121-

    139. https://doi.org/10.1353/csd.2013.0019

House, J. D. (2002). The independent effects of student characteristics and instructional activities

    on achievement: An application of the input-environment-outcome assessment

    model. *International Journal of Instructional Media*, *29*(2), 225.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling, 6(1), 1-55. https://doi.org/10.1080/10705519909540118

Ishitani, T. T. (2016). Time-varying effects of academic and social integration on student persistence for first and second years in college: National data approach. *Journal of College Student Retention: Research, Theory & Practice*, *18*(3), 263-286. https://doi.org/10.1177/1521025115622781

Jennings, N., Lovett, S., Coba, L., Swingle, L. & Lindkvist, H. (2013). "What would make this a successful year for you?" How students define success in college. Liberal Education, 99(2). p. 1-11. http://repository.wellesley.edu/scholarship/3/

Jones, W. A. (2010). The impact of social integration on subsequent institutional commitment conditional on gender. *Research in Higher Education*, 51(7), 687-700. https://doi.org/10.1007/s11162-010-9172-5

Kaplan, A. (2016, August). *Research on Motivation and Achievement: Infatuation with Constructs and Losing Sight of the Phenomenon*. Paper presented at the biennial meeting of the International Conference on Motivation, Thessaloniki, Greece.

Kline, R. B. (2016). *Principles and Practice of Structural Equation Modeling: Fourth Edition*. The Guilford Press.

Kline, R. B. (2011). Principles and practice of structural equation modeling. Guilford.

Krumrei-Mancuso, E. J., Newton, F. B., Kim, E., & Wilcox, D. (2013). Psychosocial factors predicting first-year college student success. *Journal of College Student Development*, *54*(3), 247-266. https://doi.org/10.1353/csd.2013.0034

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects

of student engagement on first-year college grades and persistence. *Journal of Higher

Education*, *79*(5), 540-563. https://doi.org/10.1080/00221546.2008.11772116

Lent, R. W., Singley, D., Sheu, H. B., Schmidt, J. A., & Schmidt, L. C. (2007). Relation of

social-cognitive factors to academic satisfaction in engineering students. *Journal of

Career Assessment*, *15*(1), 87-97. https://doi.org/10.1177/1069072706294518

Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning

environment and academic outcomes: implications for theory and practice. *Studies in

Higher education*, *27*(1), 27-52. https://doi.org/10.1080/03075070120099359

Lounsbury, J. W., Fisher, L. A., Levy, J. J., & Welsh, D. P. (2009). An investigation of character

strengths in relation to the academic success of college students. *Individual Differences

Research, 7*, 52-69.

McDonald, R. P., & Ho, M. H. R. (2002). Principles and practice in reporting structural equation

analyses. *Psychological methods*, 7(1), 64-82. https://doi.org/10.1037//1082-989X.7.1.64

Meeuwisse, M., Severiens, S. E., & Born, M. P. (2010). Learning environment, interaction, sense

of belonging and study success in ethnically diverse student groups. *Research in Higher

Education*, *51*(6), 528-545. https://doi.org/10.1007/s11162-010-9168-1

National Center for Educational Statistics (2019). *Fast Facts: Back to School Statistics*.

https://nces.ed.gov/fastfacts/display.asp?id=372#College_enrollment

Osters, S. & Roberts, D. (2007). Academic success - How do students define it? Presentation at

the Southern Association for College Student Affairs (SACSA)/ National Association of

Student Personnel Administrators (NASPA) Region III/ Texas Association of College &

University Student Personnel Association (TACUSPA) Joint Student Affairs Conference, Dallas, Texas

Pritchard, M. E., & Wilson, G. S. (2003). Using emotional and social factors to predict student success. Journal of college student development, 44(1), 18-28. https://doi.org/10.1353/csd.2003.0008

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review*, *41*, 71-90. https://doi.org/10.1016/j.dr.2016.06.004

Ribera, A. K., Miller, A. L., & Dumford, A. D. (2017). Sense of Peer Belonging and Institutional Acceptance in the First Year: The role of high-impact practices. *Journal of College Student Development*, 58(4), 545-563. https://doi.org/10.1353/csd.2017.0042

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), 353. https://doi.org/10.1037/a0026838.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, 130(2), 261-288. https://doi.org/10.1037/0033-2909.130.2.261

Sam, R., Souriyavongsa, T., Zain, A. N. M., Jamil, H., Wu, X., & Sovath, S. (2013). Conceptualizing Institutional Policies for Students' Academic Success in Cambodian Universities: What Matters for Policy?. *Asian Social Science*, *9*(10), 283-294.

Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological Bulletin*, 143(6), 565-600. https://doi.org/10.1037/bul0000098

Schumacker, R. E., & Lomax, R. G. (2004). A beginner's guide to structural equation modeling. Lawrence Erlbaum Associates.

Strang, T. (2015). *Defining Success in a College Course.* https://blog.cengage.com/defining-success-college-course/

Strayhorn, T. L. (2012). Satisfaction and retention among African American men at two-year community colleges. *Community College Journal of Research and Practice*, *36*(5), 358-375. https://doi.org/10.1080/10668920902782508

Stricker, L. J., Rock, D. A., Burton, N. W., Muraki, E., & Jirele, T. J. (1992). Adjusting college grade-point average for variations in grading standards. *ETS Research Report Series*, (2).

Svanum, S., & Aigner, C. (2011). The influences of course effort, mastery and performance goals, grade expectancies, and earned course grades on student ratings of course satisfaction. *British Journal of Educational Psychology*, *81*(4), 667-679.

U.S. Department of Education (2017). *Table 303.70. Total undergraduate fall enrollment in degree-granting postsecondary institutions, by attendance status, sex of student, and control and level of institution: Selected years, 1970 through 2026.* https://nces.ed.gov/programs/digest/d16/tables/dt16_303.70.asp

Thurmond, V. A., & Popkess-Vawter, S. (2003). Examination of a middle range theory: Applying Astin's input-environment-outcome (IEO) model to web-based education. *Online Journal of Nursing Informatics*, *7*(2).

Thurmond, V. A., Wambach, K., Connors, H. R., & Frey, B. B. (2002). Evaluation of student satisfaction: Determining the impact of a web-based environment by controlling for student characteristics. *The American journal of distance education*, *16*(3), 169-190.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent

research. *Review of educational research*, *45*(1), 89-125.

https://doi.org/10.3102/00346543045001089

Tinto, V. (1999). Taking retention seriously: Rethinking the first year of college. NACADA

journal, 19(2), 5-9. https://www.nacadajournal.org/doi/pdf/10.12930/0271-9517-19.2.5

Tinto, V. (2006). Research and practice of student retention: What next? *Journal of College*

Student Retention: Research, Theory & Practice, *8*(1), 1-19.

https://doi.org/10.2190/4YNU-4TMB-22DJ-AN4W

Trzesniewski, K. H., Donnellan, M., & Lucas, R. E. (2011). *Secondary data analysis: An*

introduction for psychologists. American Psychological Association

Willingham, W. W., Pollack, J. M., & Lewis, C. (2002). Grades and test scores: Accounting for

observed differences. *Journal of Educational Measurement*, *39*(1), 1-37.

https://doi.org/10.1111/j.1745-3984.2002.tb01133.x

Woosley, S.A. (2003). How important are the first few weeks of college? The long term effects

of initial college experiences. College Student Journal, 37(2), 201-207.

Yazedjian, A., Toews, M. L., Sevin, T., & Purswell, K. E. (2008). " It's a Whole New World": A

Qualitative Exploration of College Students' Definitions of and Strategies for College

Success. *Journal of College Student Development*, *49*(2), 141-154.

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success.

Practical Assessment, Research & Evaluation, *20*(5), 1-20.

http://www.pareonline.net/getvn.asp?v=20&n=5

Zepke, N., & Leach, L. (2010). Beyond hard outcomes: 'soft' outcomes and engagement as

student success. *Teaching in Higher Education*, *15*(6), 661-673.

https://doi.org/10.1080/13562517.2010.522084

CHAPTER THREE: STUDENTS WITH LD AT POSTSECONDARY EDUCATION:

SUPPORTING ACADEMIC SUCCESS AND THE ROLE OF STUDENT

CHARACTERISTICS AND INTEGRATION

Abstract

Students with learning disabilities (LD) are attending postsecondary education more than ever, but are also less likely to complete their education compared to non-LD peers. Using the Inputs-Environment-Outcomes model of Astin (1991; 1993), we examined students with LD and non-LD peers during their first-year of postsecondary studies. Inputs included perception of academic ability and drive to achieve, environment included both academic and social integration, and outcomes included three measures of academic success: current GPA, acquisition of knowledge and skills and overall satisfaction. Using structural equation modeling (SEM), we found that for all students, perceived academic ability had a positive direct effect on outcomes, while drive to achieve had only an indirect effect. Academic integration was important for GPA and satisfaction. Social integration was important for the acquisition of knowledge and skills and satisfaction, and these connections were stronger for students with LD. Our discussion highlights potential supports for students with LD.

Introduction

Millions of diverse American students attend postsecondary institutions each Fall (National Center for Educational Statistics, 2019). These students arrive on campuses with various backgrounds, goals for their studies, academic and social abilities, and expectations for the year ahead. More than ever before, many of these students also arrive on campus with a learning disability (LD; Eckes & Ochoa, 2005; Gregg & Scott, 2000). Students with LD can experience a number of challenges related to their academic performance including word reading, reading comprehension, spelling, written expression or mathematics (American Psychiatric Association, 2013, p. 66). These challenges can impact student experiences on campus, and their potential for success in their postsecondary pursuits. For example, a student who has difficulty with reading may find the amount of reading required for their courses difficult to complete. Perhaps not surprisingly, postsecondary completion rates for students with LD is significantly lower than the general student population (Cortiella & Horowitz, 2014; 41 and 52 percent respectively). Thus, while more individuals with LD are attending postsecondary schooling now than in the past, they are also less likely to complete their postsecondary education than their peers without LD (Bolt et al., 2011; Kurth & Mellard, 2006). Therefore, research on students with LD at postsecondary should be a priority. This is particularly true if such research can inform postsecondary supports that better position students with LD for success.

Within this objective, researchers must consider a broad definition of academic success, as success may be perceived differently by students, and likely involves more than just grades (e.g., learning important skills). Likewise, researchers and postsecondary institutions should gain a multifaceted understanding of the characteristics that students with LD arrive on campus with

including their goals and how well they will be able to integrate into the academic and social

environment of the campus. Such considerations may be particularly important to examine in

first-year students with LD because the freshman year is a space of particular vulnerability with

increased risk of students dropping out (Freeman, 2009). Thus, the purpose of the current study

is to examine student characteristics and behaviours that are antecedents of academic success at

postsecondary for students with LD and make comparisons to the general student population.

Theoretical Framework: The Inputs-Environment-Outcomes Model

We utilized Astin's (1991; 1993) Inputs-Environment-Outcomes Model as our theoretical

model to examine multiple components of the postsecondary experience for first-year students

with LD. According to this model, inputs are the experiences or characteristics that students

bring with them to campuses. Environments are the student's "lived experiences" that occur

while attending school (Astin & Antonio, 2012, p. 87). Outcomes are any important result of

postsecondary schooling and, in this paper, will be considered synonymous with indicators of

academic success. Understanding inputs, environment, and outcomes is critical for the

development of necessary supports and services for students. The I-E-O model is commonly

used to guide research in postsecondary settings with typically developing students (e.g., Goegan

& Daniels, 2019; Keup, 2006) and has also been applied in some instances to students with LD

(e.g., Pingry et al., 2012) or other disabilities (e.g., Cox et al., 2015; Cox et al., 2017). Oftentimes

the main inputs considered for students with disabilities are stable characteristics such as

socioeconomic status or age. Similar narrow conceptualizations seem to be applied for

environment (e.g., type of services provided) and outcomes (e.g., graduation). This

operationalization of the I-E-O model for students with LD stands in contrast with research on

typical populations, which tends to consider malleable inputs and a broader consideration of

success. Thus, the current research stands to advance the field by providing important

information on the experiences of students with LD that can inform the development of supports

and services. The following sections will examine the components of the model in more detail.

      Inputs. Inputs are the student's experiences or characteristics that they bring with them to

campus. Rather than focusing on stable inputs like age or disability status (e.g., Pingry et al.,

2012), we build on work by Keup (2006) and Goegan and Daniels (2019) that conceptualizes

inputs in terms of a student's motivation for attending postsecondary education and their self-

views, that is, their beliefs and evaluations of themselves (Morin, 2017). Generally, we chose

this operationalization because researchers have found that psychosocial factors have a

significant relationship with academic outcomes at postsecondary institutions (e.g., Fong et al.,

2017; Richardson et al., 2012; Robbins et al., 2004). For example, Robbins and colleagues

conducted a meta-analysis to examine factors that predicted GPA and persistence. They found

that student academic self-efficacy and achievement motivation were strong predictors of GPA

and also had moderate relationships with persistence. Fong and colleagues (2017) examined the

relationships between self-perceptions and motivation in relation to academic achievement and

persistence, and these relationships were positive. Furthermore, Schneider and Preckel (2017)

conducted a meta-analysis and found a large effect size for performance self-efficacy on

achievement. Together, these studies highlight the importance of self-perceptions as student

characteristics to consider when examining academic success at postsecondary.

      Examining these types of beliefs in students with LD specifically, Hen and Goroshit

(2012) found that students with LD report lower academic self-efficacy, but no difference in

GPA in comparison with their undergraduate peers without LD. Reed and colleagues (2015)

found that students with and without disabilities had similar internal and external motivations for

attending postsecondary institutions regardless of year in studies. Most recently, DuPaul et al., (2017) found that students with LD had significantly lower self-concepts in academics compared to their peers without LD. In sum, it seems that in some ways students with LD are similar to their college peers without LD and in other ways, they arrive on campus with different inputs.

No research has explicitly looked at perceived ability and drive to achieve as inputs for students with LD and thus the functionality of these constructs for this specific population remains unknown. However, Keup (2006) found that for a general student population perceived academic ability and drive to achieve both positively predicted the outcomes of college GPA and self-assessed cognitive development. Moreover, Keup noted that academic ability had one of the largest effects on GPA, while also commenting that drive to achieve was a strong predictor of self-assessed cognitive development. More recently, Goegan and Daniels (2019) showed that perceived academic ability was directly related to current GPA, and acquisition of knowledge and skills, while drive to achieve only had an indirect effect on these outcomes. Therefore, we were interested in extending these findings to students with LD to determine if there were similarities or differences in the connections between these constructs.

Environment. Environments are the lived experiences of students during their education (Astin & Antonio, 2012). Like other studies (e.g., Goegan & Daniels, 2019), we have conceptualized the environment based on Tinto's (1975; 1999; 2006) Student Integration Model. Tinto described postsecondary environments as consisting of two systems – academic and social. Academic integration is related to the intellectual development of a student, such as going to class, studying or researching in a library (Chrysikos et al., 2017; Meeuwisse et al., 2010). If a student is not able to integrate academically at postsecondary, Tinto suggested that they would achieve low grades and as a result, be required to discontinue their studies. On the other hand,

social integration is related to interactions with peers, or being involved in campus activities like clubs or sports, or more generally speaking, feeling a sense of belonging with others on campus (Chrysikos et al., 2017; Meeuwisse et al., 2010). Tinto suggested that if a student is not able to integrate socially, then they would feel withdrawn and disconnected from others on campus and would choose to leave before they completed their studies.

Researchers have found that integration has a significant relationship with academic outcomes at postsecondary institutions (e.g., Goegan & Daniels, 2019). For example, academic integration was positively associated with GPA, the acquisition of knowledge and skills and satisfaction, while social integration was only positively associated with the acquisition of knowledge and skills and satisfaction. However, there is limited research on this topic for students with LD. Research by Mamiseishvili and Koch (2011) that examines the experiences of students with disabilities in general, found that academic and social integration was significantly positively related to persistence. Students with LD specifically tend to report lower levels of academic and social integration in postsecondary environments (DaDeppo, 2009; DuPaul et al., 2017). Students with LD also experience challenges with time management and communicating their needs with their instructors (Smith et al., 2002), which could impact their academic integration. Students with LD can also feel misunderstood, or discriminated against by instructors and peers, compared to their peers without LD (Kurth & Mellard, 2006; McGregor et al., 2016) which could impact their social integration. Researchers looking at postsecondary students more generally have found that degree completion was related to both student academic and social adjustment (Woolsey, 2003), and academic integration had a significantly positive effect on a student's first-year persistence (Ishitani, 2016). Therefore, more research is needed to

examine academic and social integration and various forms of academic success outcomes in samples of students with LD specifically.

Outcomes. As is the case with all students, postsecondary institutions are invested in helping students with LD secure good grades. However, there are mixed findings when it comes to grades as the primary indicator of success, for students in general and for students with LD specifically. Some researchers suggest that students with LD tend to have lower GPAs than their peers without LD (McGregor, et al., 2016), whereas others report no difference between students with LD and peers without LD in terms of grades (Jorgensen et al., 2005). Regardless of the mean differences when it comes to grades, it is also possible that students with LD and their peers without LD have a broader definition of what it means to them to be successful in their postsecondary pursuits rather than just focusing on grades.

Grades are not the only indicator of success for students. For example, when surveyed, students identify many indicators of success including doing their best, achieving personal goals, being satisfied with one's own accomplishments and learning or developing knowledge (Osters & Roberts, 2007). The research reviewed above focuses on objective measures of success such as GPA and persistence (e.g., Mamiseishvili & Koch, 2011; Robbins et al., 2004), and therefore, subjective criteria such as students being satisfied with their postsecondary experience are largely missing from the research, yet are also important to consider. Indeed, researchers examining academic success often make the distinction between "hard" (i.e., grades) and "soft" outcomes (i.e., student engagement, students' perceptions learning; Zepke & Leach, 2010). Therefore, we utilize three measures of academic success to provide a more nuanced understanding of this construct: GPA, acquisition of knowledge and skills and overall satisfaction. Acquisition of knowledge and skills can include knowledge gain about the student's

field or discipline, whereas, skills include critical thinking or problem solving. Satisfaction, on the other hand, is defined as the individual's enjoyment of their experiences (Lent et al., 2007).

The Current Study

Utilizing the Inputs-Environment-Outcomes (I-E-O) model of Astin (1993) as our theoretical model, which we adapted into our conceptual model (Figure 3.1), we examine the connections between these components, while comparing students with LD and their peers without LD. The model suggests relationships between student characteristics (i.e., inputs) and student academic success (i.e., outcomes) can be mediated by student integration at their postsecondary institution (i.e., environment). Student characteristics are conceptualized as the student's perceived academic ability and drive to achieve. Environments are conceptualized as academic and social integration. Outcomes are conceptualized as GPA, acquisition of knowledge and skills and overall satisfaction.

Our research questions were as follows: (1) How do student characteristics and integration relate to three different indicators of academic success? (2) How does a student's academic and social integration mediate the relationship between the student's characteristics and the indicators of academic success? (3) Are these relationships moderated by a student's status as an individual who self identifies as LD or not? Answers to these questions will be used to make recommendations for supports and services that campuses can offer to their students.

Method

In the current study, we conducted a secondary analysis of one-year longitudinal data collected by the Higher Education Research Institute (HERI) through their Cooperative Institutional Research Program (CIRP). Each year, HERI recruits postsecondary students to complete *The Freshman Survey* (TFS) in the fall semester and the *Your First College Year*

survey (YFCY) in the winter semester. The survey includes a variety of questions on topics such as demographics (e.g., sex, age, ethnicity), ease of adjustment (e.g., how has it been to develop effective study skill), sense of belonging (e.g., I see myself as a part of the campus community.), aspirations (e.g., What is the highest academic degree that you intend to obtain?), and opinions (e.g., Same-sex couples should have the right to legal marital status?). According to the HERI website, their mission is to "inform educational policy and promote institutional improvement through an increased understanding of higher education and its impact on college students." Over the years they have developed well-established surveys that are continuously being evaluated and adapted by staff (Higher Education Research Institute, 2019). We requested access to the same items used in Goegan and Daniels (2019) to examine the model for students with and without LD. The researchers' university Research Ethics board granted ethical approval for this research (Pro00085240).
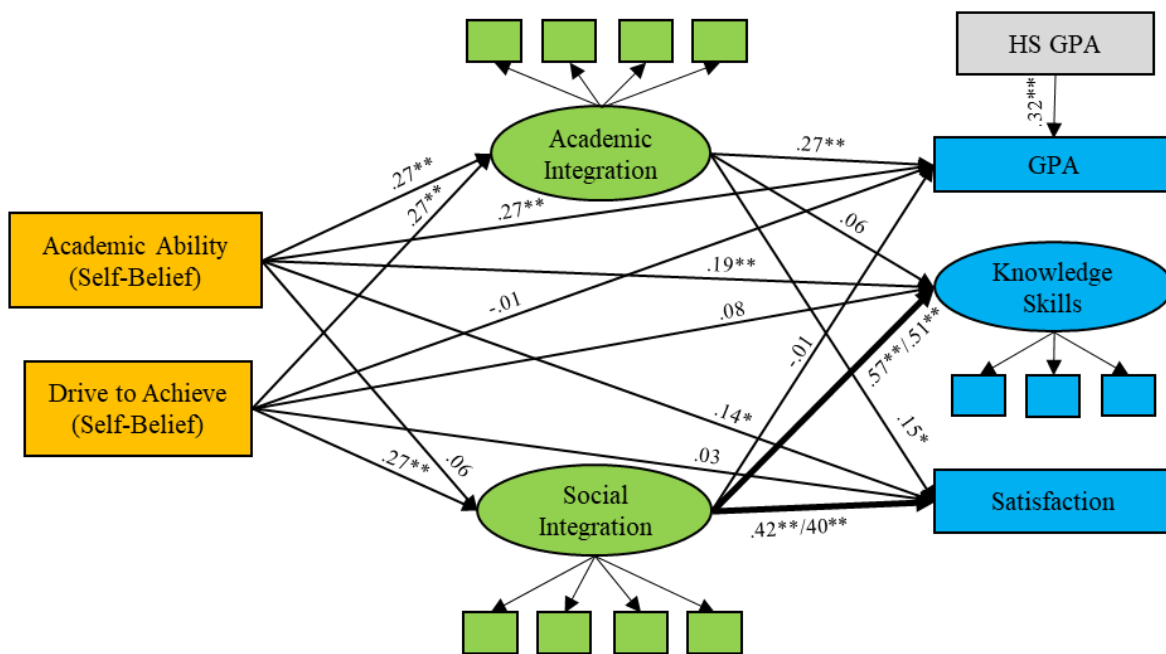
Theoretical Model
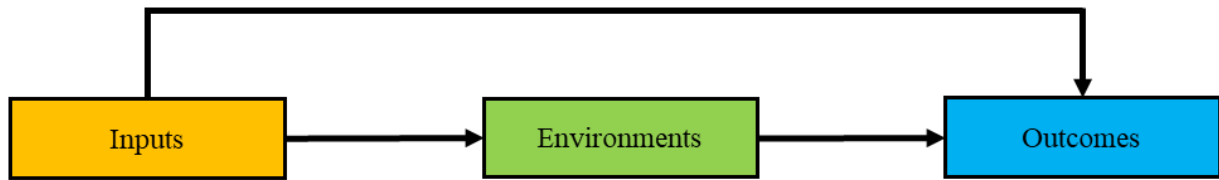
Conceptual Model
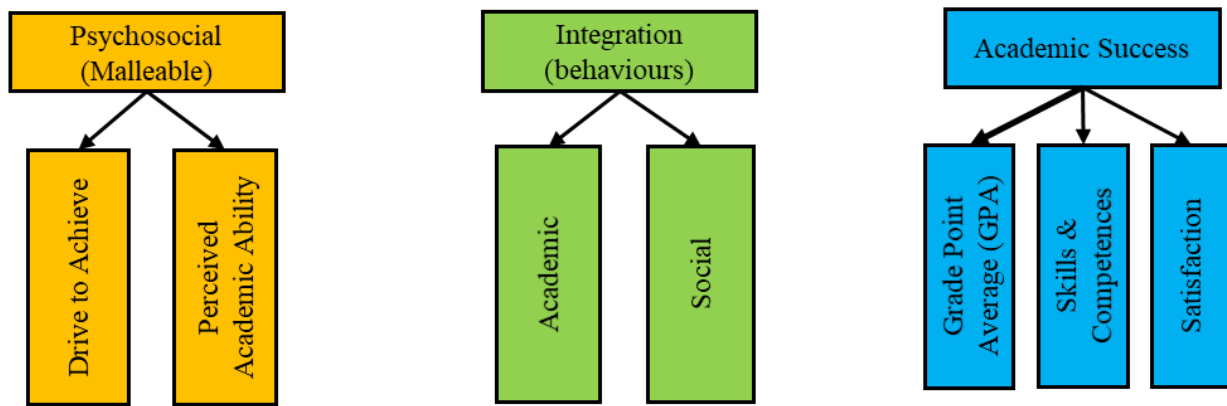
Structural Model with Standardized Regression Weights

Note: * p<.01, **p <.001, LD / non-LD

Figure 3.1: Study Models

Participants

For this study, we were particularly interested in first-year postsecondary students with LD. To achieve this sample, we excluded students who had not graduated from high school or began postsecondary in a year other than 2014 or students who were over the age of 20. We first applied these restrictions to students who identified as LD, in response to the prompt: *Do you have any of the following disabilities or medical conditions? (Mark Yes or No for each item)* and the item*:* Learning disability (dyslexia, etc.) was utilized. Students were excluded if they indicated additional disability or medical conditions. Our initial sample of students with LD was 209. Due to missing data, this number was reduced to a final sample of students with LD of 199. Second, we applied the same exclusion criteria to the remainder of the sample and randomly selected an additional 199 students without LD from the data file to test group comparisons.

The 398 participants included in this study were recruited from more than 30 different postsecondary institutions across the United States. The students had an average age of 18.24, and 35.2% of students identified as male, while 64.8% identified as female. Students were also asked: *What is your best estimate of your parents' total income last year? Consider income from all sources before taxes*. The responses ranged from 1 (less than $10,000) to 14 ($250,000 or more) with an average income reported by students as 10 (between 75,000 and 99,999 dollars). When asked to identify their race/ethnicity group, students identified as Caucasian (68.8%), Asian (9.5%), Hispanic (4.5%), Black (2.8%) and Other (1.3%). As well, 12.8% of students selected the option 'two or more race/ethnicity'. Furthermore, students identified over 80 different intended majors, with some of the most popular options being: Biology (7.5%), Psychology (5.4%), and Nursing (4.6%). Additionally, 10% of students reported being undecided.

Model Variables

Student Characteristics: Inputs. For inputs we utilized two single items: (a) academic ability and (b) drive to achieve. Students responded to the statement: *Rate yourself on each of the following traits as compared with the average person your age. We want the most accurate estimate of how you see yourself,* and responded on a scale from 1 (lowest 10%) to 5 (highest 10%) to rate themselves on these items. Higher scores signify more perceived academic ability and drive to achieve.

Student Integration: Environment. We assessed student integration by creating two variables: academic integration and social integration. The *academic integration* variable was created based on items utilizing the prompt: *Since entering this college, how has it been to,* and responses were recorded on a scale from 1 (very difficult) to 4 (very easy). The four items to represent academic integration were: (a) understand what your professors expect of you academically, (b) develop effective study skills, (c) adjust to the academic demands of college and (d) manage your time effectively. Scores on academic integration for students with and without LD are presented in Table 3.1. These scores were created by averaging participants' responses across these four items (α = .81 and .82 respectively). Higher scores on academic integration signifies that the student found it easier to adjust to postsecondary education.

The *social integration* variable was created based on items utilizing the prompt: *Please indicate the extent to which you agree or disagree with the following statements.* Responses were recorded on a scale from 1 (strongly disagree) to 4 (strongly agree). The four items to represent social integration were: (a) I see myself as part of the campus community, (b) I feel valued at this institution, (c) I feel a sense of belonging to this campus, and (d) I feel I am a member of this college. Scores on social integration are presented in Table 3.1. These scores were created by

averaging participant's responses across these four items (α = .88 and .87 respectively). A higher score on social integration denotes that the student felt more sense of belonging on campus.

Academic Success: Outcomes. We examined academic success based on three outcomes: (a) current GPA, (b) acquisition of knowledge and skills, and (c) overall satisfaction. Current GPA was assessed utilizing the item: *What is your overall grade average (as of your most recently completed academic term)?* Students were asked to respond on an eight-point scale from 1 (D) to 8 (A or A+). Higher scores indicated by students signify a higher GPA. Acquisition of knowledge and skills was assessed utilizing three items from the prompt: *Please rate your agreement with the following statements: This institution has contributed to my,* and responses were recorded on a scale from 1 (strongly disagree) to 4 (strongly agree). Following Goegan and Daniels (2019) we used three items to represent acquisition of knowledge and skills: (a) intellectual and practical skills (including inquiry and analysis, critical thinking, and information literacy), (b) knowledge of a particular field or discipline, and (c) problem-solving skills. Scores were created by averaging participant's responses across these three items for students with and without LD (α = .88 and .79 respectively). Higher scores signify a greater acquisition of knowledge and skills. Overall satisfaction was assessed utilizing the item: *Please rate your satisfaction with this institution on each of the aspects of college life listed below.* Responses were recorded on a scale from 1 (very dissatisfied) to 5 (very satisfied). Higher scores indicate more overall satisfaction with their overall experience during their first-year of studies at their postsecondary institution. Additional information is presented in Table 3.1.

Rationale for Analyses

We conducted our analyses in two steps. First, we ran preliminary analyses on all study variables separately for students with and without LD, including descriptive statistics (Table 3.1)

and correlations among manifest study variables (Table 3.2). This step allowed us to obtain

information about the students, observe trends in the data, and examine the distribution of the

variables. Second, we utilized SEM with latent variables where possible, to examine the model

and test for multi-group invariance.

Table 3.1: *Descriptive Statistics Variables. LD (n = 199) and non-LD Students (n = 199)*

	Students with LD				Non-LD Students			
Variable	Mean	*SD*	Skew	kurtosis	Mean	*SD*	Skew	kurtosis
Age	18.41	.49	.38	-1.87	18.24	.46	.45	1.86
Sex	1.64	.48	-.58	-1.68	1.66	.48	-.67	-1.56
Inputs								
Academic Ability	3.57	.82	.27	-.61	3.86	.79	-.24	-.13
Drive to Achieve	3.92	.89	-.28	-.71	3.99	.85	-.49	-.19
High School GPA	6.03	1.28	-.34	-.15	6.78	1.04	-.69	.21
Environment								
Academic Integration	2.84	.66	-.00	-.57	2.85	.63	-.17	-.03
Social Integration	3.10	.61	-.47	.40	3.03	.58	-.23	.30
Outcomes								
Current GPA	5.47	1.76	-.50	-.34	6.07	1.47	-.70	.13
Knowledge and Skills	3.22	.58	-.91	2.66	3.26	.48	.03	.02
Overall Satisfaction	3.87	.89	-.89	1.08	4.06	.77	-.77	1.08

The SEM analyses began with a confirmatory factor analysis to assess the adequacy of

the measurement models of academic integration, social integration, and acquisition of

knowledge and skills as latent variables. Then, we tested the structural model, which consisted of these three latent variables and four manifest indicators using the maximum likelihood estimation. We estimated a fully recursive model, including all possible paths between the inputs, environment, and outcome variables (Cortina, 2005). All of the variables in the model were connected to all remaining variables, thus producing a unidirectional model (Kline, 2016). We also controlled for the influence of high school GPA to current GPA (See Figure 3.1). We considered overall model fit to be sufficient when the chi-square was significant (Garson, 2008; Schumacker & Lomax, 2004), the comparative fit index (CFI) value was $\geq$ .90 (Kline, 2016; McDonald & Ho, 2002), and the root mean square error of approximation (RMSEA) value was < 0.06 (Garson, 2008; McDonald & Ho, 2002).

To test for group invariance, we performed a multi-group mean and covariance structures analysis (MACS) based on the steps outlined by Little (1997). As such, we constrained all structural paths to be equal between students with and without LD (Byrne, 2001; Byrne & Watkins, 2003) and then examined the change in fit between the models. To determine if models were invariant we considered both the chi-square difference test (Byrne, 2001) and direct changes in the CFI (Cheung & Rensvold, 2002; Putnick & Bornstein, 2016) such that a non-significant difference test or a change in CFI < .01 were deemed to demonstrate invariance between the groups. To resolve non-invariance, we released constraints on regression paths one at a time until the goodness of fit indices returned to acceptable. Finally, we examined the indirect effects by running 1000 bootstrapped estimates of the model and inspected confidence intervals.

Results

The means, standard deviation (SD), skewness and kurtosis of each variable are presented in Table 3.1 for students with and without LD. We assessed the data by examining histograms for the main study variables and calculated the means, standard deviations (SD) skewness and kurtosis. In general, the variables appeared to have adequate normality. The exception was sex, which was slightly skewed due to the proportion of female students. However, we identified this skew as acceptable due to the fact that females have been reported to attend postsecondary institutions more than males (National Center for Educational Statistics, 2019). Correlations between all study variables are shown in Table 3.2 separately for students with and without LD (above and below the diagonal, respectively). Several of these correlations are highlighted here. For both groups the input variables of perceived academic ability and drive to achieve were significantly positively correlated ($r = .32$, $r = .48$ respectively). Similarly, the environment variables of academic integration and social integration were positively correlated for both groups ($r = .36$, $r = .24$). Moreover, the outcome variables of current GPA, acquisition of knowledge and skills, and overall satisfaction were also positively correlated for both groups. The strongest correlation between the outcome variables was the same across both groups, namely the association between acquisition of knowledge and skills and overall satisfaction ($r = .65$, $r = .43$). Relationships between the variables within the model were also as expected. For example, high school GPA and the outcomes variables, high school GPA had the strongest correlations with current GPA ($r = .50$, $r = .41$). The correlations between our variables were relatively equivalent between the two groups with the largest difference found between the variables social integration and acquisition of knowledge and skills ($r = .70$, $r = .37$). Overall,

these correlations provide evidence of validity for the selected items and constructed scales and

point to similarity in relationships between the two groups of students.

Table 3.2: Correlation Matrix. LD (Below the diagonal), non-LD (Above the diagonal)

Variables	1	2	3	4	5	6	7	8	9	10
1. Age	-	-.10	-.02	-.05	-.02	-.00	.04	-.01	.02	-.04
2. Sex	-.06	-	-.20**	-.02	.10	-.06	-.02	.11	.03	.02
3. Academic Ability	.02	-.09	-	.48**	.33**	.35**	.19**	.46**	.32**	.31**
4. Drive to Achieve	-.03	.03	.32**	-	.21**	.35**	.36**	.21**	.44**	.30**
5. High School GPA	.06	.21**	.44**	.28**	-	.03	-.03	.41**	.11	.09
6. Academic Integration	-.06	.08	.39**	.36**	.14*	-	.24**	.27**	.21**	.32**
7. Social Integration	-.06	.11	.17*	.21**	.18*	.36**	-	.04	.37**	.39**
8. Current GPA	-.05	.13	.53**	.35**	.50**	.46**	.26**	-	.17*	.23**
9. Knowledge and Skills	.02	.04	.29**	.20**	.27**	.35**	.70**	.32**	-	.43**
10. Overall Satisfaction	-.04	.14*	.26**	.22**	.23**	.35**	.58**	.33**	.65**	-

Note. Scores are based on the average score on scale items. *$p < .05$, ** $p < .01$

Measurement Model

To examine our measurement model, we tested academic integration (four items), social

integration (four items), and acquisition of knowledge and skills (three items) variables in a

single confirmatory factor analysis (CFA). The CFA resulted in a good fit to the data χ^2 $p < .001$,

CFI = .97, RMSEA = .06, SRMR = .05. The standardized regression weight ranged from .52 to

.82 for the academic integration items, from .72 to .88 for the social integration items, and from

.76 to .89 for the acquisition of knowledge and skills items. All items were retained in the analyses below.

Multigroup Analysis

To test for differences between students with and without LD we performed a multi-group mean and covariance structures analysis (MACS; Little, 1997). To test for differences between the groups we set the structural paths to invariant and inspected the change in χ2 (Byrne, 2001; Little, 1997). The unconstrained model (model 1 in Table 3.3) demonstrated good fit χ^2 $p < .001$, CFI = .97, RMSEA = .04. Based on a chi-square difference test, the measurement weights were not significantly different $\Delta\chi^2$ $p = .10$, thereby suggesting invariance between the two groups at the measurement level (model 2). However, the structural weights were significantly different according to a chi-square difference test $\Delta\chi^2$ $p < .001$, and the absolute change in CFI > .01 (model 3; Cheung & Rensvold, 2002; Putnick & Bornstein, 2016).

To determine the source of non-invariance in our model, we examined differences in standardized path coefficients between the two groups. The standardized path coefficients that were significant for the students with LD were also significant for students in the non-LD group, so no obvious path could be identified based on statistical significance. Instead, we identified the paths that had the largest differences between the two groups despite both being statistically significant. We released constraints on paths one at a time, starting with the largest difference, until the model fit returned to equivalent to the original model. We first released the path between social integration and overall satisfaction (model 4) and then the path between social integration and the acquisition of knowledge and skills (model 5). With these two paths released, the model fit was not significantly different from the original model χ^2 $p = .08$, CFI = .96, RMSEA = .04. This model, with two unconstrained paths, was retained for all further analyses.

Table 3.3. *Model fit indices, tests of invariance of the measurement models and structural paths.*

Models	χ^2	df	CFI	*RMSEA*	$\Delta \chi^2$
1. Baseline (Unconstrainted Model)	271.35	170	.965	.039	
2. Invariance of loadings (Measurement Weights)	289.99	182	.963	.039	18.64
3. Invariance of loadings, and structural paths (Structural Weights set to equal)	335.50	195	.952	.043	64.15**
4. Invariance of loadings, and structural paths Path from social integration to acquisition of knowledge & skills released	312.44	194	.959	.039	41.09*
5. Invariance of loadings, and structural paths Paths from social integration to acquisition of knowledge & skills and to overall satisfaction released	304.68	193	.962	.038	33.33

Note: * $p \le .01$ ** $p \le .001$ 1 = unconstrained model; 2 = measurement weights; 3 = structural weight where all paths considered equal; 4 = path from social integration to acquisition of knowledge and skills set to variant; 5 = paths from social integration to acquisition of knowledge and skills and to overall satisfaction set to variant.

Direct Effects. The standardized path coefficients in the model are presented in Figure 3.1. Perceived academic ability and drive to achieve were both significantly and positively related to academic integration. Drive to achieve was also significantly and positively related to social integration. Perceived academic ability was significantly and positively related to current GPA and acquisition of knowledge and skills, and overall satisfaction. Drive to achieve did not

have any significant direct relationships with the outcome variables. For the connections between the integration variables and outcomes, it was observed that academic integration was significantly and positively related to GPA and overall satisfaction, while social integration was significantly and positively related to acquisition of knowledge and skills and overall satisfaction.

Indirect Effects. We also examined indirect effects between the inputs and outcomes through the integration variables. Both perceived academic success and drive to achieve had a significant, positive indirect effect on GPA ($b = .07$, $p = .001$, 95% CI[.04, .13], and $b = .07$, $p = .002$, 95% CI[.03, .13], respectively). Drive to achieve also had a significant, positive indirect effort on acquisition of knowledge and skills and overall satisfaction for both students with and without LD. These indirect effects were stronger for students with LD than their peers without LD for acquisition of knowledge and skills ($b = .19$, $p = .002$, 95% CI[.11, .27], and $b = .09$, $p = .005$, 95% CI[.02, .17], respectively) and overall satisfaction ($b = .17$, $p = .002$, 95% CI[.11, .24], and $b = .12$, $p = .002$, 95% CI[.06, .20]). There was no significant indirect effect from academic ability to acquisition of knowledge and skills or overall satisfaction for either group.

Discussion

Our research examined students with LD in comparison to their peers without LD on important factors related to success during postsecondary education. We examined student academic success (outcomes) and the influence of student characteristics (inputs) and perception of integration on campus (environment). In this discussion, we focus on how our findings expand the current understanding around supporting students with LD during their postsecondary pursuits. Specifically, we discuss: (a) student perceptions of their academic ability and drive to achieve as they begin their postsecondary education, (b) the importance of integration, in

particular, social integration for students with LD, and (c) recommendations for supports and

services to offer students with LD during their postsecondary studies. In closing, we discuss

research limitations and recommendations for future research.

The Role of Student Characteristics for Integration

Student perceptions of their academic ability and drive to achieve regardless of whether

they were a student with LD or not, had a significant impact on their integration at

postsecondary. Academic ability was directly related to academic integration, while drive to

achieve was significantly related to academic and social integration. Not surprisingly, perceiving

oneself as having high academic ability, and a high level of drive positively relates to one's

academic integration at postsecondary. However, it is important to note that only drive to achieve

was significantly related to social integration and future research is needed to further examine the

connection. Marshall and colleagues (2012) describe first-year students' perceptions regarding

their sense of belonging as complex and multilayered. Therefore, a qualitative approach to

examining student social integration might provide additional insights into the connection

between academic ability and one's sense of belonging. Drive to achieve had a significant

association with academic and social integration, highlighting the importance of motivation as an

input in the model and a potential avenue for supporting student success at postsecondary.

The Role of Student Characteristics for Success

Considering the influence of the inputs on the indicators of success, academic ability was

directly related to a student's GPA, acquisition of knowledge and skills, and overall satisfaction.

In contrast, drive to achieve had no direct effect on success. This is contrary to Keup (2006), who

commented on the strength of drive to achieve to predict self-assessed cognitive development,

but did not comment on its strength to predict college GPA. On first glance, this makes it seem

like ability matters more than drive. However, the indirect effects through integration emerged when examining drive to achieve, perhaps suggesting that drive is at least as important as ability. Our results are consistent with research looking at psychosocial factors with a general population and the impact on academic success at postsecondary (e.g., Fong et al., 2017; Richardson et al., 2012; Robbins et al., 2004). Robbins and colleagues (2004) found that students' academic self-efficacy and motivation to achieve success was significantly related to GPA and persistence. Our results extend these findings by examining academic success using different measures. By using multiple measures, it provides a more nuanced understanding of how student characteristics impact various indicators of academic success, also highlighting the complexity of examining these constructs. Moreover, researchers should be mindful of how they are measuring academic success, as it can provide different pieces to the postsecondary puzzle.

Further extending the findings of previous research, our results examined these student characteristics and academic success components while also comparing students with LD and their peers without LD. Our multi-group comparison did not find differences between these two groups for the connections between the student characteristics and academic success measures suggesting these two groups are more similar than different when it comes to these connections. This seems plausible and suggests that at the end of high school students who pursue post secondary education have a perception of themselves as adequately academically able and driven to achieve regardless of their disability status.

The Role of Integration for Success

Reinforcing Tinto's (1999) stance that there are two systems within postsecondary institutions, academic and social, we found that the two types of integration were related to different indicators of success. Academic integration was significantly related to GPA and

overall satisfaction. Both students with and without LD who understand what their professors expect from them academically and are able to develop effective study skills and time management practices tend to have higher grades and are more satisfied with their experience. Academic integration involves the intellectual development of the student (Meeuwisse et al., 2010), such as learning how to complete academic tasks. Therefore, it is not surprising that it was significantly related to GPA. On the other hand, social integration was significantly related to the acquisition of knowledge and skills and overall satisfaction. Students who saw themselves as part of the campus community had higher subjective measures of academic success. Social integration involves interactions with peers and developing that sense of belonging (Chrysikos et al., 2017; Meeuwisse et al., 2010) which may explain its association with satisfaction.

Less intuitive, however, was the finding that the acquisition of knowledge and skills was predicted by social and not academic integration. Presumably to obtain a high GPA, one needs to learn the knowledge and skills within their courses. Indeed, York and colleagues (2015) describe GPA as a proxy measurement of one's attainment of learning objectives and the acquisition of skills and competences. The items included within the variable involved the development of intellectual and practical skills, knowledge of a particular field and problem solving skills, which would be considered more academic in nature. A similar finding was found by Goegan and Daniels (2019) where academic and social integration were both related to acquisition of knowledge and skills, but social integration had a stronger relationship.

Group Differences. The importance of distinguishing two systems of integration was further highlighted when we examined group differences. While the direction and significance of the relationships between integration and outcomes were similar for both groups, two important differences emerged: the connection between social integration and the academic success

outcomes of (a) acquisition of knowledge and skills, and (b) overall satisfaction were significantly stronger for students with LD than their peers without LD. In other words, the impact of social integration on two indicators of success was more pronounced for students with LD. Our findings suggest that while social integration is important for all students, it is significantly more imperative for the academic success of students with LD in terms of skills and satisfaction.

Indirect Effects. Recall that social integration was only predicted by drive and not academic ability. Thus, to enhance social integration, which is important for skills and satisfaction but not grades, students' drive is what matters. Overall, our findings and the findings of previous research (DaDeppo, 2009; DuPaul, et al., 2017) demonstrate the overarching need for students with LD to integrate socially at postsecondary institutions, and social integration is uniquely supported by the level of drive that students possess at college entry. Having a sense of belonging increases not only their satisfaction, but also their reported acquisition of knowledge and skills during their studies.

Social Integration Supports for Students with LD

Because drive is established prior to entering postsecondary, we chose to focus our recommendations on supporting social integration because its influence on indicators of success was particularly strong for students with LD. Campuses often have "welcome weeks" at the beginning of term to assist students. To build on those opportunities, disability resource centers could provide additional opportunities during this time for students with LD. These supports could include learning how to navigate the academic supports that students need to access for themselves such as getting accommodations for their courses, while also offering a social component where students can meet others who also have learning challenges and begin to build

their network of peers on campus. More generalized supports such as how to understand

professor expectations, study skills and time management strategies could also be provided by

academic success centers on campuses to support the larger community of students, including

students with LD. Students with LD often do not disclose their disability to postsecondary

institutions (Newman & Madaus, 2015), therefore, ensuring a wider reach of services would be

advantageous for students who choose to not disclose their disability status.

It might also be advantageous to develop a peer mentoring program (DaDeppo, 2009)

through disability resource centers as well as academic success centers where students

continuing with their studies could be matched with new students. Returning students could

assist new students navigating postsecondary education and provide peer support during the

challenges of the first few months. Efforts on the part of disability resource centers could be

made to pair students with similar learning challenges wherein students could learn from one

another as to the strategies that work for them, for example, how they study for exams or manage

their course work. Moreover, for academic success centers, efforts could be made to pair

students based on programs of study to further support their integration into their respective

academic programs, both academically and socially. Academically, the student could learn

specific study skills for their program, or time management skills from someone who has been

through that program. Socially, the mentor might introduce the mentee to other students in the

program, or the mentor could take on a peer role in future classes taken together.

To encourage participation in peer mentorship programs, facilitators might want to begin

these programs in the summer before classes start. Students with LD who have difficulties with

time management may benefit from this timeframe as they could meet individuals before the

busy term begins, and learn important skills for their coursework that they can incorporate into

their classes right from the beginning of term. Alternatively, peer mentorship programs may want to partner with local high schools and come into the schools and speak to the students before they begin their postsecondary education. As part of this partnership, students could meet potential mentors and determine fit. Moreover, these programs could offer after school sessions for students to learn important skills required at postsecondary such as time management and study skills. Mentors could be part of these sessions as well, and offer their own experiences to the high school students. These sessions could be provided specifically to students with LD, and more broadly to all students who may seek support in the transition to postsecondary education.

Social integration might also be supported by encouraging students with LD to get involved with school clubs or sports teams. This recommendation is supported by the work of Mamiseishvili and Koch (2011) that highlighted the importance of involvement in co-curricular activities on campus. Many campuses offer Clubs Week where the various clubs on campuses advertise to recruit new members. Efforts could be made to promote these types of events across campus through various means such as instructor announcements, flyers and emails. Students with LD might also want to form their own student groups to build connections with others who have LD and might feel more comfortable with that peer support as these students often report feeling misunderstood by others or discriminated against (Kurth & Mellard, 2006; McGregor et al., 2016). A group specifically for students with LD could provide academic integration, by supporting one another in the development of important skills such as time management or study skills, as well as social integration, by allowing students to develop friendships and comradery with other individuals who are LD.

Another potential avenue for support builds on the work of Tinto (1999) who suggested the development of learning communities for first-year students. One component of these

communities involves coordination of courses so that they cluster in such a way that a group of students would take the same courses together to aid in the development of friendships, collegial relationships, and by extension social integration. It might be advantageous to create these clusters purposefully wherein students with LD who engaged in the disability resource center orientation also take courses together to continue to build their peer networks.

Other avenues to support social integration include faculty/student mentor programs, and freshman year seminar classes (DaDeppo, 2009; Mamiseishvili & Koch, 2011). Teachers can also encourage their students to develop study groups to learn course material but also develop relationships with other students. Group work and class discussions might also provide students with the opportunity to integrate with students depending on the class size. Providing meaningful opportunities for cooperation and collaboration in learning activities can help all students develop meaningful connections with one another (Mamiseishvili & Koch, 2011).

These various avenues for supporting students with LD at postsecondary provide institutions with a number of possibilities. Future research is needed to examine what supports students with LD are currently using and what types of supports they would be interested in accessing in the future to guide decisions related to supports. Moreover, longitudinal research might be advantageous to determine how these supports are supporting student's success over time, so that programs can meet the needs of students.

Limitations and Future Research

Our research provides important insights that can be used to support students with LD in their academic pursuits. However, there are three important limitations that should be mentioned. First, secondary data has a number of challenges (Trzesniewski et al., 2011), such as the constraint of using single items rather than multi-item scales with existing evidence of reliability

and validity. Nevertheless, we were able to combine a number of items to create constructs of

interests, and analyzed those constructs utilizing our measurement model that demonstrated

adequate fit. Furthermore, our items had good evidence validity in terms of direct language

(Zedeck, 2014) and expected zero-order associations. Nevertheless, we were limited in the

number of items that could be used to address each component of our model, and future research

could extend our findings to include additional items related to student characteristics,

integration, and academic success. Moreover, the design and data did not allow us to follow-up

with participants as to their experiences at postsecondary and provide additional context to their

responses. Future research could trade the breadth we gained through secondary data analysis for

depth by examining the model within a single institution and then have follow-up interviews

with students to provide additional information and context for student experiences.

Although our study was designed to specifically compare first-year students with and

without LD, they are not the only groups of interest on campuses. Future research could extend

the model to other groups of students who continue to become more common on campuses such

as students with mental health issues, chronic medical conditions, acquired brain injuries, or on

the autism spectrum (National Education Association of Disabled Students, 2018). Testing the

model with these various groups would provide postsecondary institutions with additional

information as to the experiences of diverse students on their campuses and provide insights for

how to support them. Moreover, longitudinal studies that follow cohorts of undergraduates

would extend our understanding from these groups of first-year students with and without LD to

those in later years to determine if the same factors continue to predict success over time.

A third limitation of our study was that there are numerous potential other inputs and

environment variables that could have been utilized in our model. Our model does demonstrate a

number of important relationships between the components of the I-E-O model, but it is possible that other variables could provide additional information to the results found here. Indeed Keup (2006) included a wide assortment of predictors from the YFCY database in regression models to try and determine which were most important for college GPA and self-assessed cognitive development. While future research needs to consider the multifaceted nature of these components when deciding which variables to include within the model. we would continue to urge researchers to bring theoretical and empirical perspectives to bear on their decisions.

Conclusion

In conclusion, our study provides important information about students with LD and how to support their success at postsecondary institutions. The results here highlight the importance of social integration in supporting students with LD in their academic success and suggest that in many ways the relationships between these constructs function similarly for students with and without LD. The implications of the current results have been paired with recommendations for postsecondary institutions to support these individuals. Future research is needed to implement such supports, determine their utility for these students and adapt as needed so that students with LD are properly supported in their academic pursuits.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. American Psychiatric Pub.

Astin, A. W. (1991). *Assessment of Excellence*. Macmillan.

Astin, A. W. (1993). *What Matters in College? Four Critical Years Revisited* (1st ed.). Jossey-Bass.

Astin, A. W. & Antonio, A. L. (2012). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. Rowman & Littlefield.

Bolt, S. E., Decker, D. M., Lloyd, M., & Morlock, L. (2011). Students' perceptions of accommodations in high school and college. *Career Development for Exceptional Individuals*, *34*(3), 165-175. https://doi.org/10.1177/0885728811415098

Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Lawrence Erlbaum Associates Inc.

Byrne, B. M., & Watkins, D. (2003). The issue of measurement invariance revisited. *Journal of Cross-Cultural Psychology, 34*, 155-175. https://doi.org/10.1177/0022022102250225

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*(2), 233-255. https://doi.org/10.1207/S15328007SEM0902_5

Chrysikos, A., Ahmed, E., & Ward, R. (2017). Analysis of Tinto's student integration theory in first-year undergraduate computing students of a UK higher education institution. *International Journal of Comparative Education and Development*, *19*(2/3), 97-121. https://doi.org/10.1108/IJCED-10-2016-0019

Cortiella, C., & Horowitz, S. H. (2014). *The State of Learning Disabilities: Facts, Trends and Emerging Issues.* National Center for Learning Disabilities. https://www.ncld.org/wp-content/uploads/2014/11/2014-State-of-LD.pdf

Cortina, L. M. (2005). Recursive models. *Encyclopedia of Statistics in Behavioral Science, 4*, 1722-1723. https://doi.org/10.1002/0470013192.bsa54

Cox, B. E., Mintz, A., Locks, T., Thompson, K., Anderson, A., Morgan, L., Edelstein, J. & Wolz, A. (2015). Academic experiences for college students with autism: Identity, disclosure, and accommodations. *Journal of College Student Development*. https://doi.org/10.1.1.725.9811

Cox, B. E., Thompson, K., Anderson, A., Mintz, A., Locks, T., Morgan, L., Edelstein, J. & Wolz, A. (2017). College experiences for students with autism spectrum disorder: Personal identity, public disclosure, and institutional support. *Journal of College Student Development*, *58*(1), 71-87. https://doi.org/10.1353/csd.2017.0004

DaDeppo, L. M. (2009). Integration factors related to the academic success and intent to persist of college students with learning disabilities. *Learning Disabilities Research & Practice, 24*(3), 122-131. https://doi.org/10.1111/j.1540-5826.2009.00286.x

DuPaul, G. J., Pinho, T. D., Pollack, B. L., Gormley, M. J., & Laracy, S. D. (2017). First-year college students with ADHD and/or LD: differences in engagement, positive core self-evaluation, school preparation, and college expectations. *Journal of Learning Disabilities, 50*(3), 238-251. https://doi.org/10.1177/0022219415617164

Eckes, S. E., & Ochoa, T. A. (2005). Students with disabilities: Transitioning from high school to higher education. *American Secondary Education*, *33*(3), 6-20. https://doi.org/142.104.201.65

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). Psychosocial

    factors and community college student success: A meta-analytic investigation. *Review of*

    Educational Research, *87*(2), 388-424. https://doi.org/10.3102/0034654316653479

Freeman, (2009, September 20). 1 in 6 first-year university students won't make the grade. The

    Star. https://www.thestar.com/news/canada/2009/09/20/1_in_6_firstyear_

    university_ students_wont_make_the_grade.html

Garson, G. (2008). *Path Analysis lecture notes*.

    https://www.scribd.com/document/323656506/Garson-2008-PathAnalysis-pdf

Goegan, L. D. & Daniels L. M. (2019). Academic Success for Students in Postsecondary

    Education: The Role of Student Characteristics and Experiences. *Journal of College*

    Student Retention: Research, Theory & Practice.

    https://doi.org/10.1177/1521025119866689

Gregg, N., & Scott, S. S. (2000). Definition and documentation: Theory, measurement, and the

    courts. *Journal of Learning Disabilities*, *32*(4), 5-13.

    https://doi.org/10.1177/002221940003300104

Hen, M., & Goroshit, M. (2012). Academic procrastination, emotional intelligence, academic

    self-efficacy, and GPA: A comparison between Students with and without learning

    disabilities. *Journal of Learning Disabilities*, *47*(2), 116-124.

    https://doi.org/10.1177/0022219412439325

Higher Education Research Institute (2019). *Mission*. https://heri.ucla.edu/mission/

Ishitani, T. T. (2016). Time-varying effects of academic and social integration on student

    persistence for first and second years in college: National data approach. *Journal of*

College Student Retention: Research, Theory & Practice, *18*(3), 263-286.

https://doi.org/10.1177/1521025115622781

Jorgensen, S., Fichten, C. S., Havel, A., Lamb, D., James, C., & Barile, M. (2005). Academic

Performance of College Students with and without Disabilities: An Archival

Study. *Canadian Journal of Counselling*, *39*(2), 101-117.

Keup, J. R. (2006). Promoting new-student success: Assessing academic development and

achievement among first-year students. *New Directions for Student Services*, *2006*(114),

27-46. https://doi.org/10.1002/ss.205

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). The

Guilford Press.

Kurth, N., & Mellard, D. (2006). Student perceptions of the accommodation process in

postsecondary education. *Journal of Postsecondary Education and Disability*, *19*(1), 71-

84. http://files.eric.ed.gov/fulltext/EJ844625.pdf

Lent, R. W., Singley, D., Sheu, H. B., Schmidt, J. A., & Schmidt, L. C. (2007). Relation of

social-cognitive factors to academic satisfaction in engineering students. *Journal of Career

Assessment*, *15*(1), 87-97.

Little, T. D. (1997). Mean and covariance structures (MACS) analyses of cross-cultural data:

Practical and theoretical issues. *Multivariate Behavioral Research, 32*, 53-76.

https://doi.org/10.1207/s15327906mbr3201 3

Mamiseishvili, K., & Koch, L. C. (2011). First-to-second-year persistence of students with

disabilities in postsecondary institutions in the United States. *Rehabilitation Counseling

Bulletin*, *54*(2), 93-105. https://doi.org/10.1177/0034355210382580

Marshall, S., Zhou, M., Gervan, T., & Wiebe, S. (2012). Sense of belonging and first-year academic literacy. *Canadian Journal of Higher Education*, *43*(3), 116-142. https://files.eric.ed.gov/fulltext/EJ1002139.pdf

McDonald, R. P., & Ho, M. H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods, 7*(1), 64-82. https://doi.org/10.1037//1082-989X.7.1.64

McGregor, K. K., Langenfeld, N., Van Horne, S., Oleson, J., Anson, M., & Jacobson, W. (2016). The university experiences of students with learning disabilities. *Learning Disabilities Research & Practice*, *31*(2), 90-102. https://doi.org/10.1111/ldrp.12102

Meeuwisse, M., Severiens, S. E., & Born, M. P. (2010). Learning environment, interaction, sense of belonging and study success in ethnically diverse student groups. *Research in Higher Education*, *51*(6), 528-545. https://doi.org/10.1007/s11162-010-9168-1

Morin, A. (2017). *Toward a glossary of self-related terms*. *Frontiers in Psychology, 8*, 1-9. https://doi.org/10.3389/fpsyg.2017.00280

National Center for Educational Statistics (2019). *Fast Facts: Back to School Statistics*. https://nces.ed.gov/fastfacts/display.asp?id=372#College_enrollment

National Education Association of Disabled Students (2018). *Landscape of Accessibility and Accommodation in Post-Secondary Education for Students with Disabilities*. https://www.neads.ca/en/about/media/.

Newman, L. A., & Madaus, J. W. (2015). Reported accommodations and supports provided to secondary and postsecondary students with disabilities: National perspective. *Career Development and Transition for Exceptional Individuals*, *38*(3), 173-181. https://doi.org/10.1177/2165143413518235

Osters, S. & Roberts, D. (2007). Academic success - How do students define it? Presentation at

the Southern Association for College Student Affairs (SACSA)/National Association of

Student Personnel Administrators (NASPA) Region III/Texas Association of College &

University Student Personnel Association (TACUSPA) Joint Student Affairs Conference,

Dallas, Texas.

Pingry O'Neill, L. N., Markward, M. J., & French, J. P. (2012). Predictors of graduation among

college students with disabilities. *Journal of Postsecondary Education and

Disability*, *25*(1), 21-36. https://files.eric.ed.gov/fulltext/EJ970017.pdf

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting:

The state of the art and future directions for psychological research. *Developmental

Review*, *41*, 71-90. https://doi.org/10.1016/j.dr.2016.06.004

Reed, M. J., Kennett, D. J., & Emond, M. (2015). The influence of reasons for attending

university on university experience: A comparison between students with and without

disabilities. *Active Learning in Higher Education*, *16*(3), 225-236.

https://doi.org/10.1177/1469787415589626

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university

students' academic performance: A systematic review and meta-analysis. *Psychological

Bulletin*, *138*(2), 353. https://doi.org/10.1037/a0026838.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do

psychosocial and study skill factors predict college outcomes? A meta-analysis.

Psychological Bulletin, *130*(2), 261-288. https://doi.org/10.1037/0033-2909.130.2.261

Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education:

    A systematic review of meta-analyses. *Psychological Bulletin*, *143*(6), 565-600.

    https://doi.org/10.1037/bul0000098

Schumacker, R. E., & Lomax, R. G. (2004). A beginner's guide to structural equation modeling.

    Lawrence Erlbaum Associates.

Smith, S. G., English, R., & Vasek, D. (2002). Student and parent involvement in the transition

    process for college freshmen with learning disabilities. *College Student Journal*, *36*(4),

    491-504.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent

    research. *Review of Educational Research*, *45*(1), 89-125.

    https://doi.org/10.3102/00346543045001089

Tinto, V. (1999). Taking retention seriously: Rethinking the first year of college. *NACADA*

    Journal, 19(2), 5-9. https://www.nacadajournal.org/doi/pdf/10.12930/0271-9517-19.2.5

Tinto, V. (2006). Research and practice of student retention: What next? *Journal of College*

    Student Retention: Research, Theory & Practice, *8*(1), 1-19.

    https://doi.org/10.2190/4YNU-4TMB-22DJ-AN4W

Trzesniewski, K. H., Donnellan, M., & Lucas, R. E. (2011). Secondary data analysis: An

    introduction for psychologists. American Psychological Association.

Woosley, S.A. (2003). How important are the first few weeks of college? The long term effects

    of initial college experiences. *College Student Journal*, *37*(2), 201-207.

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success.

    Practical Assessment, Research & Evaluation, *20*(5), 1-20.

    http://www.pareonline.net/getvn.asp?v=20&n=5

Zedeck, S. (Ed.). (2014). *APA dictionary of statistics and research methods*. American

Psychological Association.

Zepke, N., & Leach, L. (2010). Beyond hard outcomes: 'Soft' outcomes and engagement as

student success. *Teaching in Higher Education*, *15*(6), 661-673.

CHAPTER FOUR: GENERAL DISCUSSION

The majority of students who drop out of postsecondary institutions do so in their first-year. Furthermore, students with LD are more likely to not complete their education when compared with their peers. As such, the results of this research are timely and important because they document how important malleable factors relate to a number of indicators of success for both students with and without LD. I utilized the I-E-O model of Astin (1991, 1993) as the theoretical framework for my dissertation research. For inputs I included two malleable student characteristics: perceived academic ability and drive to achieve. For the environment, I drew on the work of Tinto's Social Integration Model and examined academic and social integration. Furthermore, over the course of my doctoral studies I have come to appreciate the complexity of academic success, and therefore, examined this construct using three indicators (a) current GPA, (b) acquisition of knowledge and skills, and (c) overall satisfaction.

In this general discussion, I extrapolate and discuss the findings across both studies. I begin by examining avenues for supports and services that postsecondary institutions could offer to students in general, and students with LD in particular, based on the significant connections within the model. Next, I reflect on the methodological and theoretical challenges that arose with this project, and consider potential solutions for conducting future research with LD and non-LD students. Finally, I conclude this General Discussion by identifying directions for future research that will continue to reach and advocate for students with LD.

Avenues for Supports and Services

Based on the results of these two studies, I believe there are a number of supports and services that can be offered to aid students in achieving their academic success. In my two studies, I conceptualized environment as both academic and social integration, based on the

influential work of Tinto and his Student Integration Model (1991, 1999). Tinto proposed that a

lack of academic integration would lead to lower grades, and as a result, the student may be

required to leave the institution. The results from both studies highlight the importance of this

point. Students, regardless of whether they had LD or not, who understood what their professors

expected from them academically, developed effective study skills, and managed their time

effectively achieved higher GPAs. Furthermore, they reported greater satisfaction with their

experiences, perhaps they felt successful because of the high value that is placed on obtaining

good grades. On the other hand, students who reported an inability to integrate into the academic

environment achieved lower grades and were less satisfied.

One avenue that students have at their disposal to develop the academic skills required

for integration is through academic support service offered on campuses. For example, campuses

often have Academic Success Centres that offer various supports to students such as workshops

and one-on-one appointments that students can access to get help with tasks such as time

management, studying, note-taking, exam preparation and writing papers. Campuses also offer

new student orientation in the Fall. While these are positive ways to support students, I wonder

about how often these services are accessed. In other words, postsecondary institutions are

offering things to help students successfully integrate academically, but the question of whether

or not the students who need the supports the most access them remains open.

In my time at the disability resource centre (DRC) at the University of Victoria, there

were two large influxes of students accessing supports. The first was prior to September,

representing students who were highly motivated to access services they perceived as necessary

for their success, and the second was just after the first round of midterms when students who did

not do so well decided to seek supports. I always struggled with supporting the latter influx, as

the students I met during this time seemed unprepared for the adjustment necessary for

postsecondary education, and after midterms there was a limited amount of time remaining in the

academic semester. For example, writing an essay in your introductory English class at

postsecondary is very different from the 5-paragraph essay taught in high schools. I wondered

how best to support these students earlier. Based on the findings of my studies and my personal

experiences supporting students, I have three main recommendations to support student

academic integration. The first is similar to the ideas of Tinto (1999) who suggested that "the

first-year of college should be understood as a developmental year in which new students acquire

the skills, dispositions and norms needed to learn and grow throughout the college years" (p. 9). I

believe that the first-year of postsecondary education should be a developmental year. Students

should take courses that teach them the necessary skills to be successful at postsecondary. These

skills can support their development in their second year and beyond by providing them with an

appropriate foundation to build specific knowledge in their departments and faculties. For

example, skills such as problem solving, communication, analytical thinking, teamwork and

critical thinking are all important for the future job market (Bean-Mellinger, 2019; Rosenberg

McKay, 2019). Furthermore, students transitioning to postsecondary education need to develop

important skills early on to support their success in the years to come. Using the knowledge base

that is developed over the course of this foundational year, departments can build the skills and

knowledge specific to their field or discipline.

Second, I think that first-year courses need to take time to teach some fundamental

strategies for how to be an effective and successful postsecondary student. This would include

providing students with scaffolding on how to take notes, and how to prepare for exams. As

students move into the higher-level courses these scaffolds are removed and the student is able to

complete these tasks independently, or as independently as possible. There will still be individuals who presumably struggle with some of the components of being a student, and this is where Academic Support Services can continue to support them. This leads me to my third recommendation, which is that there needs to be more communication as to the supports and services available to all students and particularly students with disabilities. I can not count the number of times a student told me "I didn't know (insert name of support) existed" when I asked them if they had accessed one support or another. Students can not access what they do not know exists. As such, I recommend that postsecondary institutions consider ways to publicize their supports and services. No business would create a product without knowing how to get it into the hands of those who need it, and postsecondary institutions would benefit from a bit more of this end-user perspective when it comes to academic and social supports.

Social Integration is Important

Tinto proposed that a lack of social integration would lead to a student feeling disconnected from others on campus, increasing their likelihood of leaving the institution as a result of a lack of integration (Tinto, 1975). The results from both studies also highlight the importance of this point. Students, regardless of whether they had LD or not, who saw themselves as a part of the campus community, felt valued at their institution, had a sense of belonging, and felt they were a member of their college identified themselves as acquiring more knowledge and skills and had more overall satisfaction. However, as was found in Study Two, these connections between social integration and these measures of academic success were stronger for students with LD.

In general, postsecondary institutions offer various services to support social integration. For example, campuses have new student orientations in the Fall that provide opportunities for

new students to meet and socialize with one another. Furthermore, there are various social clubs and sports teams available on campus that students can join. Due to the importance of social integration for students with LD, more attention could be placed on development opportunities for these students, in particular to help them thrive during their postsecondary education. For example, disability resource centres could provide additional social opportunities during student orientation. Likewise, disability resource centres could increase their visibility so that students know the academic supports that are available to them, which often include accommodations for courses and exams – things which support the academic integration of these students. When offering these supports, students can also meet others who have learning challenges and build their social network on campus. Students with LD might feel more comfortable making peer connections within this environment as the research has found that often students with LD express feeling of being misunderstood and discriminated against by their peers (Kurth & Mellard, 2006; McGregor et al., 2016). These supports, offered during orientation, could extend to the development of a peer support program (DaDeppo, 2009) through these centres. Moreover, students could develop their own social club on campus.

Supporting the Transition of Environments

I believe that some of the academic and social integration necessary for success at postsecondary can start before students begin their degrees in the Fall. Indeed, both studies found important connections between student characteristics and integration as well as academic success. Recall, that the student characteristics or inputs were measured in September and therefore really reflect beliefs that students would have established during their K-12 education. Therefore, it is imperative that teachers and other school personnel in the K-12 system support these positive perceptions in their students. Moreover, the development of the necessary

academic skills required to be successful at postsecondary can begin in the high school years. This could become possible by building bridges between high schools and postsecondary institutions wherein there is open communication as to what general knowledge and skills students need to be successful at the postsecondary level. At my time working at the DRC, many of my students commented that they did not know how to study, or take notes, and high schools can help build these foundational skills necessary for integration at postsecondary. This could be done within the scope of the Career and Life Management course outlined by Alberta Education (Alberta Education, 2019). This could also involve the development of a new course around postsecondary preparation and planning. As part of this course, students could be required to attend a postsecondary institution for a day. These students could sit in on lectures they were interested in, see what postsecondary was all about firsthand and meet other students who had similar postsecondary pursuits. Given the increasing number of students entering postsecondary education, such a course could be extremely valuable to students (National Center for Educational Statistics, 2019). If this is not possible through the high school program, postsecondary could offer outreach programs wherein high school students are welcomed to campuses and are able to be a student for a day or perhaps even a week. During the summer term in particular, high school students would not have class and postsecondary institutions could offer these students an opportunity to come to campus and experience it. Moreover, campuses are quieter during the summer so it might provide a nice transition space for these high school students before the hustle and bustle of September begins.

Challenges in the Past and on the Road Ahead for Research and Theory

Over the course of completing my studies, there have been various bumps in the road. In this section of the General Discussion, I examine those methodological and theoretical challenges and share what I have learned to move forward with my research.

Recruitment of Individuals with LD

When I began to imagine my doctoral research, I wanted to conduct my own longitudinal study, where I would recruit students in high school and then follow these individuals during the first-year of their postsecondary education. However, despite massive efforts to partner with schools in both Edmonton and Calgary, I was unable to acquire a large enough sample of students with LD to follow into their first-year. Given this set back, I began to look for alternatives that would still allow me to examine this transition for students. In my search, I found the Higher Education Research Institute (HERI) and their Cooperative Institutional Research Program (CIRP). The longitudinal nature of their data paired with the ability to identify students who self-reported LD provided a different way to approach my dissertation research that I had not expected.

Recruitment of individuals with LD, I feel, will always be a challenge in the work that I do. Over the course of my Masters, I examined the accommodation of extended time for students with LD and non-LD students (Goegan & Harrison, 2017). Recruitment of students with LD was slow, and there came a point where my supervisor and I just had to move on and continue with the data analyses in the project. I had connected with the DRC, posted flyers, tried to snowball my participants by asking them to pass along information about my study to their friends and I struggled with recruitment for over a year. During my preparation for candidacy, I examined how to apply universal design principles in the development and implementation of quantitative

research (Goegan, Radil, & Daniels, 2018). Within this investigation, I found a number of articles that commented on the self-disclosure of participants with LD. Individuals with LD often do not want to share information about themselves, particularly related to their LD, due to the potential stigma others might hold about having LD (Denhart, 2008; May & Stone, 2010). This may be one of the reasons I have had and continue to have challenges with recruitment of individuals with LD in my research.

However, in the course of my Master's project, I noticed something important. After my participants completed my study and I debriefed them about the purpose of the study and answered their questions, I was able to have some conversations with the students. Often during these conversations, I disclosed to them that I was an LD student as well. It was interesting to see their demeanor change. I was no longer an outsider who might have prejudice and preconceptions about them as students, but I was one of them, part of the "LD club." Students became more talkative, disclosing their challenges and experiences. It was remarkable. It reinforced how important it is for me, as a person with LD, to do this research. I have been on my LD path for many years now and I can understand their experiences on a similar level. Being part of the LD club positions me nicely to be able to make sense of their stories and experiences. The fear participants might have around disclosure and preconceived notions will hopefully be minimized if they understand this research is being done by an individual with LD, for people with LD. I want to ensure the voices of students with LD are heard in the research literature and empower them to participate and engage in research should the opportunities become available.

These experiences during my graduate studies have prepared me to conduct future research with students who identify as LD. To recruit individuals with LD, I believe there are two main avenues I can take. The first is continuing to develop partnerships with organizations

that have the means and resources to reach a larger number of individuals with LD. The partnership I developed with CIRP was encouraging, and I see myself forging new connections with similar organizations in the future. A second avenue would be engaging in more qualitative and/or longitudinal research that would require a smaller sample of students with LD. The path I take will be dependent on the focus of my research questions moving forward. Furthermore, where appropriate, I believe that my own self-disclosure is an important component to my continued work with this population. I believe that being an individual with LD makes me uniquely qualified to understand and share their experience.

Secondary Data Analysis

Despite a desire for primary data, I turned to secondary data for my dissertation – a decision I stand by and would make again as I balanced its advantages with its challenges. One common challenge is that secondary datasets typically have breadth of content, rather than depth of measurement (i.e., constructs often only have an item or two; Trzesniewski et al., 2011). As a result, a number of single items were used within my models: however, the face validity of the individual items I selected is good. I weighed this disadvantage in terms of scale design and measurement against the advantage of easily accessing a huge dataset that contains a large number of students with LD (Cheng & Phillips, 2014; Trzesniewski et al., 2011). With my past research experience, I decided the compromise in measurement was worth the sample size.

Another disadvantage of secondary data is that there is a lack of control over the questions to be asked and the methods in which data is collected. The administrators of the CIRP Freshman Survey (2017) identify that they take a number of steps to maximize distribution of the survey to all beginning first-year students at participating postsecondary institutions in the United States. To increase the ease of distribution, CIRP allows each institution to select paper or

web-based surveys where students will complete surveys (e.g., large-groups during orientation, in-class). Overall, I ultimately decided that the benefits outweighed the potential disadvantages for the purposes of my dissertation and I would look to secondary data sources in the future as well. I believe that having large numbers of participants tells a different part of the story for students with LD and allows rigorous designs and questions that may exceed my primary data collection capacities. This is a space where I see chances for generalizability and breadth of research impact, which can be critical for impacting policy and practice.

Theoretical Specificity and Flexibility

I believe that the I-E-O model is a straightforward way to conceptualize different components of the academic experience at postsecondary institutions. However, when one examines any single part of the model, the possibilities can be overwhelming. As a case in point, researchers could choose any number of "inputs" to operationalize the beginning of the model. Going back to the work of Robbins and colleagues (2004), there are traditional, demographic and psychosocial components, each of which in turn includes a long list of possibilities. For the current study, I included malleable inputs, Tinto's work on student integration in terms of the environment, and multiple indicators of academic success as the outcomes. As I move forward with this sort of research, I would continue to focus on malleable inputs over stable because of the possible role for intervention and to acknowledge the complexity involved in measuring academic success.

Despite the wide range of combinations within each part of the model, the full I-E-O model provides researchers with a simple general framework to sequence the experiences of first-year students. When conducting research with students with LD, the simplicity of the I-E-O model can help researchers incorporate theory into their research designs in a way that can

elevate the existing research that often lacks theoretical guidance. Overall, I believe that the I-E-O model's strength is in providing a general framework that allows for flexibility in considering the various components of the academic experiences of students in general and specifically with those students who identity as LD.

Directions for Future Research

In this last section I will explore three specific areas of research that I believe need to be prioritized. I have chosen to focus on students with LD because that is where my passion lies and it poses a bigger challenge than conducting research with typically developing university students. Within this, I attend to methodological implications as well as spaces for theories to shape the research. The theoretical sophistication is particularly important, because on some occasions research with LD takes a pragmatic approach that reduces theoretical rigor and I believe this is a place in which I can bring a new perspective to the literature.

First, I believe it is critical to follow students with LD from high school into their first-year of their postsecondary studies. I think there is valuable information that can be gained from this type of investigation that would compliment the work I have already completed. Similar to how there are nuances in how to define academic success, there are going to be nuances in the experiences of these students. Examining their experiences over time will help researchers and other professional to understand those experiences better and provide additional information for the development of supports and services. This could involve quantitative data collection using well established measures to examine my constructs of interest, removing the need to rely on single items. Additionally, I would interview students multiple times or ask students to keep a diary of their experience during the first-year of their postsecondary education to add depth to this sort of research.

As mentioned above, although I think the I-E-O model provides a good framework, I believe that Self-Determination Theory (SDT; Deci et al., 1991; Deci & Ryan, 2012; Ryan & Deci, 2000) may also be well suited to this work. SDT states that there are three basic psychological needs. These needs include competence (e.g., feeling confident with respect to a goal, or perceiving effectiveness), relatedness (e.g., developing connections with others, sense of belonging) and autonomy (e.g., actions that are self-determined, acting out of interest; Deci et al., 1991; Deci & Ryan, 2014). Social environments, which would include educational environments, can either support or disrupt these needs, which can impact one's functioning and development (Deci & Ryan, 2002). This would include their ability to integrate academically and/or socially on campus. In other words, SDT may be a more modern and psychological theory to overlay on top of Tinto's perspectives giving a different lens from which recommendations to support academic or social integration could be framed.

Second, as much as I have argued to focus on first-year students, I believe there is value in looking at students in their second year and through to the end of their postsecondary journey. In this sort of research Attribution Theory (Weiner, 2000) may come alongside the I-E-O model to help understand how students' cognitions influence their trajectory. Specifically, Attribution Theory may expand the way inputs are conceptualized. According to Attribution Theory, casual ascriptions (i.e., the reasons for why an outcome occurred) are theorized to impact how students think, feel, and enact future behaviour (Rudolph & Tscharaktschiew, 2014). Weiner (1985) suggests that there are only three underlying causal dimensions: locus, stability and controllability (Hareli, 2014; Weiner, 1985). First, the locus dimension refers to the individual's perception of the location of a cause as either internal or external to oneself (Graham & Taylor, 2016). Second, the stability dimension refers to how stable or unstable over time a cause is

perceived by the individual (also referred to as causal permanence; Weiner 2014). Third, the

controllability dimension refers to whether a person perceives that they have influence over the

cause that produced the outcome.

Let's consider an example: A student with LD who did not do so great in their first-year

at their postsecondary institution. If they attribute their poor performance to effort, "*I didn't try*

hard enough" this attribution is internal, controllable and unstable (Weiner, 2014). They can

choose to put in more effort, and might feel hopeful for the next year. But what if the student

thinks to themselves: "*I didn't do well this year because I have LD.*" By having an ability

attribution, the student sees their performance as internal, uncontrollable and stable, which could

make them feel embarrassed, helpless or other negatively based emotions (Weiner, 2014). Based

on the attributions associated with these two statements the student made, it could impact the

inputs going forward. Using constructs similar to my current model, the first student might

increase their drive to achieve, working harder to do well at postsecondary and be positively

related to their integration and academic success. Whereas the second student might develop

lower perceptions of their academic ability which can lead to negative associations with

integration and academic success components. I would be interested in exploring the connections

between the I-E-O model and Attribution Theory.

Finally, although theory-driven empirical research is critical, as an advocate for students

with LD I believe that I can make an important contribution through research on the

development and evaluation of supports and services offered to students at postsecondary

institutions. As a first step, I would interview various stakeholders such as administrators,

students and faculty about the supports and services currently in place for students. From there, I

would design new or modify existing supports based on the recommendations and comments of

these stakeholders. I would look to implement these supports and services at one university to start and evaluate them at the end of the semester or year, depending on the specifics involved. If positive results are found, I would attempt to approach more postsecondary institutions to extend the reach of these positive supports and services.

Plan for Future Research

The evidence accumulated in through this dissertation leads me to conclude that research guided by the I-E-O model can be beneficial. As such, in terms of future research I plan to continue using the I-E-O model to study the experiences of students with LD (Astin, 1993; Astin & Antonio, 2012). In a new project, I am looking to expand the understanding of the I-E-O model and its components. First, I plan on surveying students in high school about their academic experiences to date. I will then connect with participants who identified as LD and invite them to participate in a year-long in-depth project to examine their experiences during the first year of postsecondary studies. This year-long project requires ten to twelve students with LD which mitigates some of the challenges I have experienced in the past with recruiting participants with LD. Specifically, I will interview participants at three distinct timepoints in their first year. In September, the focus of the interview will be placed on inputs and students will be asked to describe their journey after high school and about what has motivated them as they begin a postsecondary program. In January, the focus will be placed on the environment. Students will be asked questions about their integration to campus life over their first semester. Emphasis will be placed on both academic and social integration (Tinto, 2006). In April, the focus will be placed on the outcomes that students experience over their first year and how they see those as representing success. This research will allow for the refinement of the I-E-O model to determine what is most pertinent for students with LD at postsecondary institutions.

Within these interviews, I will incorporate components of Attribution Theory and Self-Determination Theory into the I-E-O model thereby making contributions to further refinement of the theory. For example, during the September interviews, I can examine the causal explanations as to what has motivated the students to begin a postsecondary program. These explanations could be examined based on Attributions Theory's causal dimensions, as outlined above. I can also examine how these explanations impact their experiences in January and April. Moreover, I can use the Basic Psychological Needs of Self-Determination Theory to make sense of their experiences at postsecondary, for example, their integration on campus. Relatedness could be associated with feelings of social integration, whereas competence could be seen with their academic integration. By examining the I-E-O model in an interview-based study, I will be able to understand which components of the I-E-O model are most important for students with LD and their academic success. This information could then be applied to a future study to examine the supports in place at postsecondary institutions, and how they align with this model and the accompanying theories.

An additional component I would also like to incorporate into this new project would be to follow-up with participants at the beginning of their second year. One of the limitations of the I-E-O model is that it ends with outcomes. However, I believe that there is no end to our experiences, but rather an outcome informs our beliefs and motivations (i.e., inputs) moving forward. Therefore, while I believe that it is vital to examine the first-year experience of students with LD, I also think that considering the second year of studies is important. How do the inputs change from the first year to the second year? How does integration look in that second year? Presumably, they have not integrated to some extent on campus, and how does that impact the

outcomes of academic success? These are additional questions I would be interested to develop

into research projects in the future as well.

Conclusion

In summary, it is important to continue exploring how to support student success for all

students. This dissertation provided me with the opportunity to examine and comment on some

important inputs and environments that influence different forms of academic success for

students with and without LD. My hope was to provide valuable information to researchers,

administrators and faculty members who are trying to support students during their academic

journeys. I believe I have made great strides here towards that goal. I have outlined a number of

future research areas that can build on the work completed here, and continue to support

students. In my own journey, I hope to continue to examine the transition from high school to

postsecondary education, and build on this important area of research. By better understanding

and supporting students who are transitioning from high school to postsecondary education, I

believe that researchers, administrators, faculty members and other stakeholders are better

positioned to move forward with appropriate and meaningful supports to that will best support all

learners in achieving their definition of academic success.

References

Alberta Education (2019). https://education.alberta.ca/career-and-life-
management/?searchMode=3

Astin, A. W. & Antonio, A. L. (2012). *Assessment for excellence: The philosophy and practice
of assessment and evaluation in higher education*. Rowman & Littlefield.

Astin, A. W. (1991). *Assessment of Excellence*. Macmillan.

Astin, A. W. (1993). *What Matters in College? Four Critical Years Revisited* (1st ed.). Jossey-
Bass.

Bean-Mellinger, B. (2019, March 1). Most Important Employee Skills in the Workplace.
https://smallbusiness.chron.com/important-employee-skills-workplace-24708.html

Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: opportunities and
implementation. *Shanghai archives of psychiatry*, *26*(6), 371-375.
https://doi.org/10.11919/j.issn.1002-0829.214171

Deci, E. L., & Ryan, R. M. (2002). Overview of self-determination theory: An organismic
dialectical perspective. In E. L. Deci, R. M. Ryan (Eds.), *Handbook of self-determination
research* (pp. 3-33). University of Rochester Press.

Deci, E. L., & Ryan, R. M. (2012). Motivation, personality, and development within embedded
social contexts: An overview of self-determination theory. In R. M. Ryan (Ed.), *Oxford
handbook of human motivation* (pp. 85-107). Oxford University Press.

Deci, E. L., & Ryan, R. M. (2014). Autonomy and need satisfaction in close relationships:
Relationships motivation theory. In N. Weinstein (Ed.) *Human motivation and
interpersonal relationships* (pp. 53-73). Springer.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, *26*(3-4), 325-346. https://doi.org/10.1080/00461520.1991.9653137

Denhart, H. (2008). Deconstructing barriers: Perceptions of students labeled with learning disabilities in higher education. Journal of Learning Disabilities, 41, 483-497.

Goegan, L.D., & Harrison, G. L. (2017). The Effects of Extended Time on Writing Performance. *Learning Disabilities: A Contemporary Journal*, 15(2), 209-224. https://files.eric.ed.gov/fulltext/EJ1160642.pdf

Goegan, L. D., Radil, A. I. & Daniels L. M. (2018). Accessibility in Research Design: Integrating Universal Design to Increase the Participation of Individuals with Learning Disabilities. *Learning Disabilities: A Contemporary Journal*, *16*(2), 177-190. https://files.eric.ed.gov/fulltext/EJ1194555.pdf

Graham, S. & Taylor, A. Z. (2016). Attribution theory and motivation in school. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (pp. 11-33). Routledge.

Hareli, S. (2014). Making sense of the social world and influencing it by using a naïve attribution theory of emotions. *Emotion Review*, *6*(4), 336-343. https://doi.org/10.1177/1754073914534501

Kurth, N., & Mellard, D. (2006). Student Perceptions of the Accommodation Process in Postsecondary Education. *Journal of Postsecondary Education and Disability*, *19*(1), 71-84. http://files.eric.ed.gov/fulltext/EJ844625.pdf

May, A. L., & Stone, C. A. (2010). Stereotypes of individuals with learning disabilities: Views of college students with and without learning disabilities. *Journal of learning disabilities*, *43*(6), 483-499.

McGregor, K. K., Langenfeld, N., Van Horne, S., Oleson, J., Anson, M., & Jacobson, W. (2016). The university experiences of students with learning disabilities. *Learning Disabilities Research & Practice*, *31*(2), 90-102. https://doi.org/10.1111/ldrp.12102

National Center for Educational Statistics (2019). *Fast Facts: Back to School Statistics*. https://nces.ed.gov/fastfacts/display.asp?id=372#College_enrollment

Rosenberg McKay, D. (2019, March 11). Top Skills You Need to Compete in Today's Workplace. https://www.thebalancecareers.com/what-skills-do-you-need-to-compete-in-today-s-workplace-526255

Rudolph, U., & Tscharaktschiew, N. (2014). An attributional analysis of moral emotions: Naïve scientists and everyday judges. *Emotion Review*, *6*(4), 344-352. https://doi.org/10.1177/1754073914534507

Ryan, R. M., & Deci, E. L. (2000a). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78. https://doi.org/10.1037110003-066X.55.1.68

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of educational research*, *45*(1), 89-125. https://doi.org/10.3102/00346543045001089

Tinto, V. (1999). Taking retention seriously: Rethinking the first year of college. NACADA journal, 19(2), 5-9. https://www.nacadajournal.org/doi/pdf/10.12930/0271-9517-19.2.5

Tinto, V. (2006). Research and practice of student retention: What next? *Journal of College Student Retention: Research, Theory & Practice*, *8*(1), 1-19. https://doi.org/10.2190/4YNU-4TMB-22DJ-AN4W

Trzesniewski, K. H., Donnellan, M., & Lucas, R. E. (2011). Secondary data analysis: An

    introduction for psychologists. American Psychological Association

Weiner, B. (1985). An attributional theory of achievement motivation and

    emotion. *Psychological Review*, *92*(4), 548-573. https://doi.org/0033-295X/85/S00.75

Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attribution

    perspective. *Educational Psychology Review, 12*(1), 1-14. https://doi.org/10.1007/978-1-
4615-1273-8_2

Weiner, B. (2010). The development of an attribution-based theory of motivation: A history of

    ideas. *Educational Psychologist*, *45*(1), 28-36.

    https://doi.org/10.1080/00461520903433596

Weiner, B. (2014). The attribution approach to emotion and motivation: History, hypotheses,

    home runs, headaches/heartaches. *Emotion Review*, *6*(4), 353-361.

    https://doi.org/10.1177/1754073914534502

REFERENCES

Alberta Education (2019). https://education.alberta.ca/career-and-life-

     management/?searchMode=3

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*

     (DSM-5®). American Psychiatric Pub.

Arnekrans, A. K. (2014). Tinto's Student Integration Model & Diathesis Stress Model: Adverse

     Childhood Events, Resilience, & Retention in a First Year University Population.

     (Unpublished doctoral dissertation).

     https://etd.ohiolink.edu/!etd.send_file?accession=toledo1396182197&disposition=inline

Astin, A. W. & Antonio, A. L. (2012). *Assessment for excellence: The philosophy and practice*

     of assessment and evaluation in higher education. UK: Rowman & Littlefield.

Astin, A. W. (1991). *Assessment of Excellence*. Macmillan.

Astin, A. W. (1993). *What Matters in College? Four Critical Years Revisited* (1st ed.). Jossey-

     Bass.

Avery, C., & Turner, S. (2012). Student Loans: Do College Students Borrow Too Much-Or Not

     Enough? *Journal of Economic Perspectives*, *26*(1), 165-92.

     https://doi.org/10.1257/jep.26.1.165

Bandura, A. (1978). The self system in reciprocal determinism. *American psychologist*, *33*(4),

     344-358. https://doi.org/10.1037/0003-066X.33.4.344

Barrow, L., Brock, T., & Rouse, C. E. (2013). Postsecondary education in the United States:

     Introducing the issue. *The Future of Children*, *23*(1), 3-16.

     https://doi.org/10.1353/foc.2013.0006

Bean-Mellinger, B. (2019, March 1). Most Important Employee Skills in the Workplace.

    https://smallbusiness.chron.com/important-employee-skills-workplace-24708.html

Braxton, J. M., Shaw Sullivan, A. V., & Johnson, R. M. (1997). Appraising Tinto's theory of

    college student departure. In J. C. Smart (Ed). Higher Education: *Handbook of Theory*

    and Research (pp. 107-164). Agathon Press Incorporated.

Beatty, A. S., Walmsley, P. T., Sackett, P. R., Kuncel, N. R., & Koch, A. J. (2015). The

    reliability of college grades. *Educational Measurement: Issues and Practice*, *34*(4), 31-

    40. https://doi.org/10.1111/emip.12096

Beekhoven, S., De Jong, U., & Van Hout, H. (2002). Explaining academic progress via

    combining concepts of integration theory and rational choice theory. *Research in Higher*

    Education, *43*(5), 577-600. https://doi.org/10.1023/A:1020166215457

Bolt, S. E., Decker, D. M., Lloyd, M., & Morlock, L. (2011). Students' perceptions of

    accommodations in high school and college. *Career Development for Exceptional*

    Individuals, *34*(3), 165-175. https://doi.org/10.1177/0885728811415098

Borden, V. M., & Holthaus, G. C. (2018). Accounting for Student Success: Academic and

    Stakeholder Perspectives That Have Shaped the Discourse on Student Success in the

    United States. *International Journal of Chinese Education*, *7*(1), 150-173.

    https://doi.org/10.1163/22125868-12340094

Brookhart, S. M., Guskey, T. R., Bowers, A. J., McMillan, J. H., Smith, J. K., Smith, L. F.,

    Stevens, M. T. & Welsh, M. E. (2016). A Century of Grading Research Meaning and

    Value in the Most Common Educational Measure. *Review of Educational Research*,

    86(4), 1-79. http://uknowledge.uky.edu/edp_facpub

Bryant, J. L. (2006). Assessing expectations and perceptions of the campus experience: The

        Noel-Levitz Student Satisfaction Inventory. *New Directions for Community*

        Colleges, (134), 25-35. https://doi.org/10.1002/cc.234

Budny, D. D., & Paul, C. A. (2003). Working with Students and Parents to Improve the

        Freshman Retention. *Journal of STEM Education: Innovations & Research*, *4*.

Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications,*

        and programming. Lawrence Erlbaum Associates Inc.

Byrne, B. M., & Watkins, D. (2003). The issue of measurement invariance revisited. *Journal of*

        Cross-Cultural Psychology, 34, 155-175. https://doi.org/10.1177/0022022102250225

CAST (2019). *Universal Design for Learning Guidelines*. http://udlguidelines.cast.org/

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing

        measurement invariance. *Structural equation modeling*, *9*(2), 233-255.

        https://doi.org/10.1207/S15328007SEM0902_5

Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: opportunities and

        implementation. *Shanghai archives of psychiatry*, *26*(6), 371-375.

        https://doi.org/10.11919/j.issn.1002-0829.214171

Chrysikos, A., Ahmed, E., & Ward, R. (2017). Analysis of Tinto's student integration theory in

        first-year undergraduate computing students of a UK higher education

        institution. *International Journal of Comparative Education and Development*, *19*(2/3),

        97-121. https://doi.org/10.1108/IJCED-10-2016-0019

Conger, D., & Long, M. (2010). Why Are Men Falling Behind? Gender Gaps in College

        Performance and Persistence. *The Annals of the American Academy of Political and*

        Social Science,627, 184-214. http://www.jstor.org/stable/40607412

Cortiella, C., & Horowitz, S. H. (2014). *The State of Learning Disabilities: Facts, Trends and Emerging Issues.* National Center for Learning Disabilities. https://www.ncld.org/wp-content/uploads/2014/11/2014-State-of-LD.pdf

Cortina, L. M. (2005). Recursive models. *Encyclopedia of Statistics in Behavioral Science, 4*, 1722-1723. https://doi.org/10.1002/0470013192.bsa54

Cox, B. E., Mintz, A., Locks, T., Thompson, K., Anderson, A., Morgan, L., Edelstein, J. & Wolz, A. (2015). Academic experiences for college students with autism: Identity, disclosure, and accommodations. *Journal of College Student Development*. https://doi.org/10.1.1.725.9811

Cox, B. E., Thompson, K., Anderson, A., Mintz, A., Locks, T., Morgan, L., Edelstein, J. & Wolz, A. (2017). College experiences for students with autism spectrum disorder: Personal identity, public disclosure, and institutional support. *Journal of College Student Development*, *58*(1), 71-87. https://doi.org/10.1353/csd.2017.0004

DaDeppo, L. M. (2009). Integration factors related to the academic success and intent to persist of college students with learning disabilities. *Learning Disabilities Research & Practice, 24*(3), 122-131. https://doi.org/10.1111/j.1540-5826.2009.00286.x

Deci, E. L., & Ryan, R. M. (2002). Overview of self-determination theory: An organismic dialectical perspective. In E. L. Deci, R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3-33). University of Rochester Press.

Deci, E. L., & Ryan, R. M. (2012). Motivation, personality, and development within embedded social contexts: An overview of self-determination theory. In R. M. Ryan (Ed.), *Oxford handbook of human motivation* (pp. 85-107). Oxford University Press.

Deci, E. L., & Ryan, R. M. (2014). Autonomy and need satisfaction in close relationships: Relationships motivation theory. In N. Weinstein (Ed.) *Human motivation and interpersonal relationships* (pp. 53-73). Springer.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, *26*(3-4), 325-346. https://doi.org/10.1080/00461520.1991.9653137

Demetriou, C., & Schmitz-Sciborski, A. (2011). Integration, motivation, strengths and optimism: Retention theories past, present and future. In *Proceedings of the 7th National Symposium on student retention* (pp. 300-312). https://pdfs.semanticscholar.org/909d/94498abfe9d8606994c319509f43ac6b06fa.pdf

Denhart, H. (2008). Deconstructing barriers: Perceptions of students labeled with learning disabilities in higher education. Journal of Learning Disabilities, 41, 483-497.

Dolbier, C. L., Webster, J. A., McCalister, K. T., Mallon, M. W., & Steinhardt, M. A. (2005). *Reliability and validity of a single-item measure of job satisfaction*. American Journal of Health Promotion, *19*(3), 194-198.

DuPaul, G. J., Pinho, T. D., Pollack, B. L., Gormley, M. J., & Laracy, S. D. (2017). First-year college students with ADHD and/or LD: differences in engagement, positive core self-evaluation, school preparation, and college expectations. *Journal of Learning Disabilities, 50*(3), 238-251. https://doi.org/10.1177/0022219415617164

Eckes, S. E., & Ochoa, T. A. (2005). Students with disabilities: Transitioning from high school to higher education. *American Secondary Education*, *33*(3), 6-20. https://doi.org/142.104.201.65

Elliott, K. M., & Healy, M. A. (2001). Key factors influencing student satisfaction related to

    recruitment and retention. *Journal of marketing for higher education*, *10*(4), 1-11.

    https://doi.org/10.1300/J050v10n04_01

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). Psychosocial

    factors and community college student success: A meta-analytic investigation. *Review of*

    Educational Research, *87*(2), 388-424. https://doi.org/10.3102/0034654316653479

Frank, K., Frenette, M., & Morissette, R. (2015). *Labour Market Outcomes of Young*

    Postsecondary Graduates, 2005 to 2012. Statistics Canada.

    http://www.statcan.gc.ca/pub/11-626-x/11-626-x2015050-eng.pdf

Freeman, (2009, September 20). 1 in 6 first-year university students won't make the grade. The

    Star. https://www.thestar.com/news/canada/2009/09/20/1_in_6_firstyear_

    university_ students_wont_make_the_grade.html

Fuller, M. B., Wilson, M. A., & Tobin, R. M. (2011). The national survey of student engagement

    as a predictor of undergraduate GPA: a cross-sectional and longitudinal examination.

    Assessment & Evaluation in Higher Education, *36*(6), 735-748.

    https://doi.org/10.1080/02602938.2010.488791

Garson, G. (2008). *Path analysis Lecture Notes*.

    https://www.scribd.com/document/323656506/Garson-2008-PathAnalysis-pdf

Goegan, L. D. & Daniels L. M. (2019). Academic Success for Students in Postsecondary

    Education: The Role of Student Characteristics and Experiences. *Journal of College*

    Student Retention: Research, Theory & Practice.

    https://doi.org/10.1177/1521025119866689

Goegan, L. D. & Daniels L. M. (2020). Students with LD at Postsecondary: Supporting Success

and The Role of Student Characteristics and Integration. *Learning Disabilities Research*

& Practice, 35(1), 45-56. https://doi.org/10.1111/ldrp.12212

Goegan, L. D., & Harrison, G. L. (2017). The Effects of Extended Time on Writing

Performance. *Learning Disabilities: A Contemporary Journal*, 15(2), 209-224.

https://files.eric.ed.gov/fulltext/EJ1160642.pdf

Goegan, L. D., Radil, A. I. & Daniels L. M. (2018). Accessibility in Research Design:

Integrating Universal Design to Increase the Participation of Individuals with Learning

Disabilities. *Learning Disabilities: A Contemporary Journal*, *16*(2), 177-190.

https://files.eric.ed.gov/fulltext/EJ1194555.pdf

Graham, S. & Taylor, A. Z. (2016). Attribution theory and motivation in school. In K. R.

Wentzel & D. B. Miele (Eds.), *Handbook of motivation at school* (pp. 11-33). Routledge.

Grayson, J. P. (2004). The Relationship Between Grades and Academic Program Satisfaction

Over Four Years of Study. *Canadian Journal of Higher Education*, *34*(2), 1-34.

Gregg, N., Bandalos, D. L., Coleman, C., Davis, J. M., Robinson, K. & Blake, J. (2008). The

validity of a battery of phonemic and orthographic awareness tasks for adults with and

without dyslexia and attention deficit/hyperactivity disorder. *Remedial and Special*

Education, *29*(3), 175-190. https://doi.org/10.1177/0741932508315951

Gregg, N., & Scott, S. S. (2000). Definition and documentation: Theory, measurement, and the

courts. *Journal of Learning Disabilities*, *32*(4), 5-13.

https://doi.org/10.1177/002221940003300104

Guiffrida, D. A., Lynch, M. F., Wall, A. F., & Abel, D. S. (2013). Do reasons for attending

college affect academic outcomes?: A test of a motivational model from a self-

determination theory perspective. *Journal of College Student Development*, 54(2), 121-

139. https://doi.org/10.1353/csd.2013.0019

Hareli, S. (2014). Making sense of the social world and influencing it by using a naïve attribution

theory of emotions. *Emotion Review*, 6(4), 336-343.

https://doi.org/10.1177/1754073914534501

Hatcher, J., Snowling, M. J., & Griffiths, Y. M. (2002). Cognitive assessment of dyslexic

students in higher education. *British Journal of Educational Psychology, 72*, 119-133.

https://doi.org/10.1348/000709902158801

Hen, M., & Goroshit, M. (2012). Academic procrastination, emotional intelligence, academic

self-efficacy, and GPA: A comparison between Students with and without learning

disabilities. *Journal of Learning Disabilities*, 47(2), 116-124.

https://doi.org/10.1177/0022219412439325

Higher Education Research Institute (2019). *Mission*. https://heri.ucla.edu/mission/

House, J. D. (2002). The independent effects of student characteristics and instructional activities

on achievement: An application of the input-environment-outcome assessment

model. *International Journal of Instructional Media*, 29(2), 225.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:

Conventional criteria versus new alternatives. Structural Equation Modeling, 6(1), 1-55.

https://doi.org/10.1080/10705519909540118

Ishitani, T. T. (2016). Time-varying effects of academic and social integration on student

persistence for first and second years in college: National data approach. *Journal of

College Student Retention: Research, Theory & Practice*, 18(3), 263-286.

https://doi.org/10.1177/1521025115622781

Jennings, N., Lovett, S., Coba, L., Swingle, L. & Lindkvist, H. (2013). "What would make this a successful year for you?" How students define success in college. Liberal Education, 99(2). p. 1-11. http://repository.wellesley.edu/scholarship/3/

Jones, W. A. (2010). The impact of social integration on subsequent institutional commitment conditional on gender. *Research in Higher Education*, 51(7), 687-700. https://doi.org/10.1007/s11162-010-9172-5

Jorgensen, S., Fichten, C. S., Havel, A., Lamb, D., James, C., & Barile, M. (2005). Academic Performance of College Students with and without Disabilities: An Archival Study. *Canadian Journal of Counselling*, *39*(2), 101-117.

Kaplan, A. (2016, August). *Research on Motivation and Achievement: Infatuation with Constructs and Losing Sight of the Phenomenon*. Paper presented at the biennial meeting of the International Conference on Motivation, Thessaloniki, Greece.

Kemp, N., Parrila, R. K. & Kirby, J. R. (2008). Phonological and orthographic spelling in high-functioning adult dyslexics. *Dyslexia*, 15, 105-128. https://doi.org/10.1002/dys.364

Keup, J. R. (2006). Promoting new-student success: Assessing academic development and achievement among first-year students. *New Directions for Student Services*, *2006*(114), 27-46. https://doi.org/10.1002/ss.205

Kline, R. B. (2016). *Principles and Practice of Structural Equation Modeling: Fourth Edition*. The Guilford Press.

Kline, R. B. (2011). Principles and practice of structural equation modeling. Guilford.

Krumrei-Mancuso, E. J., Newton, F. B., Kim, E., & Wilcox, D. (2013). Psychosocial factors predicting first-year college student success. *Journal of College Student Development*, *54*(3), 247-266. https://doi.org/10.1353/csd.2013.0034

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects

of student engagement on first-year college grades and persistence. *Journal of Higher*

Education, *79*(5), 540-563. https://doi.org/10.1080/00221546.2008.11772116

Kurth, N., & Mellard, D. (2006). Student Perceptions of the Accommodation Process in

Postsecondary Education. *Journal of Postsecondary Education and Disability*, *19*(1), 71-

84. http://files.eric.ed.gov/fulltext/EJ844625.pdf

Learning Disabilities Association of Canada (LDAC; 2015, March). *Official Definition of*

Learning Disabilities. http://www.ldac-acta.ca/learn-more/ld-defined/official-definition-

of-learning-disabilities.

Learning Disabilities of Canada, Putting a Canadian Face on Learning Disabilities (LDAC,

PACFOLD; 2007). *Executive Summary of Putting a Canadian Face on Learning*

Disabilities Study (PACFOLD).

http://pacfold.ca/download/WhatIs/en/executiveSummary.pdf

Lent, R. W., Singley, D., Sheu, H. B., Schmidt, J. A., & Schmidt, L. C. (2007). Relation of

social-cognitive factors to academic satisfaction in engineering students. *Journal of*

Career Assessment, *15*(1), 87-97. https://doi.org/10.1177/1069072706294518

Lindstrom, J. H. (2007) Determining appropriate accommodations for postsecondary students

with reading and written expression disorders. *Learning Disabilities Research &*

Practice, *22*(4), 229-236. https://doi.org/10.1111/j.1540-5826.2007.00251.x

Little, T. D. (1997). Mean and covariance structures (MACS) analyses of cross-cultural data:

Practical and theoretical issues. *Multivariate Behavioral Research, 32*, 53-76.

https://doi.org/10.1207/s15327906mbr3201 3

Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning

     environment and academic outcomes: implications for theory and practice. *Studies in*

     Higher education, *27*(1), 27-52. https://doi.org/10.1080/03075070120099359

Lounsbury, J. W., Fisher, L. A., Levy, J. J., & Welsh, D. P. (2009). An investigation of character

     strengths in relation to the academic success of college students. *Individual Differences*

     Research, 7, 52-69.

Mamiseishvili, K., & Koch, L. C. (2011). First-to-second-year persistence of students with

     disabilities in postsecondary institutions in the United States. *Rehabilitation Counseling*

     Bulletin, *54*(2), 93-105. https://doi.org/10.1177/0034355210382580

Marshall, S., Zhou, M., Gervan, T., & Wiebe, S. (2012). Sense of belonging and first-year

     academic literacy. *Canadian Journal of Higher Education*, *43*(3), 116-142.

     https://files.eric.ed.gov/fulltext/EJ1002139.pdf

May, A. L., & Stone, C. A. (2010). Stereotypes of individuals with learning disabilities: Views

     of college students with and without learning disabilities. *Journal of learning*

     disabilities, *43*(6), 483-499.

McDonald, R. P., & Ho, M. H. R. (2002). Principles and practice in reporting structural equation

     analyses. *Psychological methods*, 7(1), 64-82. https://doi.org/10.1037//1082-989X.7.1.64

McGregor, K. K., Langenfeld, N., Van Horne, S., Oleson, J., Anson, M., & Jacobson, W. (2016).

     The university experiences of students with learning disabilities. *Learning Disabilities*

     Research & Practice, *31*(2), 90-102. https://doi.org/10.1111/ldrp.12102

Meeuwisse, M., Severiens, S. E., & Born, M. P. (2010). Learning environment, interaction, sense

     of belonging and study success in ethnically diverse student groups. *Research in Higher*

     Education, *51*(6), 528-545. https://doi.org/10.1007/s11162-010-9168-1

Miller, A. C. S. (2019). *Training for the Future: College Student Employee Persistence through Engagement and Development* (Doctoral dissertation). University of La Verne, La Verne, California.

Morin, A. (2017). *Toward a glossary of self-related terms*. *Frontiers in Psychology, 8*, 1-9. https://doi.org/10.3389/fpsyg.2017.00280

National Center for Educational Statistics (2019). *Fast Facts: Back to School Statistics*. https://nces.ed.gov/fastfacts/display.asp?id=372#College_enrollment

National Education Association of Disabled Students (2018). *Landscape of Accessibility and Accommodation in Post-Secondary Education for Students with Disabilities*. https://www.neads.ca/en/about/media/.

Newman, L. A., & Madaus, J. W. (2015). Reported accommodations and supports provided to secondary and postsecondary students with disabilities: National perspective. *Career Development and Transition for Exceptional Individuals*, *38*(3), 173-181. https://doi.org/10.1177/2165143413518235

Osters, S. & Roberts, D. (2007). Academic success - How do students define it? Presentation at the Southern Association for College Student Affairs (SACSA)/ National Association of Student Personnel Administrators (NASPA) Region III/ Texas Association of College & University Student Personnel Association (TACUSPA) Joint Student Affairs Conference, Dallas, Texas

Pingry O'Neill, L. N., Markward, M. J., & French, J. P. (2012). Predictors of graduation among college students with disabilities. *Journal of Postsecondary Education and Disability*, *25*(1), 21-36. https://files.eric.ed.gov/fulltext/EJ970017.pdf

Pritchard, M. E., & Wilson, G. S. (2003). Using emotional and social factors to predict student

    success. Journal of college student development, 44(1), 18-28.

    https://doi.org/10.1353/csd.2003.0008

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting:

    The state of the art and future directions for psychological research. *Developmental*

    Review, *41*, 71-90. https://doi.org/10.1016/j.dr.2016.06.004

Reed, M. J., Kennett, D. J., & Emond, M. (2015). The influence of reasons for attending

    university on university experience: A comparison between students with and without

    disabilities. *Active Learning in Higher Education*, *16*(3), 225-236.

    https://doi.org/10.1177/1469787415589626

Ribera, A. K., Miller, A. L., & Dumford, A. D. (2017). Sense of Peer Belonging and Institutional

    Acceptance in the First Year: The role of high-impact practices. *Journal of College*

    Student Development, 58(4), 545-563. https://doi.org/10.1353/csd.2017.0042

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university

    students' academic performance: A systematic review and meta-analysis. *Psychological*

    Bulletin, 138(2), 353. https://doi.org/10.1037/a0026838.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do

    psychosocial and study skill factors predict college outcomes? A meta-analysis.

    Psychological Bulletin, 130(2), 261-288. https://doi.org/10.1037/0033-2909.130.2.261

Rosenberg McKay, D. (2019, March 11). Top Skills You Need to Compete in Today's

    Workplace. https://www.thebalancecareers.com/what-skills-do-you-need-to-compete-in-

    today-s-workplace-526255

Rudolph, U., & Tscharaktschiew, N. (2014). An attributional analysis of moral emotions: Naïve scientists and everyday judges. *Emotion Review*, *6*(4), 344-352. https://doi.org/10.1177/1754073914534507

Ryan, R. M., & Deci, E. L. (2000a). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78. https://doi.org/10.1037110003-066X.55.1.68

Sam, R., Souriyavongsa, T., Zain, A. N. M., Jamil, H., Wu, X., & Sovath, S. (2013). Conceptualizing Institutional Policies for Students' Academic Success in Cambodian Universities: What Matters for Policy?. *Asian Social Science*, *9*(10), 283-294.

Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological Bulletin*, 143(6), 565-600. https://doi.org/10.1037/bul0000098

Schumacker, R. E., & Lomax, R. G. (2004). A beginner's guide to structural equation modeling. Lawrence Erlbaum Associates.

Smith, S. G., English, R., & Vasek, D. (2002). Student and parent involvement in the transition process for college freshmen with learning disabilities. *College Student Journal*, *36*(4), 491-504.

Strang, T. (2015). *Defining Success in a College Course.* https://blog.cengage.com/defining-success-college-course/

Strayhorn, T. L. (2012). Satisfaction and retention among African American men at two-year community colleges. *Community College Journal of Research and Practice*, *36*(5), 358-375. https://doi.org/10.1080/10668920902782508

Stricker, L. J., Rock, D. A., Burton, N. W., Muraki, E., & Jirele, T. J. (1992). Adjusting college

      grade-point average for variations in grading standards. *ETS Research Report Series*, (2).

Svanum, S., & Aigner, C. (2011). The influences of course effort, mastery and performance

      goals, grade expectancies, and earned course grades on student ratings of course

      satisfaction. *British Journal of Educational Psychology*, *81*(4), 667-679.

U.S. Department of Education (2017). *Table 303.70. Total undergraduate fall enrollment in*

      degree-granting postsecondary institutions, by attendance status, sex of student, and

      control and level of institution: Selected years, 1970 through 2026.

      https://nces.ed.gov/programs/digest/d16/tables/dt16_303.70.asp

Thurmond, V. A., & Popkess-Vawter, S. (2003). Examination of a middle range theory:

      Applying Astin's input-environment-outcome (IEO) model to web-based

      education. *Online Journal of Nursing Informatics*, *7*(2).

Thurmond, V. A., Wambach, K., Connors, H. R., & Frey, B. B. (2002). Evaluation of student

      satisfaction: Determining the impact of a web-based environment by controlling for

      student characteristics. *The American journal of distance education*, *16*(3), 169-190.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent

      research. *Review of educational research*, *45*(1), 89-125.

      https://doi.org/10.3102/00346543045001089

Tinto, V. (1999). Taking retention seriously: Rethinking the first year of college. NACADA

      journal, 19(2), 5-9. https://www.nacadajournal.org/doi/pdf/10.12930/0271-9517-19.2.5

Tinto, V. (2006). Research and practice of student retention: What next? *Journal of College*

      Student Retention: Research, Theory & Practice, *8*(1), 1-19.

      https://doi.org/10.2190/4YNU-4TMB-22DJ-AN4W

Trainin, G. & Swanson, H. L. (2005). Cognition, metacognition, and achievement of college

    students with learning disabilities. *Learning Disabilities Quarterly*, *28*(4), 261-272.

    http://www.jstor.org/stable/4126965

Trzesniewski, K. H., Donnellan, M., & Lucas, R. E. (2011). *Secondary data analysis: An*

    introduction for psychologists. American Psychological Association

Van Horne, S., Lin, S., Anson, M., & Jacobson, W. (2018). Engagement, satisfaction, and

    belonging of international undergraduates at US research universities. *Journal of*

    International Students, *8*(1), 351-374. https://doi.org/10.5281/zenodo.1134313

Weiner, B. (1985). An attributional theory of achievement motivation and

    emotion. *Psychological Review*, *92*(4), 548-573. https://doi.org/0033-295X/85/S00.75

Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attribution

    perspective. *Educational Psychology Review, 12*(1), 1-14. https://doi.org/10.1007/978-1-

    4615-1273-8_2

Weiner, B. (2010). The development of an attribution-based theory of motivation: A history of

    ideas. *Educational Psychologist*, *45*(1), 28-36.

    https://doi.org/10.1080/00461520903433596

Weiner, B. (2014). The attribution approach to emotion and motivation: History, hypotheses,

    home runs, headaches/heartaches. *Emotion Review*, *6*(4), 353-361.

    https://doi.org/10.1177/1754073914534502

Willingham, W. W., Pollack, J. M., & Lewis, C. (2002). Grades and test scores: Accounting for

    observed differences. *Journal of Educational Measurement*, *39*(1), 1-37.

    https://doi.org/10.1111/j.1745-3984.2002.tb01133.x

Woosley, S.A. (2003). How important are the first few weeks of college? The long term effects

    of initial college experiences. College Student Journal, 37(2), 201-207.

Yazedjian, A., Toews, M. L., Sevin, T., & Purswell, K. E. (2008). " It's a Whole New World": A

    Qualitative Exploration of College Students' Definitions of and Strategies for College

    Success. *Journal of College Student Development*, *49*(2), 141-154.

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success.

    Practical Assessment, Research & Evaluation, *20*(5), 1-20.

    http://www.pareonline.net/getvn.asp?v=20&n=5

Zedeck, S. (Ed.). (2014). *APA dictionary of statistics and research methods*. American

    Psychological Association.

Zepke, N., & Leach, L. (2010). Beyond hard outcomes: 'soft' outcomes and engagement as

    student success. *Teaching in Higher Education*, *15*(6), 661-673.

    https://doi.org/10.1080/13562517.2010.522084