

VALIDATING THE *MINDSET* SCALE FOR USE WITH INTERNATIONAL STUDENTS  
ATTENDING COLLEGE IN THE UNITED STATES

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**Title**

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The Supervisory Committee certifies that this *disquisition* complies with North Dakota  
State University's regulations and meets the accepted standards for the degree of

**DOCTOR OF PHILOSOPHY**

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## ABSTRACT

Institutions of higher education continue to try and find new ways to help students persist in college (Kinzie & Kuh, 2017). One compelling tool to help students succeed comes from Dweck's (1999) *Mindset* model. The model depicts intelligence as either *fixed* or *growth*; meaning intelligence can be viewed as unchangeable or malleable. Students with a *growth mindset* recover from failure quicker, overcome challenges faster, and see difficulty as a positive challenge instead of questioning their intelligence. With the many challenges domestic students face persisting in college, international students studying abroad face additional factors inhibiting their motivation and ability to succeed. The primary purpose of this study was to determine whether Dweck's (1999) 8-item *Mindset* sub-scale could be valid with international students studying within the United States. A multiple-sample confirmatory factor analysis using maximum likelihood estimation was used to assess measurement invariance with domestic ( $n = 1809$ ) and international ( $n = 275$ ) students at a large-midwestern university. The secondary purpose was to determine whether GPA, gender, year-in-school, English language proficiency, and first-generation status impacted international student *mindset* scores. A seemingly unrelated regression was used to determine if there were any differences in the sub-group population of international students ( $n = 268$ ). Results indicated Dweck's (1999) *Mindset* Scale is valid for use with international students studying within the U.S. and significant differences were found in the *mindset* scores within gender, academic rank, age, and first-generation status. The results of this study inform the literature and institutions of higher education on how Dweck's (1999) *mindset* model can be used as another tool to help international students succeed in college. Future research implications were shared and discussed.

## ACKNOWLEDGEMENTS

First and foremost, I thank God for helping me through this process. I hope at least part of this work will help glorify His name. I also wish to thoroughly acknowledge that there were many individuals who helped me complete this process. This has been a long and arduous journey with many challenges, changes, pitfalls, and opportunities. Everyone including my family, former co-workers and faculty at NDSU, and the students who participated in many of the leadership programs I helped facilitate contributed to this success. In the end, I would not have had the opportunity without the tenacity, support, and love of my mother who never had the opportunities she gave me as a single, low SES, non-college educated, veteran, mother of three.

This journey started with the goal to find answers for students who struggled in college; much like I did. Whatever challenges that inhibit their beliefs about what they can accomplish or who they can become, I hope this paper will help them discover their true capabilities. No matter who you are, where you come from, I see you. You matter. You will find a way.

I wish to thank my dissertation committee Dr. Chris Ray (chair), Dr. Brent Hill, Dr. Linda Manikowske, and Dr. William Burns for their support of my journey, answering questions, and for helping to further develop my own *growth mindset* in completing this dissertation.

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Finally, I couldn't have done this without all the extra help from Al Bernardo (NDSU Social Sciences Librarian), Dr. Jennifer Suchan and Johnathan Compton (ISU Registrar's Office) for helping me acquire student emails, and Trent and Dana Duda for letting me use their spare house in Fargo as I completed this paper.

## DEDICATION

I dedicate this dissertation to my loving wife, Collette Winfrey. She put up with the countless nights of attending classes, reading, writing and research. I know there were many sacrifices made in order for me to finish this paper. I would also like to dedicate this to my two amazing daughters Amelia and Scarlett Winfrey for their understanding of why Dad always seemed to be working on his paper. I know you both have a *growth mindset*, and you use it every day to overcome bullies, difficult classes, challenging teachers, and even succeed in volleyball! Don't ever think I wasn't thinking about all of you while I was writing this paper. I was working hard because you inspired me to be a better man and father. I love you all! Dad.

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## CHAPTER 1. INTRODUCTION

In 2018, over 176 billion dollars were spent by states financing institutions of higher education, including scholarships, faculty/staff salaries, programs, services, and infrastructure (SHEEO, 2018). According to Horn and Dunagan (2018), the federal government spent over 100 billion dollars on providing student loans and grants. Though research is scarce on exact figures, higher education institutions rely heavily on revenue derived from tuition, student fees and fundraising dollars. Though each college spends its monies according to their own priorities, a portion of these dollars is spent on enhancing academic success, student engagement, and graduation rates; which are considered measures of student success in higher education. With the growing pressure on higher education institutions to prove their effectiveness, determining the elements of what constitutes student success is one of the most complicated and researched issues within the literature today (Kinzie & Kuh, 2017; Tinto, 1993).

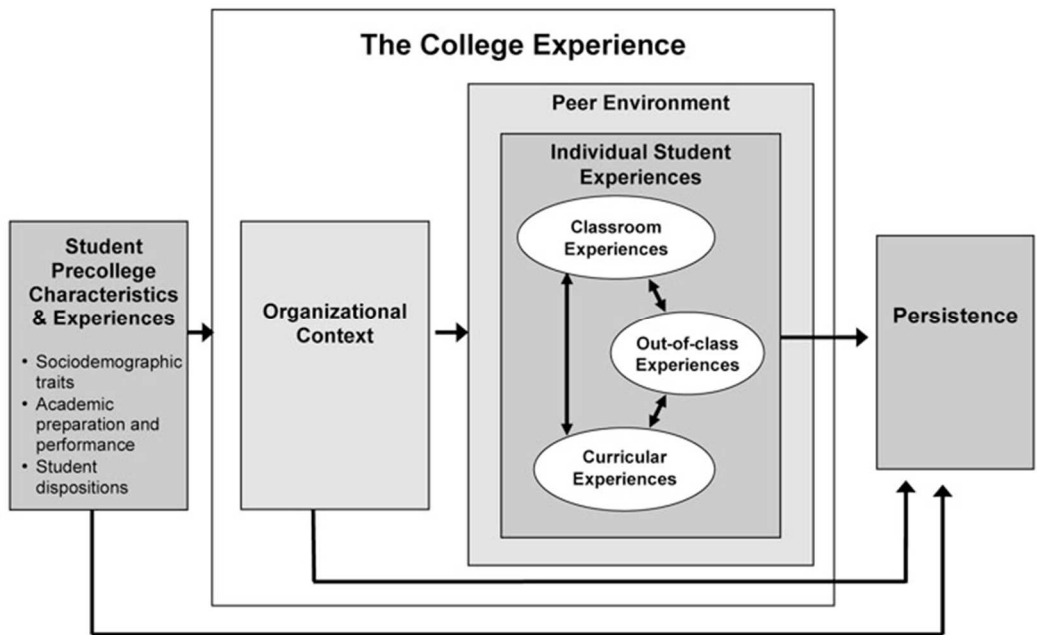
As early as 1962, researchers began studying the reasons students drop out of college (Summerskil, 1962). The literature points out that retention and persistence are two of the essential measures of student success (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006; Millea, Wills, Elder, & Molina, 2018). For many years, researchers have been trying to determine what factors retain students and supports their persistence. Over the past sixty years, research has revealed several clues related to student success in relation to student characteristics such as high school grade point average, high school academic preparation, class rank, socio-economic status, academic disposition, social disposition, first-generation status, and ethnicity (e.g., Gonzales 1996; Harvey 2001; Kuh et al., 2006, Pascarella & Terenzini, 2005; Swail, 2003; Tinto, 2006). Further research focused on what role colleges played in helping students succeed which included student satisfaction (Astin, 1993), engagement (Tinto, 2006), feeling affirmed (Kuh,

Kinzie, Schuh, & Whitt, 2011), connections with other students (Kuh, 1993), and faculty-student interactions (Pascarella & Terenzini, 2005) as potential indicators of student success (Kuh et al., 2006).

To summarize and understand the interaction of these factors, Reason (2009) developed a model of understanding student success through the various factors that impact student persistence. The goal of his model was to help universities examine student success and persistence by understanding how various factors contributed to student success and to develop strategies and methodologies in relation to the intersection of these factors. Figure 1 shows the four components of Reason’s (2009) model which includes: student pre-college characteristics, organizational context, peer environment, and individual student experiences (Terenzini & Reason, 2005).

**Figure 1**

*Model of Student Persistence (Reason, 2009)*



As a comprehensive model based in theory, Reason's (2009) work outlined the many challenges colleges and universities contend with in order to enhance student success. The challenges purported by Reason's (2009) model was developing effective strategies and methodologies based in theory as well as analyzing the intersection of the various factors, versus individual factors, in order to better understand how to enhance student success (DeAngelo, Franke, Hurtado, Pryor, & Tran, 2011). As Reason (2009) purported in his model, student pre-college characteristics included such elements as socioeconomics, ethnicity, first-generation status, preparation for college, and mental preparedness for college. Students are sometimes ill-prepared academically or mentally to face the increased academic difficulties associated with college and can struggle to persist to graduation (Kuh et al., 2006). From the perspective of students entering college, students not only worry about their academic preparedness, GPA, and their ability to graduate, but also attend a quality college, having competent professors, ability to attend graduate or professional school, and acquire a job within their field of study (Kuh, Kinzie, Schuh, & Whitt, 2011). The cost to attend college adds additional pressure on a student's ability to persist. For many students, finding a part-time job in college is inevitable. Thus, working a part-time job can divert time away from studying, developing interpersonal skills, and engaging in co-curricular learning activities which can positively impact persistence rates (Choy, 1999; Johnstone, 2005). Unfortunately, even if students are fortunate enough to overcome financial challenges, the chances of graduating within four years is less than 40% (Carey, 2004).

With as much research that exists on the factors that impact student success in college, universities within the U.S. continue to struggle to find the right formula to ensure students matriculate (Carey, 2005). Each college has their own complex organization, unique institutional factors, competition for resources, priorities, and funding challenges. This unique set of factors

inhibits a “one size fits all model.” The challenge widens as colleges struggle to understand the added challenges facing another important student population, international students (e.g., York, Gibson, & Rankin, 2015; Kuh et al., 2006; Pascarella & Terenzini, 2005; Tinto, 2006).

Unfortunately, there appears to be a lack of research on how to best aid international students attending U.S. colleges as research seemingly focuses more on the challenges of international students versus how to help them succeed (Andrade, 2006).

In 2018, over one million international students chose to attend college within the United States (Institute of International Education, 2018). Karaman (2016) found that international students in the United States make up about 42% of undergraduate degrees and 37% of graduate degrees. The highest number of students, in 2018, came from China, India, South Korea, Saudi Arabia, Canada, and Vietnam (Fox, 2019). International students attend college within the U.S. to learn about new cultures, learn a new language, find a higher quality of education, learn the impact of globalization, develop academic and socio-cultural skills, increase career marketability, and to earn a higher wage (Pinheiro, 2001). The challenges facing international students trying to attend college in the United States often include a lack of finances, difficulties acquiring visas, and determining how and where to earn money while attending college due to work restrictions (Andrade, 2006). Unfortunately, if an international student is resourceful enough to attend college in the U.S., academic and personal success is not as easy as international students would hope. Ward, Bochner, and Furnham (2001) reported countless studies on international students struggling to adapt to the U.S. culture, differences in academic structure, as well as dealing with feelings of isolation, homesickness, and depression. The struggles to transition to a U.S. college often times negatively impact international student success (Schulte & Choudaha, 2014; Zhai, 2002). Adding to the stress, international students

must also contend with language differences (McLachlan & Justice, 2009; Zhai, 2002), cultural differences (Schulte & Choudaha, 2014), integrating into campus life (Tinto, 2006), developing interpersonal relationships (Rajapaksa & Dundes, 2003; Zhai, 2002), and understanding U.S. educational differences (Olivas & Li, 2006). Unfortunately, research also shows that it is often incorrectly assumed that all international students are academically prepared to attend college (Andrade, 2006). A study of 1600 prospective international students, from 115 different countries, found that nearly half of the respondents were classified as having low academic preparedness from high school and inhibited students' ability to persist in college (Choudaha, Orosz, & Chang, 2012). Thus, if instructors assume international students are already academically prepared, students may not receive the attention and guidance necessary to succeed academically.

According to the Institute of International Education (2018), a downward trend exists in international student enrollment within the United States. Some of the factors impacting this trend include the current social and political climate in the United States, the post 9-11 increase in security obtaining foreign visas, slowing college aged populations in China, India, and South Korea; as well as competition from other countries such as China, Norway, Germany, and Australia. In spite of these issues, international students are still drawn to study in the United States more than any other country (Institute of International Education, 2018).

Institutions within the United States recruit international students to diversify their student populations, understand global concepts, and enhance their own students' knowledge of global diversity. Unfortunately, research by Rajapaksa and Dundes' (2003) posited that most universities within the U.S. struggle to understand the cultural, social, political, and socio-economic backgrounds of international students. This misunderstanding can negatively impact

international student's personal and academic success (Pinheiro, 2001). Many colleges attempt to provide resources to help international students succeed such as providing international student orientation (Murphy, Hawkes, & Law, 2002), international student services offices (Schulte & Choudaha, 2014), English language programs (Andrade, 2006), counseling (Olivas & Li, 2006) and campus life activities (Tinto, 2006). However, a national year-long study by Schulte and Choudaha (2014) revealed that most universities lack the necessary support needed to increase international student success. In spite of adding almost 37 billion dollars in 2016-2017 to the U.S. economy, few empirical studies have focused on the how to help international students persist while studying in the U.S. (Andrade, 2006). Thus, research indicates that international students studying in the United States often struggle to get the help they need to succeed (Institute of International Education, 2018).

Previous research has shown that international students need additional support in order to adapt to their new environment (Heggins & Jackson, 2003). For example, Asian and Latin students rely heavily on developing social networks to overcome the stress of a new environment and they often lack students from their home country as a support network. Unfortunately, international students often do not seek formal help as they have difficulty trusting strangers (Heggins & Jackson, 2003). As international students try to find ways to cope or contend with a variety of challenges, the burden of helping them should be on the institution, as students usually do not understand how to help themselves or how the institution can help (Lee & Rice, 2003).

As Dykstra (2016) reported, students who do not know how to help themselves or where to find help are often hindered in their motivation to succeed. Dykstra (2016) also posited that international and domestic students often differ in their motivational strategies to succeed based on different cultural upbringing and variances in how students view instructors and the academic



environment. For example, some international students tend to see instructors through a formal lens and shy away from asking questions to avoid appearing to question the instructors' intelligence. If international students are left to determine conclusions on their own, some may question their own intelligence and negatively impact their motivation or ability to succeed (Dykstra, 2016).

Research on *Mindset* by Dweck, Chiu, and Hong (1995) may offer one option for institutions to help international students improve academic success and their ability to persist in college. Dweck, Chiu, and Hong (1995) suggested an individual's beliefs about intelligence described intelligence as either *fixed* or malleable and played a causal role in determining the motivational levels of students on their academic success while influencing learning. Their research further posited that intelligence lies on a continuum involving a *growth mindset* (incremental theory of intelligence) or a *fixed mindset* (entity theory of intelligence). Individuals with a *fixed mindset* believed that intelligence is static, and they tried to appear smart and avoided looking incompetent while sacrificing actual learning. In contrast, individuals who possess a *growth mindset* believe intelligence is malleable and can be improved through increased effort. *Growth mindset* individuals will sacrifice trying to appear smart and focus on learning (Dweck, 1999). Having a *growth mindset* not only applies to academic domains but can also be applied to other domains such as athletic ability, musical ability, or social skills. Thus, if international students can be taught how to enhance their *growth mindsets*, institutions could potentially help international students improve their overall success in college.

International students face many of the same challenges' students in the U.S. face when attempting to succeed in college. Unfortunately, they face added challenges as they attempt to

overcome language differences, academic structural differences, cultural norms, as well as a lack of familial and social support (Jackson, Ray, & Bybell, 2019).

As colleges in the U.S. continue to struggle to understand the issues facing international student persistence, more research and program development needs to be done in order to address these needs (e.g., York, Gibson, & Rankin, 2015; Kuh, et al., 2006; Pascarella & Terenzini, 2005; Tinto, 2006).

### **Statement of the Problem**

International students not only face similar challenges compared to domestic college students, but also experience added social, emotional, and psychological challenges that can impede their success (Jackson, Ray, & Bybell, 2019). Research indicates that international students often lack the full support and understanding of their institution and can sometimes experience loneliness, depression, isolation, and may struggle to persist (Schulte & Choudaha, 2014). Though many colleges provide many of the basic services to help international students succeed (Murphy, Hawkes, & Law, 2002), colleges still struggle to understand the full scope and depth of these challenges while lacking effective support systems, programs, and services to support international student success (Schulte & Choudaha, 2014). Though there exists an extensive amount of research on the challenges international students face while studying in the U.S., research is scarce on how colleges can help international students succeed (e.g., Andrade, 2006; York, Gibson, & Rankin, 2015; Kuh, et al., 2006; Pascarella & Terenzini, 2005; Tinto, 2006). As an example of this, research has supported Dweck's (2006) *Mindset* model as one tool to improve student success. Though the research has been validated and effectively used to aid domestic students in the U.S., the scale's validity for use with international students attending college within the U.S. is unknown.

### **Purpose of the Study**

The purpose of this study is to validate the *Mindset* scale (Dweck, 1999) for use with international college students studying within the U.S.

### **Research Questions**

To achieve the purpose of the study, the following questions will be explored:

1. Is Dweck's 8-item *Mindset* sub-scale (1999) valid for international college students studying in the United States?
2. Does GPA, age, first-generation status, English speaking skills, year-in-school, or gender have any impact on the use of Dweck's (1999) 8-item *Mindset* sub-scale with international college students studying within the U.S.?

### **Importance of the Study**

The results of this study will inform current and future research as to whether or not Dweck's (1999) *Mindset* scale is valid for use with international college students studying in the U.S. If the *Mindset* scale is valid for international students, future research can focus on *growth mindset* interventions that could possibly assist international students with overcoming issues such as poor motivation, lack of peer group support, culture shock, as well as improving overall coping strategies that could support academic success.

### **Definition of Terms**

For purpose of this research, an *international student* is defined as an individual who is enrolled in courses at a higher education institution in the U.S. on a temporary visa, and who is not an immigrant (permanent resident with an I-151 or "Green Card"), a U.S. citizen, an illegal alien (undocumented immigrant), or a refugee in the U.S. (Collins, 2019). The most useful and

globally relevant definition should focus on “non-immigrant or non-permanent resident” status (Kwai, 2010).

*Mindset* is an individual’s belief that intelligence is either *fixed* or can be malleable (Dweck, 2006). An individual with a *growth mindset* (incremental theory) believes that intelligence can be enhanced. Whereas, an individual with a *fixed mindset* (entity theory) sees intelligence as unchangeable.

*Student Success* is a composite of cognitive and non-cognitive (psychosocial variables). Cognitive variables include measures such as GPA, class rank, grades, and test scores. Non-cognitive variables include measures of conscientiousness, persistence, openness, extraversion, intrinsic motivation, academic motivation, academic self-efficacy, and having academic goals. For the purposes of this paper, student success also incorporates any measure that pertains to 1) academic achievement; 2) social adaptation; 3) student attainment; 4) institutional success; 5) personal success; and 6) post-graduation achievement.

### **Organization of the Dissertation**

This dissertation seeks to explore, review, and understand the issues facing international college students studying in the U.S., summarize what colleges currently do to enhance international student success, and provide one option to enhance international student success by validating Dweck’s (1999) *Mindset* scale for use with international students. A review of the literature is provided in chapter two which overviews the challenges in which institutions contend with to help students succeed personally and academically, definitions of student success, and the additional issues facing international students. Chapter two also provides the conceptual framework for the study grounded in Astin’s (1999) Input, Environment, Output model (IEO). Within Chapter three, a description of the multiple-sample confirmatory factor

analysis, maximum likelihood estimation estimator, and invariance methods used for the study is provided along with a description of the *Mindset* scale (Dweck, 1999), and the delimitations of the study. An analysis of the data, results, and answers to the study questions are provided in Chapter four. Within Chapter five, a summary of the findings, discussion, interpretation of the results, and future research and implications are discussed.

## CHAPTER 2. LITERATURE REVIEW

As research regarding student success for domestic college students continues to evolve, international students studying in the United States face additional challenges with little to no research to help improve their success (Andrade, 2006; Kwai, 2010). Unfortunately, colleges and universities often do not have the financial or human resources to develop programs and services to address these needs (Schulte & Choudaha, 2014). To help determine what can be done to help international students overcome their added challenges and provide helpful tools, this chapter will provide an overview of the major factors identified in the literature that might impact student success for domestic and international college students. The second portion of the chapter outlines the various issues that hinder success for international students studying within the U.S. The third and final section will outline the concept of *Mindset* (Dweck, 1999) and its potential use as a tool to aid international student success.

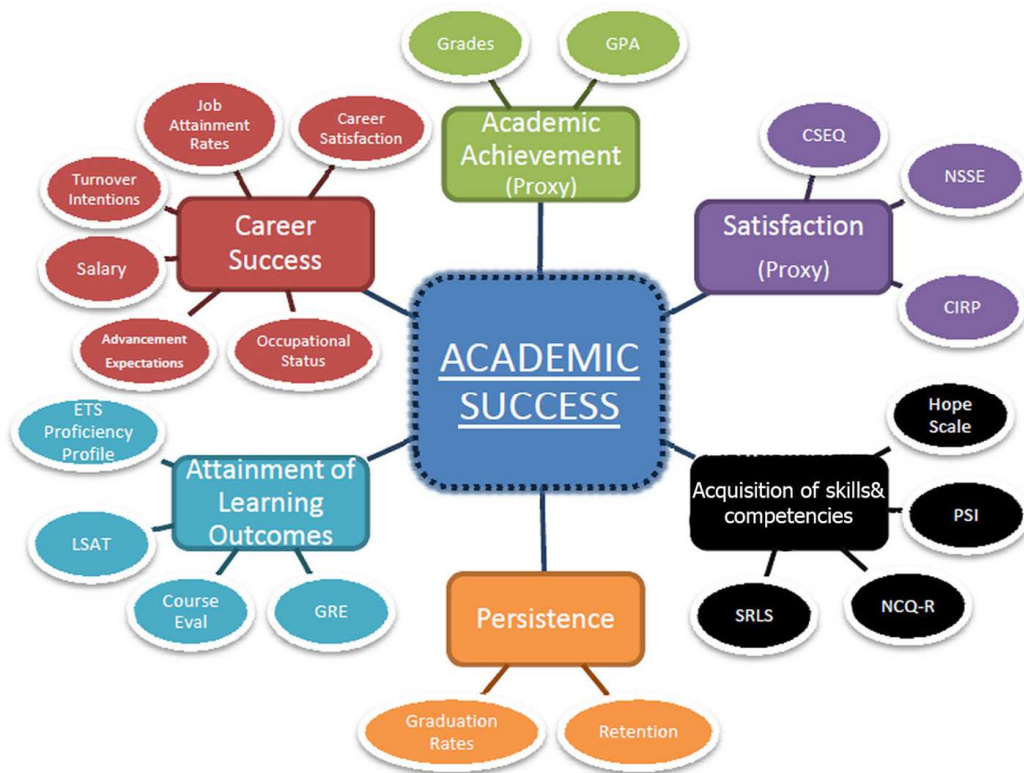
### Defining Student Success

The research regarding student success in college could be traced back to 1962 with research by Sumerskil (1962) who posited the question, “Why do students leave college?” Determining the essential factors that contribute to student success is difficult as a review of the literature seems to focus on individual elements that support student success rather than how the intersections of elements such as student characteristics, quality of the institution, and the academic and co-curricular environments impact success (Kuh et al., 2006; York, Gibson & Rankin, 2015). As there are many factors that contribute to student success, the literature does not conclusively define what colleges can do to ensure student success for large numbers of students regarding one or more measures of success (Association of Domestic Colleges and Universities, 2005; Pascarella & Terenzini, 2005). This might give direction to colleges and

researchers that student success must be, in-part, locally defined by universities in order to develop institutionally relevant models, strategies, and methodologies (York, Gibson, & Rankin, 2015). To help colleges define student success, models such as York et al's., (2015) posited student success as students' overall success in college, GPA, graduation, completion of courses, skills learned in each course, as well as persistence. Building upon the research of Kuh, Kinzie, Schuh, Whitt, and Associates (2010), and Astin (1991); York et al., (2015) summarized student success using an academic lens. York et al's., (2015) academic success model, as seen in figure 2 below, framed academic success as academic achievement, satisfaction, acquisition of skills and competencies, persistence, attainment of learning outcomes, and career success (See York et al., 2015, for a complete description of the figure). Tinto (2006) focused more on the level of student involvement outside of the classroom as well as how connected students were with other students and faculty. Getting involved sometimes meant improved social life, engagement in campus activities, and having a support network. Hence, colleges that supported orientation, first-year experience programs, and other early intervention programs, supported the notion that student success is also embedded in helping students build a network of relationships (Tinto, 2006). However, as Astin (1993) posited, student success is a combination of what attributes students bring to college, skills acquired in college, effective college engagement programs, and the success of the student post-graduation. Thus, Astin (1993), saw student success as a combination of factors and not a single factor.

**Figure 2**

*Model of Academic Success (York, Gibson, & Rankin, 2015)*



As per the research outlined above and with college campuses often needing to prove their effectiveness, additional research needs to be conducted to further define student success as well as how the intersection of the multitude of factors contribute to student success. As it is difficult to extrapolate an adequate definition of student success from the literature, for the purposes of this paper, student success is defined as any measure that pertains to 1) *academic achievement*; 2) *social adaptation*; 3) *student attainment*; 4) *institutional success*; 5) *personal success*; and 6) *post-graduation achievement*. The definition was developed using information derived from the Commissioned Report for the National Symposium on Postsecondary Student Success entitled, *What Matters to Student Success: A Review of the Literature* by Kuh, Kinzie, and Buckley (2006). Each of the six elements also falls within each of the major areas within the



I-E-O Model (Input-Environment-Output) developed by Astin (1993). The model provides a framework for assessing student characteristics, college environments, and the results of attending college in order to better define where student success is derived.

Using the definition of student success outlined in the previous section, research on student success for domestic college students follows. Research on student success has been a major concern for colleges within the U.S. for many years (Ting, 2001). With a lack of research to support the effectiveness of colleges, state support for colleges has been on the decline and the value of higher education has increasingly been called into question. Unfortunately, the lack of financial support could further impair the potential impact colleges could have on student success (Reason, 2009). Though some research oversimplifies student success to focus mainly on *academic achievement*, it is regarded as the most important element of student success (Carini, Kuh, & Klein, 2006). *Academic achievement* measures include GPA (e.g., Carini, Kuh, & Klein, 2006, Kuh et al., 2006; Strauss & Volkwein, 2002), classroom test scores (Sawyer, 2007), cumulative credit hours attempted (Kuh et al., 2006), and standardized test scores (Komarraju, Ramsey, & Rinella, 2012; Mesidor & Sly, 2016; Pascarella & Terenzini, 2005). Academic success is probably the most important measure of success for domestic college students. However, academics is only one element contributing to success in college. According to Tinto (2006), forging new relationships and enjoying time off in-between classes is also part of the college experience. As students enter college, they enter into a new social microcosm and often rebuild their social support networks. Thus, *social adaptation*, another important element of student success, includes dealing with feelings of belonging (Baumeister & Leary, 1995; Baumeister & Sommer, 1997), seeking friendships for social interaction and avoiding loneliness (e.g., Chambliss, 2014; Crockett, Iturbide, Torres Stone, McGinley, Raffaelli, & Carlo, 2007;

Elkins, Braxton, & James, 2000), receiving support from friends and family (Friedlander, Reid, Shupak, & Cribbie, 2007) and decreasing homesickness (Astin, 1993; Pascarella & Terenzini, 2005). Research shows creating social networks or getting involved in a range of activities in college seems to improve students' ability to attain a degree (Tinto, 2006). *Student attainment* indicators for domestic college students refers to students achieving an academic or personal milestone, such as degree attainment (Kuncell & Hezlett, 2010; Venezia, Callan, Finney, Kirst, & Usdan, 2005). Other indicators include enrollment in college (Kuh et al., 2006), adjusting to varying levels of academic challenge (Karaman, 2016; Ramsay, Barker, & Jones, 1999), persistence from year to year (e.g., Bean & Eaton, 2001; Nora, Barlow, & Crisp, 2005); as well as measures more difficult to assess such as academic skills (e.g., Chemers, Hu, & Garcia, 2001; Lotkowski, Robbins, & Noeth, 2004; Zhao, Kuh, & Carini, 2005), study habits (Crede & Kuncel, 2008; Dollinger, Matyja, & Huber, 2007), and academic self-efficacy (e.g., Chemers, Hu, & Garcia, 2001; Kamenetz, 2015; Richardson, Abraham, & Bond, 2012). As Kuh et al., (2006) postulated, when students begin to learn such skills, student success can improve. Thus, students can begin to feel a sense of *personal success*. Personal success can provide a sense of accomplishment and satisfaction. *Personal success* may include improving writing skills, speaking in public, critical thinking, problem solving (Colbeck, Campbell, & Bjorklund, 2000; Kuh et al., 2006; Silva, 2009), and leadership (Hughes, & Jones, 2011; Kezar & Moriarty, 2000; Nguyen, 2016). Other measures of *personal success* may include self-awareness, confidence, social competence, and self-efficacy (e.g., Farkas, 2003; Garcia, 2016; Kuh et al., 2006). Related to personal success, are measures of *post-graduation achievement*. These measures generally include graduate school admission, completion of graduate school (Pascarella & Terenzini, 2005), acquiring employment, having a salary (Choy, 2001; Tym, McMillion, Barone, &

Webster, 2004) and developing a life-long learning philosophy (Kuh et al., 2006). As students begin to see the role of the institution as critical to student success during post-graduation, defining successful institutions is important. *Institutional success* can include educational practices such as those outlined by Chickering and Gamson (1987) which include: a) student and faculty contact; b) student cooperation; c) active learning; d) feedback; e) time on task; f) high expectations; and g) diversity of talents that are linked to increased learning, personal development and academic success (e.g., Chickering & Gamson, 1987; Pascarella & Terenzini, 2005).

Other important *institutional success* measures include campus climate regarding safety, diversity, and acceptance (e.g., Glass & Westmont, 2013; Kuh, Kinzie, Schuh, & Whitt, 2011); student satisfaction (e.g., Billups, 2008; Styron, 2010; Webber, Krylow, & Zhang, 2013); level of student engagement (e.g., Korobova 2012; Pascarella & Terenzini, 2005; Tinto, 2006), quality of instruction (e.g., Lee, 1997; Tomlinson, Brighton, Hertberg, Callahan, Moon, Brimijoin, & Reynolds, 2003; Wright, 2006), student-faculty interactions (Komarraju, Musulkin, & Bhattacharya, 2010; Lundberg & Schreiner, 2004) and the quality of the institution (e.g., Cabrera, & La Nasa, 2000; Koslowski, 2006; Kuh, 2001). Having a clear goal and definition of institutional success is critical for the various student populations of students who attend college, including international students. However, institutions must look at the combination of factors that come from the definition of student success previously outlined above, as it is incumbent on colleges and universities to develop a stronger understanding of student success for domestic and international students (Axelson & Flick, 2011; Carini, Kuh, & Klein, 2006; Strauss & Volkwein 2002; Tinto, 2006).

## Defining International Student Success

Like their domestic counterparts, international students tend to measure student success with a focus on academic achievement including GPA (e.g., Andrade, 2006; Kwai, 2009; Senyshyn, Warford, & Zhan, 2000), classroom test scores (Johnson, 1988; Stoyhoff, 1997), cumulative credit hours attempted (Kwai, 2009; Stoyhoff, 1997), as well as college admission test scores (Kuh et al., 2006; Mesidor & Sly, 2016; Pascarella & Terenzini, 2005). Unlike their domestic counterparts, a great deal of research on international students has less to do with academic success and more to do with *social adaptation* issues including overcoming language issues, adapting to a new culture, and even issues of racism (Korabova, 2012). *Social adaptation* for international students may include dealing with feelings of not belonging (Baumeister & Leary, 1995; Baumeister & Sommer, 1997), loneliness (Chen, Lee, & Stevenson, 1996), homesickness (Hendrickson, Rosen, & Aune, 2011; Rajapaksa & Dundes, 2003) developing relationships (e.g., Gareis, 2012; Schweitzer, Morson, & Mather, 2011; Trice, 2004; Williams & Johnson, 2010) and finding a support network (e.g., Crockett, Iturbide, Torres Stone, McGinley, Raffaelli, & Carlo, 2007; Williams & Johnson, 2010; Yeh & Inose, 2003). Many international students report that *social adaptation* issues are often more difficult to contend with than academic success issues due to the social complexities of another culture being more difficult to grasp and traverse while trying to adopt new social rules (e.g., Council for International Education, 2006; Gareis, 2012; Schweitzer, Morson, & Mather, 2011; Smith, 2016). International students often report a lack of meaningful contact with domestic students (Bradenburg & de Wit, 2011). Constantine and Sue's (2005) research supported this notion and postulated that international students tend to socialize more with students from their own countries or other international students due to the lack of meaningful relationships with students

from the U.S. Research by Korabova (2012) posited that this was often due to feeling judged, language difficulties, or misperceptions about their culture by domestic students. Receiving support from friends and family often helps overcome the lack of acceptance by domestic students (Chen, Mallinckrodt & Mobley, 2002) and reduces the stress of dealing with transitioning to a new culture (e.g., Crockett, Iturbide, Torres-Stone, McGinley, Raffaelli, & Carlo, 2007; Smith & Khawaja, 2011; Wang & Mallinckrodt, 2006; Zhao, Jindal-Snape, Topping, & Todman, 2008). Because of difficulties transitioning and adjusting to new environments, *personal success* for international students is highly important (Korabova, 2012). *Personal success* may include learning or developing skills such as writing or speaking in English (Andrade, 2006), leadership development (Leask, 2009; Nguyen, 2016), developing self-awareness, confidence, social competence, and having a sense of individual purpose (Anderson, Carmichael, Harper, & Huang, 2009; Kuh et al., 2006). Post-graduation achievement measures may include measures such as degree attainment (Barro, & Lee, 2001; Kuh et al., 2006; Nora, Barlow, & Crisp, 2005), graduate school admission (Kuh et al., 2006; Szelényi, 2006), and graduate or professional school completion (Kuh et al., 2006; Trice, 2003). Student attainment, is described as a form of achievement and can include college enrollment (Kuh et al., 2006), academic adjustment (Cho, 2017; Ramsay, Barker, & Jones, 1999; Karaman, 2016), persistence from year to year (e.g., Andrade, 2006; Bean & Eaton, 2001; Kwai, 2010, Nora, Barlow, & Crisp, 2005); degree attainment (Kuh et al., 2006; Venezi, Callan, Finney, Kirst, & Usdan, 2005; Stoyhoff, 1997), to less measurable indicators such as academic skills (e.g., Abel, 2002; Andrade, 2006; Zhao, Kuh, & Carini, 2005). As a result of these challenges, some colleges are re-evaluating how they provide services to international students (Byrd, 1991; Fischer, 2011). U.S. colleges are realizing international students offer domestic students a global perspective,

expose them to various cultures, and significantly contribute to the institution financially (Korabova, 2012). As each institution measures student success differently, *institutional success* measures for international students are equally important. Institutional success measures include campus climate (Braskamp, 2011; Glass, 2012), satisfaction with college (e.g., Hendrickson, Rosen, & Aune, 2011; Sam, 2001; Yeh, & Inose, 2003), engagement in college activities (e.g., Axelson & Flick, 2011, Tinto, 2006; Zhao, Kuh, & Carini, 2005), quality of instruction (Apodaca & Grad, 2005; Elliott & Shin, 2002; Lee, 1997; Marsh, 2007), and quality of the institution (Cubillo, Sánchez, & Cerviño, 2006; Nguyen & LeBlanc, 2001). These measures are reported to drive student motivation to succeed and determine the degree to which students see the institution aiding in their success (e.g., Axelson & Flick, 2011; Strauss & Volkwein, 2002). As reported by Lee and Rice (2007), counter to research on high impact educational practices with domestic students, research is scarce for high impact practices on international students; mainly due to differences in academic practices in different countries (Korabova, 2012).

As is demonstrated by the literature, measures of student success may include: 1) *academic achievement*; 2) *social adaptation*; 3) *student attainment*; 4) *institutional success*; 5) *personal success*; and 6) *post-graduation achievement*. However, there is no magic formula that fits every student or institution that defines student success. A good understanding of theoretical underpinnings can help explain the foundations of student success, as is discussed in the following section.

### **Major Theoretical Perspectives**

As the research on student success spans six decades, the literature is derived from several major theoretical perspectives which include *sociological*, *organizational*, *psychological*, *cultural*, and *economic* (Kuh et al., 2006). As a major theorist within the *sociological*

*perspective*, Tinto (2006) postulated that students separated and transitioned from previous social networks to new networks in order to develop new support networks, develop social outlets, and to ultimately help persist in college. The *sociological perspective* also focuses on the development of social networks between students and faculty. The development of this relationship is critical for students to feel like they belong to the university and to improve academic success (Kuh et al., 2006). This perspective also signifies the importance that students evaluate the institution's social environment to determine whether or not to incorporate or adopt certain values or ideals of the institution, feel accepted into the environment, and to ultimately determine the overall quality of the institution (Astin, 1999). The institution is evaluated using other measures, as outlined in the *organizational perspective*. Bean (1983) posited that institutional features such as size, location, faculty-student ratios, and policies can impact student attitudes about the institution and alter persistence and academic success. Student attitudes about the institution are closely related to the attitude's students hold about themselves. The *psychological perspective* holds that students with a stronger sense of self-efficacy, self-concept, or internal locus of control believe they can more easily overcome academic or social challenges to increase persistence and academic success (Bean & Eaton, 2000). Not all students have a strong sense of efficacy or self-concept. Within the *cultural perspective*, students in under-served populations sometimes struggle with a new academic environment due to differing cultural norms and values. If students feel as if the institution's values or norms varies widely from their own or the institution doesn't appear to care for the norms and values of the students, the student satisfaction can be adverse (e.g., Astin, 1977; Kuh, Gonyea, & Williams, 2005; Pascarella & Terenzini, 2005). Research by Goldin, Katz, and Kuziemko (2006) postulated that student satisfaction supports the economy of the institution. Thus, the *economic perspective* adds that

students will weigh the benefits and sacrifices of spending money on college and related activities while trying to determine the direct benefits and the overall value of their education. Therefore, it is critical that students are made aware of the added benefits of scholarships, programs such as orientation that increase social networking in order to understand the capital benefits that would make such a large economic investment worthwhile (Goldin, Katz, & Kuziemko, 2006). Though it could be posited that no single theoretical perspective can explain or predict student success, a deeper understanding of student characteristics, a stronger understanding of the college environment, and the potential impacts colleges have on students may further explain how colleges can improve student success.

Astin's (1999) Input-Environment-Output model is a conceptual framework that lies within the theoretical perspectives above. The model purports that student success is a matter of inputs, environment, and outcomes (Astin, 1999). Specifically, the inputs (I) define the personal, demographic or academic traits of students before attending college. The environment (E) refers to the various elements' students are exposed to in college such as faculty, academic rigor, co-curricular programs, and the overall quality of the institution. The output (O) is what occurs to the student as a result of attending college such as learning, graduating, attending graduate school, life-long learning, or job attainment. Thus, assessing the impact of the environment (E) on the student (I), can help predict or help colleges enhance the output (O) or help students improve their chances for success (Astin, 1999). Thus, student outcomes (O) are a result of student characteristics (I) and the college environment and experiences within college (E).

### **Domestic Student Characteristics and Pre-college Experiences**

Using Astin's I-E-O model (1999) to frame student success, this section outlines the most researched measures presented within the I-E-O model. The *Input* (I) includes a student's



background, individual characteristics, and pre-entry skills before attending college. Various researchers point out that pre-entry skills have a significant impact on student completion rates. For instance, students who enrolled in college preparatory programs and prep-courses improved their college readiness, aptitude, motivation to learn, and were more academically prepared to handle college and enhance their chances for completion (Adelman, 2006; Arum, Roksa, & Velez, 2008; Kuh, et al., 2006) Arcidiacono and Koedel (2014) posited that in addition to the level of academic preparedness, the quality of the student's high school education, the quality of the college, and the access to academic resources directly influence student graduation rates. Compared to males, females have surpassed their male counterparts in graduation rates since 2001 (Kornhauser, 2017). Further research on gender and student success found a larger number of females in college than males (Kornhauser, 2017; Kena, Johnson, Wang, Zhang, Rathbun, Wilkinson-Flicker, & Kristapovich, 2014). Goldin, Katz and Kuziemko (2006) posited that this may be due to females outperforming males in measures of academic success in high school, test performance, and pre-college courses. Other reasons for this change could be attributed to societal norms of women in college and their changing roles within marriage and the workforce (Kuh et al., 2006). However, research by Terenzini, Cabrera, and Bernal (2001) reported both men and women who come from low socioeconomic (SES) families, struggled to persist in college as they are often unable to afford access to additional academic resources such as college preparatory programs or preparation courses. Their research also found that lower SES was associated with lower grades, decreased collegiate experience, lower levels of involvement, decreased levels of persistence, as well as lower levels of learning. King (as cited in Kuh et al., 2006, p. 18) cited that students with lower SES not only struggled to pass basic high school curriculum, they were also less likely to enroll in college. In addition, Kornhauser's research

(2017) posited that low socioeconomic status was linked to a decreased level of academic success in college as well as lower completion rates across all races (Kornhauser, 2017). Research on race and student success demonstrated the achievement gap between white students and underrepresented students continued to show underrepresented students struggled to keep pace with their white counterparts (e.g., Arcidiacono & Koedel, 2014; Arum & Roska, 2011; Braswell Lutkus, Grigg, Santapau, Tay-Lim, & Johnson, 2001; Carter & Wilson, 1997). As Kena et al., (2014) found in their research, the educational gap between white and underrepresented students widened as completion rates for white students between 1990-2013 improved from 26 to 40 percent compared to 13 to 20 percent for African-domestic and 8 to 16 percent for Hispanic students. Related research by Flowers and Pascarella (2003) showed cognitive *growth* and cognitive skills were significantly higher for white students compared to African domestic students. Unfortunately, the problem is compounded for underrepresented families with low SES that have first-generation college students. First-generation college students sometimes struggle with degree attainment (e.g., Astin, 1993; Astin & Oseguera, 2005; Attewell, Heil & Reisel, 2011). However, with support and encouragement from family, high educational aspirations, and a high level of interest to succeed, Arum et al., (2008) showed that a positive relationship exists between first-generation college students and degree completion.

### **Domestic Student Experiences and Institutional Factors**

The second factor in Astin's I-E-O model (1999) environment (E), described student success as a derivative of student experiences and institutional factors that impact student success. Student experiences range from finding a support group, developing a social life, participating in college traditions, and participating in co-curricular or academic related activities. According to Kuh et al., (2006), academic student experiences such as engaging in

career related activities, improving soft skills, internships, studying in groups, to conducting research with faculty has shown to enhance student satisfaction, persistence, and grades (Kuh et al., 2006). Research by Chickering and Gamson (1987) postulated the more time a student spent working with faculty, receiving quick feedback, actively learning, learning how to work with others, meeting high expectations, and learning how to work with diverse populations, the more students were likely to complete college.

The racial composition of the institution is important to students of all backgrounds. Various researchers (Chang, 2000; Gurin 1999; Orfield 2001; Umbach & Kuh, 2006) found diverse campuses can foster positive peer interactions that encourages contact with students from different backgrounds, speaking with others from different races/ethnicities, learning about different religious beliefs, and incorporating global ideas into class projects and discussions (Kuh et al., 2006, p. 43). Roksa, Trolan, Pascarella, Kilgo, Blaich, and Wise (2016) concluded that campuses that provided diversity experiences and a positive racial climate, aided students in developing improved critical thinking and learning skills and improve completion rates. Thus, institutions must provide the appropriate environment to help students socialize, make friends, and engage in academic and co-curricular activities in order to help students obtain a degree (Seidman, 2005).

In an attempt to provide the necessary experiences and support to students, colleges and universities have developed a variety of programs and services. Many programs are designed to support first-year students in order to help students adapt to their new surroundings (Kuh et al., 2006). Campus residences offer communal living, social opportunities, and an environment which offers engagement opportunities outside of the classroom. Strange and Banning (2001) posited research that showed supportive campus residences promoted student *growth* and

development. However, research offers little direct support to show that campus residences positively impact student success by themselves (Pike, 2002; Pike & Kuh 2005). Student success does seem to improve when campus residences partner with academically focused programs such as faculty-in-residence programs, hosting academically focused activities, or enlisting learning communities (Kezar, 2006). Learning Communities offer students the opportunity to enroll in courses as a group and is usually focused on a theme such as leadership or a particular major. Students who participate in learning communities often live in the same residence halls which offer ample opportunity to socialize, work, and learn as a community. As research shows, students who participate in learning communities have improved academic performance, persist longer, and have a higher degree of student engagement (e.g., Knight, 2003; Price, 2005; Taylor, 2003).

Like learning communities, college orientations are also designed to help new students adjust to their new surroundings, improve social adjustment, and aide students in navigating the academic landscape (Perigo & Upcraft, 1989; Cook, 1996). Research from the *National Scale of Student Engagement* (2005) indicated that students who attended college orientation, participated in extra-curricular activities, and saw their campus as supportive, gained more developmentally and were more satisfied with their college experience. Research by Busby, Gammel and Jeffcoat (2002) demonstrated that students who participated in orientation performed higher academically and were more adjusted to college life. However, research from Pascarella and Terenzini (2005) indicated the impact of orientation programs is statistically insignificant. Further research by Hollins (2009) stated that more research on college orientation programs impact on students needed further investigation.

Hunter, Skipper, and Linder (2003) estimated that 74 percent of higher education institutions within the United States provided an orientation course or first-year seminars. First-year seminars can be directly or indirectly related to orientation. Some first-year seminars are tied to certain colleges in order to help the students gain familiarity with the rules or culture of that particular college (Kuh et al., 2006). Still other colleges combine orientation, advising, and discipline specific information (Upcraft, Gardner, & Barefoot, 2005). Research by Pascarella and Terenzini (2005) found that students who participated in a first-year seminar tended to remain in school. Additionally, the *National Scale of Student Engagement* (2005) discovered first-year seminar participants collaborated with others more, interacted with faculty more often, perceived a supportive campus, and utilized campus services such as counseling, tutoring, or advising services.

Advising services is another example of an institutional program provided to students to improve student success. Quality college advising has been known to be one of the strongest predictors of student satisfaction (Kuh et al., 2006). Though there is little evidence to examine the differences between faculty and professional advisors, studies have also shown high quality advising has a positive impact on college completion (Kuh et al., 2006). Specifically, college completion has shown to rise when advisors focus on addressing the needs of students who are undecided about their major, students who change their majors, and first-generation students (Tinto, 2006). Advising can be used as both a method to guide students through college as well as to help those who struggle. Some colleges utilize early warning systems (EWS) to aid academically at-risk students. EWS are meant to be simple alert systems that provide a network for faculty, staff, and other support units information about the academic progress of students. If needed, EWS can signal advisors to help students enroll in remediation courses, suggest

strategies to improve grades, and improve students' chances of graduating from college (Bettinger & Long, 2005). As is seen in the research cited above, there are many institutional programs and activities that help students adapt and engage in their environment. However, few factors can compare to the impact that faculty relationships can have on student success.

Faculty-student contact (Chickering & Gamson, 1987) is arguably one of the most important methods that promotes learning, cognitive development, student engagement, and college completion (e.g., Kim, & Lundberg, 2016; Kuh et al., 2006; Pascarella & Terenzini, 2005). Spending quality academic time between faculty and students conducting research projects, providing feedback, and discussing grades can be as important as spending informal time together. Faculty who spends time with students outside of the classroom mentoring, in residence halls, workshops, or campus engagement events positively shape student perceptions and educational goals (Fuentes, Alvarado, Berdan, & DeAngelo, 2014). Some research has postulated that a student's experience with faculty and peers in and out of the classroom are better indicators of degree attainment than a student's pre-college characteristics (Gerken & Volkwien, 2000). For Latinx students, faculty-student interaction seems to improve student persistence and GPA (Tovar, 2015). Similarly, Fries-Britt and Turner (2002) found that faculty-student interaction with black American students also increased persistence and student engagement. Wood and Ireland (2014) found that faculty-student interactions with black American students also improved reading remediation, study skills, and student engagement. In contrast, a study by Soria and Stebleton (2012) showed that first-generation college students had lower academic engagement and success with lower student faculty interaction. Additionally, Collier and Morgan (2008) posited that first-generation students needed additional student-faculty interaction in order to better understand their roles as students, faculty expectations, and

to increase their abilities to learn and persist. Overall, the research shows that the more frequent the student-faculty interaction, in and outside of the classroom, the more it promotes student development, learning outcomes, college satisfaction, persistence, and college completion (Kim & Sax, 2009).

Though faculty-student contact has been shown to be critical in advancing student success, effective teaching and learning approaches have received considerable attention in the research as it also impacts student learning and engagement (Pascarella & Terenzini, 2005). Faculty who embeds an educational philosophy that utilizes high expectations, mastery learning, as well as embodying the approach that every student can learn in the right environment, create environments in which student success can thrive (Kuh et al., 2006). Students seem to adapt to this more challenging learning environment and exceed instructor expectations for learning (Blose as cited in Kuh et al., 2006). Kuh et al., (2006) also posited that pedagogical approaches that address different styles of learning, collaborative learning, problem-based learning, and holding students accountable are all approaches that support student success. In addition to strong student-faculty relationships impacting student success, different types of organizational environments can also have a strong impact on student success.

Birnbaum's (1988) work on the types of organizational structures colleges include: collegial, bureaucratic, political, anarchical, and cybernetic (e.g., Berger, 2002; Kuh et al., 2006; Tinto, 1993). Collegial campuses typically focus on consensus building, thrive on relationships, and focus on campus community. Bureaucratic institutions are more hierarchical, with strong boundaries, and decision making coming from upper administration. Though similar to the bureaucratic model due to the existence of various departments, the political organization is identified by decisions being made within the institution based on the relationship between

department leaders as well as upper administration. The anarchical institution focuses on granting authority to individuals within the organization, sometimes resulting in competing decisions and a lack of clear direction. Cybernetic organizations monitor and utilize mechanisms and feedback loops to improve the effectiveness of processes, administrators, and the institution (Birnbaum, 1988). Though the results have been mixed (Berger, 2002), Tinto's (1993) research posited that the type of organizational structure of a college can have an impact on students' success. For example, Tinto found the more collegial a college was organized, the more students felt engaged with faculty, administration, and other students and the more likely they were to persist. Kornhauser (2017) argued that institutional level factors are not as predictive of educational attainment as are student level factors. However, there are many institutional factors that do impact student success including whether or not the institution is public or private. Private institutions depicted 45% graduation rates in four years compared to 28% for their public counterparts (National Center for Educational Statistics, 2011). Pascarella, Wang, Trolian, and Blaich (2013) discovered that students attending liberal arts versus regional or research-based colleges developed higher critical thinking skills and increased their levels of cognitive activity due to faculty focused more on instruction versus research, higher student-faculty contact, and higher expectations of students. In addition, colleges that were more selective, whether public or private, tended to have higher completion rates (Pascarella & Terenzini, 2005). As the authors posited, this could be due to students having a higher desire to succeed, higher faculty expectations, and being surrounded by higher performing students. Consequently, it takes a certain number of financial resources to provide a quality academic environment. As Gansemer-Topf and Schuh (2006) added, the amount of money spent on providing quality teaching, academic advising and academic related activities demonstrated a strong relationship to retention



and completion rates. The size of the institution seems to have a volatile impact on student engagement with larger institutions. Pascarella and Terenzini (2005) postulated that students may have a more difficult time engaging in larger campuses, negatively impacting student engagement. In contrast, the larger the institution, the higher future earnings and the better the occupational status. This might indicate that larger institutions have larger networks in which to find jobs (Pascarella & Terenzini, 2005). In contrast, research by Titus (2004) did not support these findings. However, Pascarella and Terenzini (2005) concluded, there were many such inconsistencies within the research concerning institutional factors impact on student success.

### **Domestic Student Post-College Success**

The third element in Astin's model, output (O), focuses on the success students achieve after college. Success after college may be measured by grades, attending graduate or professional school, employment in a desired field, economic benefits, and overall quality of life (Kuh et al., 2006). As previously mentioned, the biggest predictor of college success are grades, even when controlling for student's precollege characteristics (Pascarella & Terenzini, 2005). Higher grades are usually associated with students being more prepared for class, time on task, asking for feedback, student-faculty interaction, and enjoyment of learning; all of which results in higher student engagement and increased chance of college completion (Kuh et al., 2006).

Though employers might look at GPA as indicator of future success, employer's expect college graduates to possess soft skills such as critical thinking, analytical skills, problem-solving skills, and a lifelong learning philosophy (Hart Research Associates, 2015). To help demonstrate what skills and traits colleges can help graduates provide to employers, Kuh (1993) posited five learning domains linked to college graduates, including: (a) having cognitive complexity; (b) knowledge acquisition; (c) humanitarianism; (d) interpersonal and intrapersonal competence; and

(e) practical competence. Practical competence is the one domain that employers specifically seek in recent college graduates, but often do not find (e.g., Deepa & Seth, 2013; Hart Research Associates, 2015; Nunn, 2013) Practical competence is an individual's ability to apply what they have learned from their studies in their major field work and use it in team settings, project management, communication, and decision making (Kuh et al., 2006). Unfortunately, from a student's perspective, success after college is more simply defined as job attainment, being promoted, and receiving a large salary (Ng, Eby, Dorensen, & Feldman, 2005). Fortunately, as research from Williams and Swail (2005) posited, students who graduated from college across all races, SES, and gender, reported a higher quality of living versus non-degree earning peers as well as higher career satisfaction, job enjoyment, and the ability to contribute professionally to their career field (Colarelli, Dean, & Kronstans, 1991).

As the literature has shown, Astin's IEO model (1993) contends that student outcomes (O) are determined by student characteristics (I) and college environments (E), while student characteristics (I) can also directly influence student outcomes. Though it may be difficult to determine which sources are most critical in influencing student success, Kuh et al's., (2006) extensive review of the literature proposed several key variables that influence success across each of the elements of Astin's (1993) IEO model, including: (a) academic success being established long before students matriculate; (b) family and community support are indispensable in raising a student's educational aspirations, becoming college prepared, and persisting; (c) the right amount and kind of money matters to student success; too little can make it impossible for students to pay college bills, while too much loan debt can discourage students from persisting; (d) most students benefit from early interventions and sustained attention at key transition points; (e) students who find something or someone worthwhile to connect to in the

postsecondary environment are more likely to engage in educationally purposeful activities, persist, and achieve their educational objectives; (f) institutions that focus on student success, subscribe to a talent development philosophy, and create a student-centered culture are better positioned to help their students attain their educational objectives; and (g) colleges must utilize focused assessment and accountability efforts to determine what matters to student success (p. 89-99).

### **International Students**

International students often experience a gap in their expectations of studying in the United States as the enjoyment of interacting with people from other countries and the possibility of working abroad are often met with many stumbling blocks and even departure from college (Andrade, 2009). In order to study within the U.S., the U.S. Department of State-Bureau of Consular Affairs website (2020) generally grants three types of visas including: a) M visa for vocational student visas; b) the most common F-1 visa is used for most international students and allows the student to work off-campus in their particular field of study; and c) J-1 is used for students sponsored in a specific educational exchange program (i.e. Fulbright) and will only allow on-campus employment up to 20-hours. According to the website, the following steps must be followed in order to be allowed to study within the U.S.:

- a) Apply to an approved Student and Exchange Visitor Program (SEVP) school.
- b) Be enrolled in the Student and Exchange Visitor Information System (SEVIS) and pay the SEVIS fee (varies).
- c) Once accepted by the school, the school will provide the student a I-20 form to be submitted to the U.S. Embassy or Consulate to obtain a visa.

- d) Submit a visa application, visa application fee (approximately \$160), and submit a photo online to a U.S. Embassy or Consulate.
- e) Take a passport, visa application, application fee, photo, and the school's I-20 form to the visa interview.
- f) Attend a visa interview at the U.S. Embassy or Consulate.
- g) If a student visa is granted, to enter into the U.S., a passport, visa, and the I-20 form must be provided to a U.S. port-of-entry where permission or denial is given.

As might be expected when studying outside of ones' country of origin, international students face additional challenges such as socially adapting to a new environment. This often translates to not fitting in, lacking a support network, and loneliness (e.g., Gareis, 2012; Williams & Johnson, 2010). Other challenges such as adjusting to language differences, differing social norms, and changing academic environments often hinder academic success (Crockett, Iturbide, Torres Stone, McGinley, Raffaelli, & Carlo, 2007). International students are often able to overcome these challenges when they are academically prepared, have the necessary social supports, are financially stable, and are provided the opportunities to be successful at their host institution (Andrade, 2009). Utilizing Astin's I-E-O model (1999), international students tend to matriculate when students' background and precollege experiences (I), environment (E), and students' post college success (O) are supported throughout their academic journey.

### **International Student Characteristics and Pre-college Experiences**

*The Input (I)* of Astin's (1999) model includes a student's background, individual characteristics, and students' precollege experiences. Race and ethnicity within a students' background, play a significant role in the challenges facing international students when studying in the United States. Yeh and Inose (2003) posited that domestic student perceptions of race and

cultural differences inhibit meaningful social interaction with international students. This is often attributed to individualistic ideals of aggressiveness, independence, and over-confident domestic students. The lack of positive social interaction often results in the development of acculturative stress for international students (Yeh & Inose, 2003). As a result, international students tend to socialize more with students from their own country (Bradenburg & de Wit, 2011; Constantine & Sue 2005). Depending on country of origin, international students may also experience various levels of discrimination. For example, students from Canada who appeared white, experienced much less discrimination than students from the Middle East, Africa, or Asian countries. Often, this is attributed to the degree of language difference (Lee & Rice, 2007). Not having sufficient English language skills often inhibit cross-cultural interactions. Thus, international students who excel in the English language tend to adjust easier to their new surroundings and were better able to make friends with domestic students (Ying, 2002) and caused less overall stress in trying to communicate and adopt to new surroundings (Wilton & Constantine, 2003). Supporting research by Andrade (2006) and Stoyhoff (1997) indicated that having proficient English language skills positively influenced international student persistence and overall academic success. Mamiseishvili (2011) showed that international students involved in remedial English courses were likely to have a lower GPA and negatively impacted persistence.

Persistence can also be correlated with a student's financial background. Andrade (2006) postulated the higher the socio-economic background of an international student, the more likely they were to persist to graduation. Research has shown there is an assumption that international students are financially stable and have enough money to afford college (Andrade, 2009). On the contrary, research has found that financial concern is a major issue for international students; especially for low socio-economic students (e.g., Srivastava, Srivastava, Minerick, & Schulz,

2010; Tompson & Tompson, 1996). Sirin (2005) posited a student's socioeconomic status is strongly tied to academic performance. Like their domestic counterparts, international students also seek other means to support their financial needs such as part-time work. Unfortunately, there are definite work restrictions for international students studying in the United States. However, international students are able to find some relief in graduate assistantships or scholarships. In one study, 58% of international students were cited as receiving assistantships and scholarships but also found that the money was not enough, causing students ongoing hardships (Sherry, Thomas, & Chui, 2010). The same study noted that some students were troubled by not knowing the exact amount of additional course fees, student activity fees, health insurance fees and other extraneous differential fees. It is evident, that the stress and worry of not having adequate funding for college negatively impacts international students' experience as well as persistence (Chen, Lee, & Stevenson, 1996; Sirin, 2005).

College funding for first-generation students (FGS) is a challenge that hinders student success. FGS students tend to derive from lower income and lower social status homes and significantly struggle with college affordability (Spiegler & Bednarek, 2013). FGS are defined as, "someone whose parents have not completed a college degree" (Petty, 2014, p. 133). FGS students experience difficulty when dealing with college finances, class schedules, academic rigor, and many of the other programs and services offered by an institution. Unfortunately, this also translates to FGS having lower grade point averages, aptitude scores, and generally experiencing more difficulties matriculating (Saenz, Hurtado, Barrera, Wolf, & Yeung, 2007).

In a review of FGS for both domestic and international students, Spiegler and Bednarek (2013) found that domestic and FGS international students chose majors and colleges that were less prestigious and looked for colleges and majors that had a direct tie to specific jobs. FGS also

took longer to learn course requirements and studied less; possibly due to not fully understanding the academic rigor and/or time needed to be successful. Unfortunately, FGS also tended to take fewer courses, had less time to devote to studies and were less engaged in extracurricular or social activities. As a result, FGS international students tended to have lower self-esteem, felt insecure about their academic abilities, and were well aware of these issues. Unfortunately, even with their knowledge of the issues, FGS international students viewed the university as unsupportive and tended to avoid seeking help (Hurst, 2012). FGS international students were at higher risk for dropping out of college more than their domestic counterparts, especially when they lacked English language skills, were married, lacked financial resources, and lacked support from friends or family (Spiegler & Bednarek, 2013). Counter research by Gofen (2009) suggested some FGS succeed as a result of being from a first-generation family as family members want to be supportive of the FGS and often provide a great deal of support and resources to help break the FGS cycle. Parents of FGS often see education as the key to rising out of poverty and try to financially, physically, and socially support their FGS to help them avoid the challenges of FGS (Gofen, 2009). Social support from friends and family is important for international students studying abroad and can ward off acculturative stress as it is often overwhelming and difficult to adjust to and can have a significant impact on an individual's psychological well-being. International students who lack support from family and friends can experience a sense of loss, depression, dissatisfaction with surroundings, and have lower levels of academic success (Chen, Mallinckrodt & Mobley, 2002).

Academic success encourages international student persistence from the first to second year; even more than domestic students (Kwai, 2010; Zhao et al., 2005). However, some research posited that it is incorrectly assumed that all international students are academically

prepared to attend college (Andrade, 2006). A study of 1600 prospective international students from 115 different countries found that nearly half of the respondents were classified as having low academic preparedness from high school and inhibited students' ability to persist in college (Choudaha, Orosz, & Chang, 2012). As might be expected, higher GPA scores, higher number of attempted credit hours, academic integration (e.g., meeting with advisors, study group participation) and having a degree plan were positively related to international student persistence (Kwai, 2010; Mamiseishvili, 2011). Like their domestic counterparts, some international students participate in college prep courses such as the International Baccalaureate Program (Gazda-Grace, 2002). Much like advanced placement courses, the International Baccalaureate Program (IBP) is designed to prepare international students for college. IBP began in 1968, in Geneva, Switzerland to help standardize curriculum for students who often had to move. The IBP is well known in many Ivy League schools as students who have completed the IBP program were often seen as less stressed and better prepared to attend college in another country (Gazda-Grace, 2002).

It is clear that college is a stressful time for any student, regardless of the country of origin. Research by Misra and Castillo (2004) posited international students often deal with stress differently than domestic students. Whether physical or mentally related, international students tend to use the college health centers more and seem to deal with stressors better than their domestic counterparts; though it is not clear if international students attempt to hide their ability to handle stress to avoid negative stigmas (Misra & Castillo, 2004). Having a high level of resiliency has been shown to help international students overcome adjustment issues and resists psychological adjustment problems that negatively impact graduation rates (Wang, 2006).



Emotional intelligence has also been reported in the literature to have a positive impact on international student resiliency to adjustment issues. Emotional intelligence is the ability to determine and manage one's own emotional state as well as to evaluate the emotional states of others in order to better interact. Thus, individuals with low levels of emotional intelligence tend to struggle adjusting to college as well as graduate (Mesidor & Sly, 2016). Related studies have shown that international students with high emotional intelligence are able to better adapt to new cultures and had higher levels of psychological adjustment that could aid their persistence to graduation (Harrison & Brower, 2011).

Research by Dykstra (2016) has shown that higher motivation and educational aspirations can aid student persistence. International and domestic students often differ in their self-motivation strategies in college based on different cultures, values, and upbringing. For example, international students who tend to see instructors through a formal lens, tend not to ask questions that might appear to question the instructors' intelligence. Thus, international students are left to make concept connections on their own. If left to their own accord, some international student may question their own intelligence and potentially negatively impact their motivation or ability to succeed (Dykstra, 2016). Some international students contend that if the instructor provided the necessary content of the course but failed to employ the student as a partner in the learning process, some students felt disconnected from the learning process and experienced a decreased sense of internal control and decreased motivation to succeed. Similarly, if students felt they lacked autonomy in the learning process, this had a negative impact on students' motivation to succeed (Pulfrey, Darnon, & Butera, 2013).

Success can also be the result of dedication and goal orientation. Andrade and Evans (2009) posited that success for international students who had a future-oriented perspective, were

dedicated to their academics, and possessed a formalized plan of study were more likely to persist in college. Supporting research by Reason (2009) argued that students who developed the goal to graduate from college, were more likely to persist. When students are integrated into the social and academic system of the college, they are also likely to form subsequent goals and increase their chances of academic success. Tinto (1996) added that a student's experience and level of engagement in their first year of college is highly important in students achieving their long-term educational goals. Overall, faced with the multitude of social adjustment issues, no formalized plan of study, and a lack of dedication to academics, international students struggle in their motivation to succeed and had decreased levels of academic success (Dykstra, 2016).

As there may be many individual pre-college characteristics that may help or hinder an international student's ability to succeed, success is not based solely on student pre-college characteristics. The institutional environment, culture, student experiences with faculty and high impact programs are also important in order to help international students succeed in colleges within the United States (Astin, 1999).

### **International Student Experiences and Institutional Factors**

The environmental elements (E) in Astin's I-E-O model (1999), describes success as derivatives of student experiences and the programs and services institutions offer to students. In order to better understand how an institutional environment can help international students succeed, it is important to consider the challenges international students face during college. Once on campus, international students experience language difficulties, cultural differences, lack of a social support network, and the need to adapt to a different academic structure (Lee & Rice, 2007). Research from Pritchard and Skinner (2002) outlined challenges such as differences in food, housing needs, religious traditions, polychronic differences (flexible sense of time), and

the type of clothing worn. Having to adjust to so many differences is difficult for international students. Though it is usually left to the international student to adapt to these differences, institutions have need to create tools to help international students succeed (Zhao et al., 2005).

Research supports international students studying in the United States need additional support from their university in order to adequately adapt to their new environment (Heggins & Jackson, 2003). Asian and Latinx students have been said to rely heavily on developing social networks in order to overcome the stress of a new environment and the lack of students from their home country as a support network. Unfortunately, international students shy away from seeking formal help as they often have no assurance that they can trust others (Heggins & Jackson, 2003). When international students do seek formal help through university counseling services, it is usually after the issues have already negatively impacted the student (Lee & Rice, 2003). As international students try to find ways to cope or contend with a variety of environmental challenges, it is important for the institution to find ways to help as students do not understand how an institution can help them. If the institution fails to find ways to help international students, the institution may add additional stress or unintentionally develop mental health issues in students (Lee & Rice, 2003).

Zhou, Jindal-Snape, Topping, and Todman (2008) postulated historical research focused on mental health issues as the main precursors to the various adjustment issues of international students. Specifically, historical research focused on two themes: (1) individual predisposition to migration issues and (2) the effects of migration-developing mental health issues of international students. The unfortunate unintended message of this perspective was exposure to international students might lead to mental health issues (Zhou et al., 2008). Fortunately, later studies began to move beyond the mental health perspective as the sole precursor of poor social adjustment and

cleared the way for social and psychological causes in understanding how to assist international students in their academic pursuits (Zhou et al., 2008). Tompson and Tompson's (1996, p. 53) research summarized the multitude of adjustment issues experienced by international students studying abroad. The results of their research ranked students' perceptions of the most challenging issues facing international students studying abroad. The issues included: (a) social isolation, (b) language skills, (c) knowing norms, rules, and regulations, (d) overcoming stereotypes, (e) transportation, (f) clothing norms, (g) weather differences, (h) food differences, (i) oral presentation assignments, and (j) personal finances. Recent research by Jackson, Ray and Bybell, (2019) shows little change in the multitude of adjustment issues challenging international students studying abroad. However, some research highlights discrimination as impeding academic success, adjustment to their new environments, as well as a decline in overall numbers for international students studying in the United States (Lee & Rice, 2007). Smith and Khawaja (2011) posited that international students often feel marginalized and inferior to their domestic counterparts and inhibited persistence. Research has found that social support networks and engagement in social activities can help overcome many of these feelings. However, institutions must also find ways to inhibit discrimination against international students (Crockett, Iturbide, Torres Stone, McGinley, Raffaelli, & Carlo, 2007; Wang & Mallinckrodt, 2006; Zhao, Jindal-Snape, Topping, & Todman, 2008).

In order to help international students, cope with adjustment issues, research has posited several concepts for universities to help students. Zhou et al. (2008) summarized three ideas for helping universities better understand adjustment issues to enhance students' ability to cope including: (a) differences in cultural-learning (social skills/interpersonal behavior); (b) various stress and coping strategies; and (c) variances in social identification (ethnic identity/inter-group

relations). Together, the three ideas help identify and explain international students' potential responses to new cultures, communication differences, personality differences, cultural norms and rules, as well as provided relevant means to assist and develop the necessary adjustment skills in international students. Hayes and Lin (1994) postulated, "In the growing number of studies on bicultural adjustments, social concern has been identified as one of the biggest problems for international students...they often feel less confident" (p. 7). Research by Russell, Rosenthal, and Thomson (2010) supported social isolation as one of the major issues, alongside academic needs, that effects overall success of international students studying abroad. Zhou et al. (2008) confirmed social issues as an unresolved issue that continues to be the result of what the authors posited as *culture shock*. The authors defined culture shock as, "the collective impact of unfamiliar experiences on cultural travelers" (p. 63). Social groups often act as a means to decrease culture shock and reduce social and academic adjustment issues. Ward, Bochner, and Furnham, (2001) postulated three levels of social networks used by international students including: (a) friends made within the host country as well as from their country of origin, (b) individuals from the host country that include teachers, counselors, program staff and advisors, (c) individuals from other countries who experience similar adjustment issues. As international students began to develop and utilize the three levels, Ward et al. (2001) found international students were better able to adjust to their new surroundings. Ward et al. (2001) also found that international students usually find a way to overcome adjustment issues by utilizing host culture social groups as well find comfort in teachers and other university officials.

Earlier research by Hayes and Lin (1994) posited a framework for university officials and counselors for working through adjustment issues with international students. The framework encouraged university staff to understand a student's perspective on: (a) social loss; (b) patterns

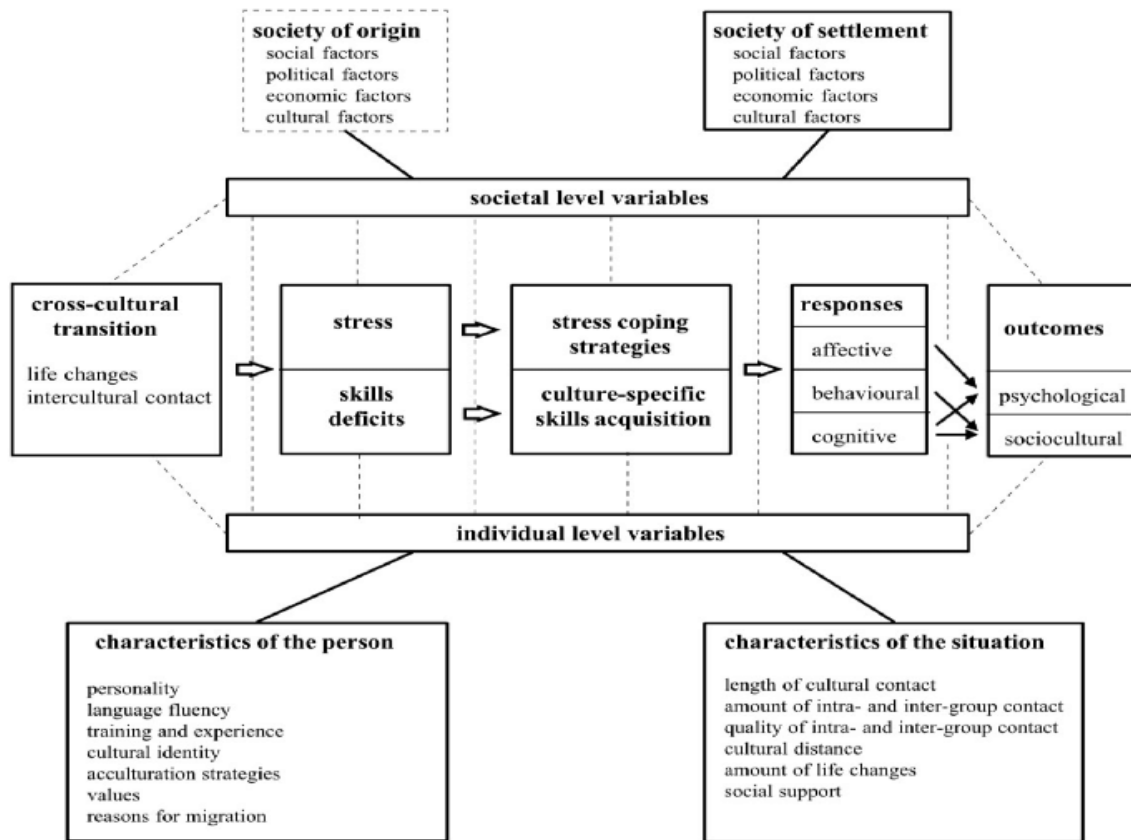
of social response (social networks in and outside of their country of origin); (c) strategies for coping with stress; (d) factors for social interaction (language, cultural aspects, and perceived discrimination); (e) individual differences (personality type); (f) sex role differences; (g) perceived stigmas of culture; and language difficulties (p. 7-16). Hayes and Lin (1994) posited that if various elements of the framework were left unaddressed, the student could be at increased academic risk, experience a decrease in satisfaction with the university, as well as continue to struggle to cope.

International students working through social adjustment issues respond in a variety of ways including taking more time to study, getting involved socially with students from their own country, getting involved in diversity activities, as well as other student engagement opportunities (Kuh et al., 2006; Mamiseishvili, 2012). Some research suggests that international student persistence levels have risen and surpassed that of domestic students. This could be a result of an evolving coping strategy compensating for a lack of social adjustment by spending more time on academics (Dozier, 2001; Kwai, 2010; Zhao, Kuh, & Carini, 2005). However, decreased time interacting with domestic students results in lower satisfaction with college and lessens academic, cultural, and global learning (Kuh et al., 2006; Trice, 2004). As Zhou et al., (2008) posited, international students ultimately find a way to adapt to their new surroundings in order to overcome the stress of studying abroad.

Acculturation is the process in which individuals from different countries begin to adapt or assimilate into the cultural norms, rules, and values of the country in which they visit as a means to overcome “culture shock”, cope with social isolation, gain acceptance, and contend with adjustment issues (Zhou et al., 2008). To collectively understand the acculturation process, Ward et al., (2001) outlined the acculturation process seen in figure 3.

**Figure 3**

*The Acculturation Process (Ward, Bochner & Furham, 2001)*



The diagram can be viewed in terms of psychological and social issues that interconnect and attempt to show how international students go through the process of acculturation and assimilation. Concurrently, the diagram also points out the interactions between *individual issues* (personality, values, identity, and social support) and *system/societal issues* (societal rules, politics, philosophy, educational system, and economic factors) and how this interplay results in the degree of positive or negative adjustment for international students.

While in the classroom, international students often struggle with cultural differences pertaining to language issues with the instructor and domestic students (Andrade, 2006; Qian & Krugly-Smolka, 2008; Unruh, 2015), group problem solving activities due to an inability to

understand group dynamics of the host culture (Tompson & Tompson, 1996), as well as speaking up in class due to a formal view of instructors (Portin, 1993). Glass, Kociolek, Wongtrirat, Lynch, and Cong (2015) also found that international students who had lower SES and lower academic preparedness were correlated with a poor faculty-student relationship and a lower sense of belonging. Biemans and Van Mil (2008) posited that international students must often adjust to academic differences due to differences in learning styles as they tend to learn differently than their domestic counterparts as they (a) focused on rote memorization of material; (b) utilized deeper processing of information; and (c) tend to focus on components of data and how they can apply the data to other problems. These differences tend to counter how domestic instructors typically instruct in the classroom and interact with students. Biemans and Van Mil (2008) also cited numerous classroom differences interacting with the instructor including answering instructor questions and adapting to differences in the level of perceived authority of the instructor (Pinheiro, 2001). For example, complimentary studies reported Chinese students learn very differently than domestic students due to language structure, extended response time given to instructors out of respect, and because Chinese students typically view the instructor as the ultimate source of knowledge and rarely question the instructor's expertise (e.g., Hofstede 2001; Qian & Krugly-Smolka, 2008). Young's (2011) research extended this idea suggesting international students are used to a more authoritarian style of instruction. As supporting research from Sawir (2005) noted, instructors that utilized collaborative group work directly opposed many international students' traditional learning environments of passive and instructor-centered classrooms. Most faculty and staff are aware of some of the issues facing international students but lack the expertise to develop a classroom environment that support the needs of international students (Arkoudis, 2005). Research directed towards academic deans found that faculty were



grossly underprepared to instruct students on global issues and lacked a substantive communication strategy between its departments to better serve international students (Longview Foundation, 2008). More recent research by Wu, Garza, and Guzman, (2015) posited that domestic universities struggle to find the means to meet the academic needs of international students. Zhou et al. (2008) posited, “domestic universities need to critically assess the academic experiences of international students on their campuses so that they can understand the challenges, successes, and failures, and it needs to be done from the perspective of international students” (p. 2). To decrease the academic struggles of international students, Pinheiro’s research (2001) applied the adult andragogical learning theory, created by Knowles (1980), to a small group of international graduate students. The study set out to determine whether or not international students preferred the same teaching styles applied to domestic students using components of the model. Knowles (1980) model contended that students are more satisfied with their environment and their instructors when the following components are put into practice: (a) physical comfort of classroom; (b) trust and respect between student/teacher and student/student; (c) cooperation; (d) freedom of expression, and (e) acceptance of diverse points of view (as cited in Pinheiro, 2001, p. 3). Data analysis by Pinheiro (2001) found participants gauged overall academic satisfaction with the following: (a) participation roles which included classroom life and active engagement by students and teachers, (b) role of the students’ prior experiences which included meaningful application of content to students work; and (c) role of the teacher which included active learning and construction of knowledge with the students, (p. 6). This study pointed out that both domestic and international students required the same needs discovered by Knowles (1980). The result of the study posited that international students want to be engaged, respected, and want to enjoy a healthy and equitable relationship with the instructor.

University instructors that employ pedagogies and methodologies that encourage student and teacher engagement as well as encourage teacher understanding of international student adjustment issues tend to have international students with higher levels of student self-esteem, academic success and a better overall student experience (Watkins, 2010). Arkoudis (2005) suggested instructors utilize the following methodologies with international students in the classroom:

- a) record lectures for later review;
- b) encourage participation in small group work;
- c) help international students understand cultural differences regarding plagiarism;
- d) support students in developing critical thinking skills;
- e) eliminate jargon from lectures;
- f) allow international students to process questions as they translate languages and cultural meanings cognitively;
- g) utilize global issues and examples from different countries;
- h) utilize international student's perspectives to educate domestic students;
- i) help international students understand cultural differences in speaking up, answering questions, and rules of interaction with the instructor;
- j) define unfamiliar concepts and background information;
- k) summarize the main points of the lecture;
- l) set expectations of assessment (quizzes/tests) for international students clearly and in advance;
- m) help students understand the importance of preparing for upcoming lectures and to ask questions of meaning in advance;

n) help international students to create positive interactions and relationships with host culture students” (pp. 5-17).

Mamiseishvili (2012) posited that most international students are academically prepared and have the necessary finances to study in the U.S. However, they have unique challenges due to language differences, cultural differences, and lack support from friends and family. These unique challenges inhibit international students from persisting in college. Mamiseishvili (2012) contends that research on international student retention and persistence is largely absent in the literature. Besides Mamiseishvili (2012), only two other studies on international student persistence were put forth by Andrade (2006) and Kwai (2010). Mamiseishvili’s (2012) research found higher GPA, having a degree plan, and academic engagement activities, such as study groups, were positively related to persistence. Contrarily, remedial English classes were negatively associated with persistence. Interestingly, participation in sports clubs, school clubs, and fine arts activities were also negatively associated with persistence. However, international students involved in multicultural or international organizations showed higher levels of persistence.

Kwai’s (2010) research utilized 207 undergraduate international students across two statewide institutions. Kwai (2010) found that spring semester GPA, cumulative credit hours attempted, and on-campus employment had a positive effect on international student persistence in their second year. In contrast to Kwai’s (2010) and Mamiseishvili (2012) research, Andrade’s (2006) research on international student persistence was qualitative in nature and focused on 17 undergraduate international students. From her research, Andrade (2006) found that the students communicated several ideals that contributed towards their success including: (a) a strong desire to have family, friend, and faculty support; (b) a strong belief in education; (c) the value of

appreciating cultural differences; and (d) the ability to manage time and utilize various study skills. Andrade's (2006) work also emulated students' appreciation of a strong campus culture and the ability to be involved in co-curricular activities that contributed to their persistence and academic success. The main ideas from Andrade's (2006) study found that persistence was a result of balancing academic responsibilities, work, social life, adjusting to new academic environment, and possessing a high level of confidence. Just as important, Andrade (2006) posited that institutions must preserve the cultural integrity of international students in order to help them feel validated, appreciated as a culture, and persist as a student.

Institutions attempt to help international students succeed through the services of international student services offices, international student orientation programs, English language programs, counseling services, and other campus life activities (e.g., Murphy, Hawkes, & Law, 2002; Olivas & Li, 2006; Schulte & Choudaha, 2014; Tinto, 2006). Some institutions have also gone above and beyond the basic support services listed above and attempt to internationalize their institution. Internationalization is the process of integrating international issues and concepts into the delivery of academics and co-curricular programs in order to provide all students with a more complete intercultural learning experience (Knight, 2003). Altbach and Knight (2007) described internationalization occurring within curriculum, international student and faculty, and interactions between various international institutions. Within this institutional environment, internationalization could help relieve the burden of acculturation by international students and encourages everyone within the institution to promote a more global environment and student persistence (Zhao et al., 2005).

Colleges adept at developing and organizing more purposeful involvement activities are usually deemed to have a more robust and satisfying college environment while affirming

students and positively impacting persistence and retention rates (Korobova, 2012; Kuh et al., 2005). Astin's (1999) student involvement theory postulates that student involvement positively impacts persistence. Astin's (1999) student involvement theory refers to the amount of time a student spends on campus engaged in academic and/or co-curricular activities. International students who spend more time on campus interacting with faculty, other students, cultural groups, and various academic experiences improve their chances to graduate (Korobova, 2008). Research by Grayson (2008) found that international students were as involved as domestic students. Interestingly, it was found that upper-level international students were generally more involved than first year international students. Contrarily, Parikh (2008) found evidence that less involved international students had higher levels of academic achievement; possibly due to having more time to devote to academics.

### **International Student Post-College Success**

The outcomes (O) of Astin's model (1999) described the achievement of students after college related to GPA, graduate school, professional school, and life-long learning. Though there is a scarcity of research on the post-graduation success indicators regarding international students, the research on domestic students by Kuh et al., (2006) also supported the idea that post college success focused on GPA, admission into graduate or professional school, acquisition of employment, and lifelong learning. The impact of college on each of the four outcomes are difficult to measure due to the multitude of factors that can have an indirect or direct impact on the outcomes. For instance, meeting with a faculty member, time spent studying, or regular class attendance are direct impacts on student success. Whereas, living in a residence hall does not in itself constitute a direct impact. Rather, the direct impacts of living in a residence hall depend on academic support programs offered, co-curricular activities, and other social engagements in

which students participate. Thus, to understand the impact college has on student success after college, it is important to understand that there are many direct and indirect impacts on student success and the formula for success is different for each student (Kuh et al., 1993; Pascarella & Terenzini, 2005).

As Stoyhoff (1997) pointed out, international students face a multitude of challenges in their attempt to achieve success including language barriers, lack of support systems, differences in culture, varying academic environments, different teaching methods, etc. Thus, enhancing international students' academic environment and encouraging involvement in academic related activities is crucial in determining what factors may impact post college success. Though Kuh et al., (2006) posited there is a scarcity of research on post-graduation success indicators for international students, research shows academic success can be achieved when certain conditions are bolstered (Zhao, Kuh, & Carini, 2005). Earlier research by Boyer and Sedlacek (1987) found that successful international students were better able to achieve higher GPA when they possessed high levels of self-confidence and had a strong social support system. Haydon (2003) found that international students who were better able to adapt culturally and were able to develop a strong social network had higher levels of academic success. As international students are able to achieve academic success, their ability to get into graduate school or to acquire employment is also improved. Crossman and Clarke (2010) postulated that international student employment after college was not only their ability to graduate from college, but also a product of developed career networks, learning soft skills, and understanding cultural differences within the host country. Cranmer's (2006) research added that it is important for international students to seek additional job training while in college to improve chances of acquiring a job after college as well as improve overall career success.

## Summary

Research indicates that there were over one million international students who attended college in the United States in 2017-2018 (Institute of International Education, 2018). International students provide a host of cultural experiences, global perspectives, educational benefits and billions of dollars in revenue (Andrade, 2006; Mamiseishvili, 2012). Unfortunately, international students struggle to persist in college due to their lack of social support networks, cultural differences, academic differences, lack of acceptance by domestic college students, language barriers, as well as financial difficulties (Russell, Rosenthal, & Thomson, 2009). Research on how universities aide international students in overcoming these challenges indicates a lack of knowledge about international students' unique transition issues as well as differences in cultural, personal and academic backgrounds (Korabova, 2012). Similarly, there is a lack of research on what combination of factors impact retention and persistence levels of international students (Mamiseishvili, 2012). Universities within the U.S. must develop a more coherent and organized system for assessing needs and differences in culture, learning styles, as well as social adjustment issues in order to better assist international students' success (Zhou, Jindal-Snape, Topping, & Todman, 2008). As Obst and Forster (2005) posited:

It is hard to overestimate the importance of international student to U.S. higher education. The international students' study at thousands of college and universities in all 50 U.S. states. They contribute to the diversity and internationalization of their classrooms, their campuses and their communities. They also contribute to the preeminence of U.S. research and development, and to the U.S. economy with expenditure estimated at \$13 billion. The U.S. Department of Commerce ranks international education as the 5<sup>th</sup> largest service sector export. (p. 3).

## Mindset

While research has shown what factors aid academic success for domestic students, research regarding what factors aid international students has shown that institutions within the U.S. continue to struggle with how to help international students succeed (Andrade, 2006; Kwai, 2010; Mamiseishvili, 2012; Korabova, 2012; Pinheiro, 2001). Institutions within the U.S. continue to face difficulties in helping international students adapt to the new culture, English as a second language, differences in academic structure, and personal adjustment issues such as loneliness and lack of familial support (e.g., Kaczmarek, Matlock, Merta, Ames, & Ross, 1994; Schulte & Choudaha, 2014; Zhai, 2002). Few studies have focused on how to help international students succeed in institutions within the U.S. (Andrade, 2006). As a great deal of research regarding international students focuses on their challenges studying in the U.S. and developing appropriate coping mechanisms to contend with culture shock and the lack of a family or friend support network, research on coping strategies for international students is even more scarce (Mamiseishvili, 2012). Fortunately, research has shown international students possess resiliency and the determination to earn a degree due to their beliefs about the value of education and their future-oriented perspective (Andrade & Evans, 2009). Institutions can capitalize on this resiliency and develop strategies to bolster international student success.

One potential strategy colleges can use to support international students and help improve overall academic success is by enhancing their *mindsets* around their perceptions of their intellectual ability, academic achievement, and their ability to overcome social and psychological challenges (Dweck, 2006). Using what social psychologists define as implicit theories of intelligence (e.g., Dweck, 1999; Dweck, Chiu, & Hong, 1995; Mueller & Dweck, 1998; Yeager & Dweck, 2012), the theory suggests an individual's beliefs regarding intelligence explain how



intelligence can be *fixed* or *growth* oriented. An individual's beliefs about their *mindset*, lie on a continuum. Thus, an individual's *mindset* can vary in degree (Dweck & Leggett, 1988). Research has demonstrated that having a *growth mindset* can improve learning and academic success from elementary through college years (Paunesku, Walton, Romero, Smith, Yeager, & Dweck, 2015).

Research on *mindset* interventions on college campuses has shown significant improvements in academic success with underserved populations and first-generation college students (Yeager, Walton, Brady, Akcinar, Paunesku, Keane & Gomez, 2016). Research by Rattan, Savani, Chugh, and Dweck (2015) also postulated that properly executed *mindset* interventions can increase motivation, grades, and reduce achievement gaps across race, gender, and class. Related research by Paunesku et al., (2015) showed *mindset* interventions can be effective in one or two sessions and can be scalable to large groups and provided online.

As colleges continue to find new strategies to improve academic success (Tinto, 1993), research shows that high school GPA, academic preparation, socio-economic status, ethnic background, and an individual's status as a first-generation college student are strong determinants of academic success for college students studying within the U.S. (Harvey 2001; Kuh et al., 2006; Pascarella & Terenzini, 2005; Swail, 2003; Tinto, 2006). However, helping students to develop a *growth mindset* can help students gain an extra advantage.

### **History of Mindset**

Most noted for her work on *mindsets* is Stanford University researcher, instructor, and psychologist, Carol Dweck. Dweck spent most of her early research on *mindset* studying k-12 students and worked for over 30 years to understand the assumptions individuals held regarding the malleability of intelligence, the impact on future learning abilities, and the motivation to achieve (e.g., Dweck & Leggett, 1988; Dweck, Chiu & Hong, 1995; Yeager & Dweck, 2012).

Dweck (1999) purported that individuals develop certain beliefs about their intelligence on a continuum involving both *growth mindset* (incremental theory of intelligence) or a *fixed mindset* (entity theory of intelligence). Individuals with a *fixed mindset* believe that intelligence cannot be improved and will usually focus on trying to appear smart and avoid looking incompetent while sacrificing actual learning. In contrast, individuals who possess a *growth mindset* believe intelligence can be improved through increased effort and mastery-oriented learning. *Growth mindset* individuals sacrifice trying to appear smart and instead focus on learning (Dweck, 1999; Yeager & Dweck, 2012).

### **How Mindset Develops**

Like any other belief, *mindset* develops from how we see or experience the world, observe others, and learn from those around us (Walters, 2015). An individual's beliefs about their intelligence or their abilities can grow into either a *growth* or *fixed mindset*. Dweck's (2013) research pointed out that *growth* and *fixed mindsets* in children are usually developed by the type of praise given to them by authority figures such as parents or teachers. Unknowingly, authority figures attempt to reward a child for learning information or a skill by telling the child how smart they are, focusing on scores or grades, and/or how quickly they learned something. This type of praise usually results in the individual developing a "label" of being smart or quick. Thus, the individual will often try to repeat the behavior of learning, replicating the score, or doing so quickly in order to receive the praise (Dweck, 2013). Praising an individual in this manner would seem normal and initially appear advantageous. However, Dweck (2013) posited individuals praised in such a manner can negatively impact the individual as the focus is on speed and appearing smart. Often times, positive praising of students occurs in kindergarten through sixth grade. However, as Dweck (2013) also noted, around the time students matriculate into seventh

grade, teachers use less positive praise and tend to challenge and expect more from students without offering as much praise and emotional support. Students sometimes respond to this lack of praise by questioning their old labels of being smart, intelligent, or fast at learning and deem themselves not as smart or as quick as they once were. This sometimes results in students questioning their ability to learn, what it takes to learn, how they compare with others, and their level of intelligence; sometimes resulting in a *fixed mindset* (Dweck, 2013).

Dweck's (2013) research found that individuals with a *fixed mindset* focus on scores and grades and often develop a helpless response to difficult tasks and can cause an avoidance to new challenges to prevent feeling incompetent. Often, when unable to solve a problem, *fixed mindset* individuals blame their failure on external causes rather than their own lack of effort. *Fixed mindset* individuals believe extra effort as a sign of weakness or lacking intelligence (Dweck, 2013). A *growth mindset* is usually enhanced when individuals are praised for their efforts and try different strategies to learn (Dweck, 2013). When confronted with failure, *growth mindset* individuals increase their efforts and blame only internal factors for failing. *Growth mindset* individuals learn difficult concepts through creative problem solving, enhanced effort, and mastery learning. This is usually a result of praise focused on the individual's process for learning, their level of effort, and a focus on support through mastery of concepts (Dweck, 1999).

### **Motivational Model of Achievement**

Dweck (1999) believed that *mindsets* influence motivation and describes an individual's cognitive affective behavioral patterns. The model helps to explain how motivation and personality can shed understanding on how individuals might think, act, and feel depending on whether they have a *fixed* or *growth mindset*. *Mindset* can impact all domains of life including

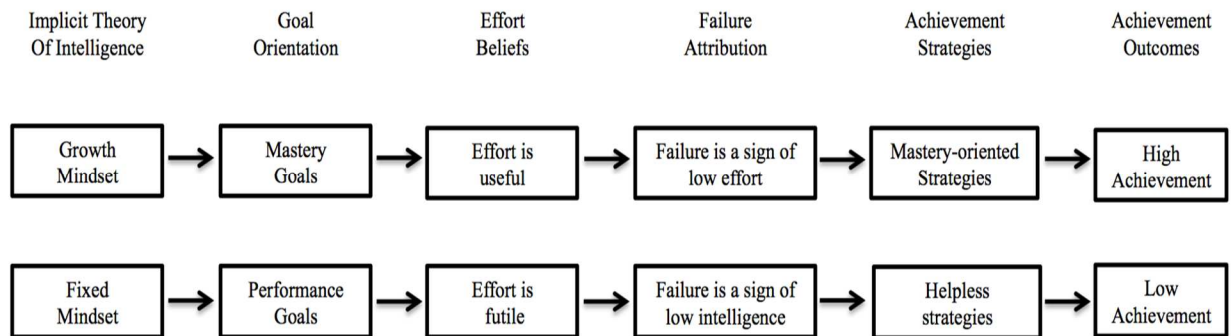
relationships, sports, music, art, etc. An individual's *mindset* can affect behavior, motivation, and a desire to succeed (Dweck, 2006).

Individuals will respond, behave, and perform tasks differently according to the degree to which they have a *growth or fixed mindset* (Dweck & Leggett, 1988). Haimovitz and Dweck (2016) added that *mindset* not only impacts motivation, but an individual's perceived ability to achieve something and how an individual sets goals and deals with setbacks with a sense of fortitude to succeed. *Mindset* can be so impactful that it can alter how a person raises or lowers performance expectations for themselves, as well as for others, based on a single instance (Rattan, Good, & Dweck, 2012). *Mindset* can also impact the type of goals an individual creates from easily achievable to more challenging and complex (Sevincer, Kluge, & Oettingen, 2014).

Dweck's (1999) motivational model of achievement begins with two opposing *Mindsets* (*growth, fixed*) and exhibits how mindset divert on (a) goal orientation (Dweck & Leggett, 1988; Grant & Dweck, 2003); (b) effort beliefs (Aronson, Fried, & Good, 2002; Hong, Chiu, Dweck, Lin, & Wan, 1999); (c) failure attribution (Henderson & Dweck, 1990; Stipek & Gralinski, 1996); (d) achievement strategies (Dweck & Sorich, 1999; Robins & Pals, 2002); and (e) achievement outcomes (see figure 4).

**Figure 4**

*Dweck (1999) Conceptual Motivational Model of Achievement*



*Note:* Found in Odom (2015)

The *mindset* model focuses on goals and goal-oriented behavior to further understand how individuals are motivated. Within the domain of intellectual achievement, Dweck and Leggett's (1988) research found that individuals concern themselves with one of two types of goals depending on whether they adopt a *growth* or *fixed mindset*. When a person identifies with a *fixed mindset*, the tendency is to utilize *performance goals* in which the focus is less on learning and more on appearing smart and avoiding potential embarrassment of appearing incompetent. Whereas, when a person utilizes a *growth mindset*, they develop *mastery goals* to focus on learning. Utilizing mastery goals encourages the individual to try different strategies and different perspectives to maintain focus and fortitude (Grant & Dweck, 2003).

Through additional effort, individuals utilizing a *growth mindset* see their effort as a useful strategy towards learning, mastery, and achievement. Individuals utilizing a *fixed mindset* with a focus on performance goals see effort as useless and an indication that they are not as smart as others who do not appear to need expend effort to appear smart. Thus, in comparing themselves with others, *fixed mindset* individuals mistakenly do not see or know the effort put

forth by *growth mindset* individuals and assume *growth mindset* individuals are naturally smart and do not need to expend effort to be smart (Dweck & Leggett, 1988).

Dweck and Leggett (1988) also reported individuals (children and adults) using a *helpless response pattern* see difficulties as failures, possess decreased ability, and quickly become overwhelmed. Sometimes these individuals would try to distract others from viewing their difficulties by redirecting the activity to focus on other positive attributes about themselves (Diener & Dweck, 1978). Individuals who end up with a *helpless response pattern* tend to blame their difficulties on external sources such as poor teaching, lack of preparation time, or a lack of time to accomplish the task. Whereas those utilizing a *mastery-oriented response* do not see difficulties as failure, rather they tend to see difficulties as opportunities to learn and blame their difficulties on internal sources such as not trying hard enough or needing to put more effort and time into the task (Dweck, 1999). As a result of their difficulties, individuals using a *helpless response pattern* tend to report negative self-talk, poor self-concept, and ultimately decreased self-esteem. Self-esteem for the *fixed mindset* individual is derived from outcomes showing the adequacy of the individual. In contrast, *mastery-oriented* individuals, rather than focusing on negative cognitions, focus on solution-oriented cognitions and have higher positive affect and optimism. More specifically, self-esteem for the *growth mindset* individual arises out of the use of learning goals (Dweck & Leggett, 1988).

Dweck and Leggett (1988) reported that individuals who utilize a *growth mindset* choose *learning goals* as a means to self-motivate, adopt a *mastery-oriented* response pattern to embrace the challenge, seek out new challenges and improve persistence. *Mastery-oriented* responses include time spent on task, studying, time management, and utilizing tutors. *Fixed mindset* individuals utilize a *helpless response pattern* and tend to avoid challenges, easily give up,

procrastinate, and see added effort as useless and reinforces the idea of being less intelligent than others. In Dweck's (1999) model, *mindset* helps explain how motivation and personality causes individuals to think, act, and feel differently; ultimately impacting achievement outcomes.

From the literature reviewed above, Dweck's (1999) *Mindset model* has the potential to positively impact student achievement, student success, and persistence. Further studies have shown that *growth mindset* can improve scores on tests (Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Yeager & Dweck, 2012); encourage students to use more effective learning strategies (Yeager & Dweck, 2012); recover from poor grades faster (Grant & Dweck, 2003); increase on-time graduation (Yeager et al., 2013); and decrease achievement gaps for black Americans and Latinx students (Aronson et al., 2002; Blackwell et al., 2007; Good et al., 2003).

### **Research on Growth Mindset on College Students**

Research on *mindset* in college students is growing. Recent research found *growth mindset* interventions for math courses in a community college decreased dropout rate by 50%. Specifically, 9% of students in the intervention group dropped out and only 20% of the control group dropped out (Paunesku, Yeager, Romero & Walton, as cited in Tough, 2014). In another study of 884 community college students, Paunesku (2013) found 13.3% more students in a *mindset* treatment group completed a semester long math course over a control group and earned higher grades. A *growth mindset* intervention study on first-year engineering students discovered that engineering students with a *growth mindset* were more likely to resolve problems with a more creative and innovative approach (Reid & Ferguson, 2011).

*Mindset* intervention research has reported multiple benefits to college students. Adelman (2006) and Lesgold and Welch (2012), found that *growth mindset* interventions improved *growth*

*mindsets* for students who had a history of academic challenges. A related study by Sriram (2010) found the promotion of *growth mindsets* in high-risk first year college students promoted increased academic effort and achievement. Aronson et al., (2002) also found *growth mindset* interventions were effective in helping black American and Caucasian college students improve their college GPA .21 units and increased their engagement academically. Cury, Da Fonseca, Zahn and Elliott (2008) found that students with a *growth mindset* had less anxiety about their academic performance. Research by Nussbaum and Dweck (2008) discovered that *fixed mindset* students had a tendency to negatively compare themselves with those who performed better academically. Hong et al., (1999) posited that students with a *growth mindset* who struggle academically were more likely to seek remedial help.

Overall, social psychologists have found that individual *mindsets* remain relatively consistent without *mindset* interventions over a period of a semester (Grant & Dweck, 2003) and four years (Robins & Pals, 2002). Unfortunately, if individuals with *fixed mindsets* do not participate in *growth mindset* interventions, researchers posited that academic challenges may persist. Within the domain of intellectual achievement, researchers found that students who participated in *growth mindset* interventions were more likely to adopt stronger *growth mindsets* and improved academically versus those who did not (Aronson et al., 2002; Chiu, Hong, & Dweck, 1997).

### **Mindset in Other Cultures**

Research regarding *mindset* and cultural differences by Spinath and Stiensmeier-Pelster (2001) found the *mindset* scale translated into German resulted in no cultural limitations for college students. A related study by Dweck (2007) found students from Hong Kong who possessed a *fixed mindset* were less likely to take a remedial English course when they were told



it would improve their scores. In another study by Rattan, Savani, Naidu, and Dweck (2012), cultural differences regarding *mindset* showed that Asian students were more likely to believe that intelligence is malleable compared to domestic students. One study revealed how two Finnish instructors who had opposing *mindsets* positively and negatively impacted their student's level of motivation and ability to learn (Rissanen, Kuusisto, Hanhimäki, & Tirri, 2018). Unfortunately, research on validating the *mindset* scale for international students studying in the United States is scarce.

Even with the many positive outcomes research has shown on *growth mindset*, not all studies supported the model. Through research by Odom (2015), he posited that *mindset* showed opposing *fixed and growth mindset* dimensions, but his research did not support a significant relationship between goal orientation (mastery goals vs. performance goals) and achievement strategies (mastery orientation vs helpless orientation). Instead, Odom (2015) posited that another factor, called academic self-perception, was also needed to influence achievement strategies. A study conducted at an elite university in Britain found little relation between *mindset* and academic achievement (Furnham, Chamorro-Premuzic, & McDougall, 2003). A study in Ireland focused on the relationship of *fixed mindset* and performance goals also found no significant relationship (O'Shea, Cleary, & Breen, 2010). Evidence of previous studies on *mindset* interventions previously discussed can be compared to the mixed results above and can serve as a compass towards future research.

### **Summary**

Research on *Mindset* has documented that one's self-perceptions of intelligence (*growth* or *fixed*), determines one's performance or goal orientation and leads to a mastery oriented or helpless response pattern (Dweck & Leggett, 1988). Furthermore, Dweck and Leggett (1988)

have purported that *mindset* orientation plays a causal role in determining the motivational level of students on their academic achievement. Because *mindset* has been shown to remain stable without some form of *growth mindset* intervention (Grant & Dweck, 2003; Robins & Pals, 2002), those who utilize a *fixed mindset* may struggle to achieve their academic and personal goals. Fortunately, as previous research has shown, intelligence is malleable, and a *growth mindset* can influence learning (Gutshall, 2013), improve persistence (Sevincer et al., 2014), and improve motivation (Dweck, 1986). Dweck's (1999) *Mindset* model has been shown to help understand student motivation in K-12 as well as in college students in the United States Paunesku (2013). *Mindset* interventions have also shown to aid domestic college students improve their *growth mindset*. Unfortunately, research is extremely scarce demonstrating that the *mindset* scale is valid when administered to international students studying within the U.S.

With the multitude of challenges facing international students studying within the U.S., more must be done to enhance their ability to succeed academically and personally. Dweck's (2016) recent research on *mindset* demonstrated improved motivation, learning, and overall academic success for students when a *growth mindset* is fostered. The primary goal of this study is to determine whether or not the *mindset* scale is valid for use with international students studying in the U.S. The secondary goal was to determine if international students' GPA, age, first-generation status, English-speaking skills, year-in-school or gender had any impact on international students' scores using Dweck's (1999) 8-item *Mindset* sub-scale. Although *mindset* influences all domains such as sports, self-concept, and relationships (Dweck, 2006), this study will focus predominantly on the domain of intelligence.

### CHAPTER 3. METHODS

The primary purpose of this study was to determine whether or not Dweck's (1999) 8-item *Mindset* sub-scale (also referred to in the literature as Implicit Theories of Intelligence Scale) could be used with international students studying within the U.S. Furthermore, the study investigated whether or not participant differences in GPA, age, first-generation status, English language proficiency, year-in-school, or gender had any impact on scale results. Research participants ( $n = 1802$  domestic students,  $n = 275$  international students) responded to Dweck's (1999) 8-item *Mindset* sub-scale. The scale is comprised of questions regarding intelligence and talent. For the purposes of this study, only the eight questions regarding intelligence in the scale were analyzed. It is important to note that there are several versions of the *Mindset* scale within the research that have varying levels of validity.

The research questions for this study included:

1. Is Dweck's (1999) 8-item *Mindset* sub-scale valid for international college students studying in the United States?
2. Does GPA, age, first-generation status, English speaking skills, year-in-school, or gender have any impact on the use of Dweck's 8-item *Mindset* sub-scale with international college students studying within the U.S.?

To determine the validity of Dweck's (1999) 8-item *Mindset* sub-scale for international students (research question 1), a multiple-sample confirmatory factor analysis (CFA) was specified for both groups (domestic and international students) with tests for invariance. Parameters were estimated using maximum likelihood. Both the model trimming ("step-down") and building approaches arrived at the same final model. Within research question two, differences within the sub-group of international students were determined by using seemingly

unrelated regression (Zellner, 1962). By using a CFA, the theoretical model is compared with the observed structure of a sample group. Thus, for research question one in this study, *mindset* scores for domestic students (theoretical model) will be compared to the *mindset* scores of international students (sample) to determine if there are any significant differences. The CFA analysis is the appropriate tool to use due to the fact that (1) the *mindset* scale is based on pre-developed theory; (2) the CFA examines the adequacy of item-to-factor associations; and (3) the CFA examines the construct validity of the scale (Hair, 2006). The design of the study, participants, data collection, analysis methods, and delimitations are presented below.

### **Research Design**

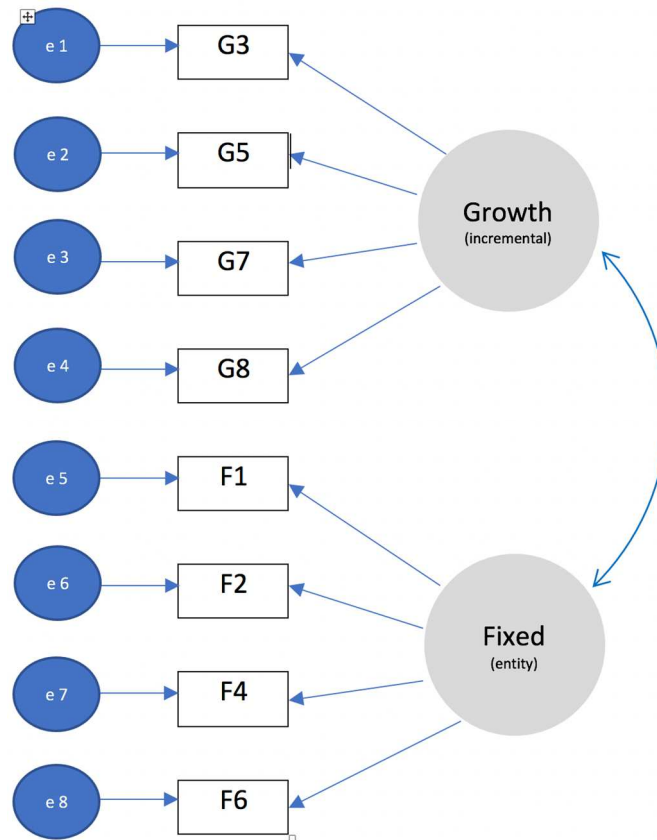
A multiple-sample confirmatory factor analysis with invariance (CFA) was used to analyze the *Mindset* scale data on a sample of domestic and international students from a large midwestern research university (Research question 1). The initial model (Figure 5) was specified for both groups (domestic and international students). Parameters were estimated using maximum likelihood. Both the model trimming (“step-down”) and building approaches arrived at the same final model.

CFA is a multivariate statistical process that tests how well measured variables represent the constructs. The goal of CFA is to determine the number of and type of factors (latent variables) that account for variation and covariation between indicators while confirming or rejecting measurement theory. Dweck’s (1999) *Mindset* model used within this study is made up of two latent factors (*growth, fixed*) with four indicators per factor. Early research by Dweck, Chiu, and Hong (1995) argued for a single construct for *Mindset*, with only unpublished research for evidence. More recent research (De Castella & Byrne, 2015; Lüftenegger & Chen, 2017; Spinath et al., 2003; Tempelaar, Rienties, Giesbers, & Gijsselaers, 2014) provided more robust

evidence that supports a two-factor model. Thus, within this research, the *growth* and *fixed* factors are two separate constructs, each with four indicators (see Figure 5).

**Figure 5**

*Dweck's (1999) Two-part Construct Using the Eight-item Mindset Sub-Scale Model*



*Note.* G3, G5, G7, G8 represents “*growth*” items within the scale; F1, F2, F4, F6 represents “*fixed*” items within the scale. e 1-8 represent errors for each item. Loadings, covariances, and variances represented by the arrows, are not included in this figure.

A major aspect of CFA is to test the reliability of the observed variables. The CFA requires a sample size of 5-20 cases per parameter estimate, contain multivariate normality, utilize random sampling, and use a priori model specification (Brown & Moore, 2012). CFA is a heavily used technique that is often used with measurement invariance to measure differences across groups and time (Milfont & Fischer, 2010). Measurement invariance (MI) is a statistical procedure that assesses the equivalence of a construct(s) across groups. Thus, if MI is supported,

it means that the construct has the same meaning across different groups. This study compared two different groups (domestic, international students) across cultures. As Steenkamp and Baumgartner (1998) pointed out in their research, “The most powerful and versatile method for testing such cross-cultural invariance is the multigroup, confirmatory factor analysis” (p. 823) (Runyan, Ge, Dong, & Swinney, 2011). Researchers conduct studies utilizing measurement invariance within CFA when the study involves a) comparisons between groups/individuals; b) when self-report scales are used; and c) when item sets are used to assess construct(s). Measurement invariance involves measuring an underlying construct(s) across groups or time. When scale items of the construct(s) are the same across groups and/or time, the scale is said to have measurement invariance (Bialosiewicz, Murphy, & Berry, 2013).

Measurement invariance involves four levels of testing beginning with configural invariance (CI). CI evaluates the overall fit of the model. CI determines whether or not the constructs have the same pattern of *fixed* or free loadings. If CI is determined to be supported, the construct pattern loadings are similar across the two groups (domestic, international students). If noninvariance is determined, the latent factor loadings differ across groups and either 1) the construct must be redefined, or 2) the construct is noninvariant and testing may stop (Putnik & Bornstein, 2016).

If there is CI, metric invariance (MI) is then tested by determining to what degree each item contributes to the latent construct across the groups. This is done by constraining factor loadings to be equal in both groups. The factor loading model is then compared to the CI model to determine fit (see upcoming section on “fit”). If the fit in the MI model is worse than in the CI model, MI is not supported. If fit is not significantly worse, then MI is said to be supported (Putnik & Bornstein, 2016).

At the third level of measurement invariance testing, scalar invariance (SI) is tested. Full or partial MI must be supported to test for SI. SI involves mean differences of the construct and include all mean differences in the shared variance of the items. Item intercepts are constrained to be equal in both groups during SI (MI constraints are also retained). The constrained SI model is then compared for fit with the MI model. If fit is not worse than in the MI model, SI is supported (Putnik & Bornstein, 2016).

Residual invariance (RI) is the final level for determining measurement invariance, if SI is supported. RI is determined when the sum of specific variance and error variance is similar across groups. This is accomplished by constraining item residuals to be equal in both groups (SI constraints are retained). The RI and SI models are compared to determine if fit has not changed significantly. If the fit has not changed too much, then RI is supported (Putnik & Bornstein, 2016). Full measurement invariance can often be difficult to acquire. Thus, partial invariance has increasingly become more accepted in research (Putnik & Bornstein, 2016). Partial invariance can be achieved by releasing constraints on factor loadings, intercepts, or both (Putnik & Bornstein, 2016).

Research by Kline (2015) outlines measurement invariance testing is completed by determining how well the specified model *fits* the observed data through the uses of multiple fit statistics. Commonly used fit statistics include chi-square ( $X^2$ ), Root Mean Square Error of Approximation (RMSEA) (Steiger & Lind, 1980), Standardized Root Mean-Square Residual (SRMR), Comparative Fit Index (CFI) (Bentler, 1990), and Tucker-Lewis Index (TLI). Good global fit for the fit statistics used within this paper include:  $RMSEA \leq .08$ ;  $SRMR \leq .10$ ;  $CFI \geq .90$ ; and  $TLI \geq .90$ . If the differences between the two models are too large, the model would not *fit* the data and the model and/or its factors would need reexamination (Awang, 2012). After

measures of invariance (configural, metric, scalar and residual) and model fit have been conducted, the group means of the latent constructs can be studied. In order to be compared to other studies, effect size statistics like Cohen's (1988)  $d$ , should be calculated.

To answer research question two, "Does GPA, age, first-generation status, English speaking proficiency, year-in-school, or gender have any impact on the use of Dweck's 8-item *Mindset* sub-scale with international college students studying within the U.S.?", the study employed Zellner's (1962) seemingly unrelated regression model (SUR). It is a generalization of the linear regression model and is useful for simultaneously estimating a system of nonparametric regressions whose error terms are assumed to be correlated. The model is useful for finding subtle interactions in different aspects of behavior. This is done by each behavior being represented by an individual regression equation. Thus, the model is a system of linear equations with correlated errors across equations for each individual, but not uncorrelated across individuals. Each equation has its own dependent variable with different exogenous explanatory variables. Each equation is estimated separately, which is why the model is called seemingly unrelated regressions (even though error terms are correlated). Properties of the SUR model includes a) efficiency gains when the equations are only related through the error term; b) the parameters in the model vary across equations; and c) regressors vary between equations depending on the model.

### **Study Participants**

Participants for this study comprised of male and female domestic and international students from Iowa State University, a large midwestern research institution. The 2020 enrollment summary included 26,846 undergraduates and 4,352 graduate students, 56% males



and 44% females, 4,546 international students, and over 5000 females participating in STEM fields.

A minimum response rate of 200 domestic and 200 international students was the goal for this study. The study was shared with and endorsed by the Director of the International Students Office at the institution in case questions arose with international students. The study was approved by the Institutional Review Board (IRB). Once approval was granted, respondent emails were requested through the Office of the Registrar at Iowa State University. Students were sent an email (Appendix A) to request their participation. The email request included the link to access the *mindset* scale through *Qualtrics*. Students read the email to determine their desire to participate. Those who chose to participate clicked on the scale link where they were provided and read the informed consent (Appendix B). Students were subsequently told, “clicking on the next page” will take them to the scale questions. Students then responded to Dweck’s (1999) 8-item *Mindset* sub-scale (Appendix C).

The survey was sent out to 33,290 students comprised of 25,287 domestic undergraduates, 3,029 international undergraduates. Domestic undergraduates included 3,457 and international graduate students included 1517. A total of 2561 participants submitted responses for the study, resulting in a response rate of 7.7%. There were 475 respondents with more than half of the questions missing data, and so these participants were eliminated. The final participant number was 2084. Domestic students comprised 87% ( $n = 1802$ ) of the 2084 respondents. International students comprised 13% ( $n = 275$ ) of the overall respondents (see Table 1).

**Table 1***International Students (n = 275) and Domestic Student (n = 1802) Characteristics*

Characteristic	International Number	Domestic Number	Total Number
<b>Age Frequencies (n)</b>			
18	8	380	388
19	23	348	371
20	37	394	431
21	32	369	401
22-25	76	193	269
26+	98	118	216
<b>Gender</b>			
Female	119	1116	1235
Male	156	662	818
All Others	0	19	19
<b>First-generation</b>			
Parent(s) attended college	203	1509	1712
No parent(s) attended college	67	276	343
Unknown	5	21	26
<b>Year in School</b>			
First Year	24	415	439
Second Year	27	367	394
Third Year	46	429	475
Fourth Year	66	470	536
Masters	30	49	79
Doctorate	82	76	158
Post-Doctorate	0	0	0
<b>English Language Skill</b>			
Extremely well	99	1617	1716
Somewhat well	127	178	305
Neither well nor poor	34	6	40
Somewhat poor	13	2	15
Extremely poor	2	2	4

Since the study is focused on international students attending college in the United States, survey questions included age, gender, first-generation status, GPA, country of origin, and English language proficiency (Appendix C). Biemans and Van Mil (2008) posited that factors such as English language proficiency, cultural differences, and how students respond to differences in the academic environment are particularly important as these factors can positively

or negatively influence students' responses on tests or responding to scales. Research has also shown that international students experience difficulty within classrooms in the U.S. as they tend to learn differently than their domestic counterparts as they (a) focused on rote memorization of material; (b) utilized deeper processing of information; and (c) and focused on components of data and how they can apply the data to other problems (Biemans & Van Mil, 2008). Pinheiro (2001) discovered Chinese students learn differently than their domestic counterparts due to language structure, took more time to respond to instructors out of respect, and viewed the instructor as the ultimate source and provider of knowledge and therefore rarely questioned the instructor's expertise. To anticipate such differences, it was important to ascertain the countries of origin for international student respondents (see Table 2).

**Table 2**

*Countries of Origin for International Students (n = 275)*

<b>Region (country)</b>	<i>n</i>
<b>Africa</b> (Egypt, Malawi, Nigeria)	8
<b>Central Africa</b> (Rwanda)	1
<b>Eastern Africa</b> (Kenyan, Uganda)	5
<b>Western Africa</b> (Burkinabe, Ghana)	2
<b>Asia</b> (UAE, Nepal, Persia, Philippines)	2
<b>Central Asia</b> (Afghanistan, Kazakhstan)	1
<b>Eastern Asia</b> (China, Japan, Korean, Taiwan)	91
<b>Southern Asia</b> (Bangladesh, India, Pakistan, Palestine, Sri Lanka, Urdu)	78
<b>Western Asia</b> (Iran, Kuwait, Saudi Arabia, Turkey)	15
<b>South East Asia</b> (Indonesia, Malaysian, Vietnam)	29
<b>Europe</b> (Germany, Portugal)	2
<b>Central Europe</b> (Czechoslovakia, Italy)	1
<b>Eastern Europe</b> (Russia)	1
<b>Western Europe</b> (France)	1
<b>Central America</b> (Panama)	1
<b>North America</b> (Canada)	1
<b>South America</b> (Argentina, Brazil, Columbia, Costa Rica, Honduras, Peru, Uruguay, Venezuela)	24
<b>Unknown</b>	12

## Instrumentation

This study utilized Dweck’s (1999) 8-item *Mindset* sub-scale, also known as the Implicit Theories of Intelligence Scale. The instrument is a self-report scale that measures an individual’s perceived level of intelligence and talent as either *growth* or *fixed*. The scale uses a six-point Likert format ranging from strongly disagree to strongly agree. Students were asked to review each item statement and subsequently rated their level of agreement or disagreement. Items 3,5,7,8,11,13,15, and 16 of the scale are *growth* (incremental) statements related to intelligence and talent and items 1,2,4,6,9,10,12, and 14 are *fixed* (entity) statements also related to intelligence and talent. For this study, only the domain of intelligence was measured. The *fixed* and *growth mindset* statements regarding intelligence can be seen in table 3 (see Appendix C for the complete list). The reliability for the scale shows high internal reliability range of  $\alpha = .93 - .95$ . Test-retest reliability over one week was  $\alpha = .82$  and  $\alpha = .71$  over a four-week interval (Levy, Stroessner, & Dweck, 1998). Good discriminate validity of the scale is shown as it is unaffected by social desirability, intellectual ability, or political beliefs (De Castella & Byrne, 2015).

**Table 3**

*Dweck’s (1999) 8-item Mindset Scale Statements (Implicit Theories of Intelligence Scale)*

Intelligence Formulations	
Item 1: F	You have a certain amount of intelligence, and you really can’t do much to change it
Item 2: F	Your intelligence is something about you that you can’t change very much
Item 3: G	No matter who you are, you can significantly change your intelligence level
Item 4: F	To be honest, you can’t really change how intelligent you are
Item 5: G	You can always substantially change how intelligent you are
Item 6: F	You can learn new things, but you can’t really change your basic intelligence
Item 7: G	No matter how much intelligence you have, you can always change it quite a bit
Item 8: G	You can change even your basic intelligence level considerably

## **Data Collection and Analysis**

The 2084 participants for this study were contacted via institutional email addresses obtained from the Iowa State University Registrar's Office. Data was downloaded from the Qualtrics survey using a csv file into Excel. This study employed a non-experimental quantitative approach with Likert-type questionnaire. The data screening procedure began with removing participants who failed to respond to 50% or more of the *mindset* items. This resulted in more than 475 participants being removed from the study. Data was labeled and numerically coded and reviewed. Additional data removed from the study included participants who chose the same number across all questions or those individuals who did not respond to the demographic questions (% of deleted data was <.1%). Responses to these questions were necessary to demonstrate the scales validity for international students as well as to determine the answers to research question two. Outliers were determined to be three standard deviations from the mean. Only four outliers were found in the data set resulting in less than .2% of outliers, which is consistent with a normal distribution. There was no statistical or theoretical reason to remove the outliers and all four outliers were left in the study. The data was entered into STATA (version 15). Descriptive statistics and frequency counts for demographic characteristics were obtained and shared.

## **Limitations**

Limitations of this study included possible sample bias due to not having equal representation of international students from the various countries, as well as differences in sample size across domestic and international students, and the larger sample of domestic female ( $n = 1116$ ) to domestic male ( $n = 662$ ) respondents may have influenced the outcome of the study.

Delimitations for the study may limit generalizability of the results as the participant sample was derived from a single institution located in the central United States. A larger sample of international students may have added increased representation from countries across the globe. Gender was analyzed using only binary male and female. Further research into all genders would make this a more generalizable study.

### **Summary of the Methods**

1. The international student population was selected as the target group for this study.
2. The 8-item *Mindset* sub-scale by Carol Dweck (1999) was selected as the instrument to determine its validity for use with the international college students studying within the U.S.
3. A return rate of 200 students was the goal for the number of participants.
4. IRB approval was requested.
5. An email asking for participation, explaining the study, and a link to the informed consent and instrument were sent to potential participants.
6. A follow-up email was sent to those that did not respond to the initial request one week after the initial request.
7. A second follow-up email was sent to those that did not respond to the initial request one week after the second request.
8. Scores were obtained, cleaned, recorded, and kept confidential for each respondent.
9. Descriptive statistics were calculated.
10. A confirmatory factor analysis with maximum-likelihood estimation was used to assess measurement invariance for Dweck's (1999) *Mindset* sub-scale (research question one).

11. International student sub-groups were analyzed using Seemingly Unrelated Regression (Zellner, 1962) for differences between age, year in school, GPA, gender, English language proficiency, and first-generation college status (research question two).
12. The data was interpreted and analyzed; and conclusions were drawn. Results are provided in the next section.

### **Summary**

Chapter three provided a description of Dweck's (1999) 8-item *Mindset* sub-scale. A summary of participant characteristics was provided to show international and domestic student differences and similarities. Finally, an explanation for the use of the confirmatory factor analysis and measurement invariance was described to test the validity of Dweck's (1999) 8-item sub-scale for research question one. The Seemingly Unrelated Regression procedure was described and how it was used to determine sub-group differences for international students to answer research question two.

## CHAPTER 4. RESULTS

The purpose of this study was to determine whether or not Dweck's (1999) 8-item *Mindset* sub-scale could be used with international students studying within the U.S. A multiple-sample confirmatory factor analysis using maximum likelihood estimation was used to assess measurement invariance on the data set for the study. Furthermore, the study used the seemingly unrelated regression (Zellner, 1962) to investigate whether or not participant differences such as GPA, first-generation status, English speaking skills, or gender had any impact on the results of taking the *mindset* scale. The following research questions were utilized to determine the outcomes.

Thus, the research questions for this study included:

1. Is Dweck's (1999) 8-item *Mindset* sub-scale valid for international college students studying in the United States?
2. Does GPA, age, first-generation status, English speaking skills, year-in-school, or gender have any impact on the use of Dweck's (1999) 8-item *Mindset* sub-scale with international students studying within the U.S.?

Research participants ( $n = 1802$  domestic students,  $n = 275$  international students) responded to Dweck's (1999) 8-item *Mindset* sub-scale. The scale is comprised of questions regarding intelligence and talent. For the purposes of this study, only questions regarding intelligence (8-items) were analyzed. It is important to note that there are several versions of the *Mindset* scale within the research that have varying levels of validity. Participants were also asked to provide information on their GPA, age, year-in-school, first-generation status, English speaking skills, and gender to determine if there were any impacts on their responses to the *Mindset* scale. Analyses and the interpretation of the results are provided below.



## Descriptive Statistics and Correlations

To review the relationships between *growth* and *fixed* items, descriptive statistics show participant data (domestic  $n = 1802$ ; international students  $n = 275$ ) including means, standard deviations, and correlations (see Table 4). Positive correlation between items indicate there is overlap between items and a negative correlation indicates as one item goes up, the other item goes down in value and the items do not represent the same constructs. Correlations for domestic students ( $n = 1802$ ) expectedly show that all *fixed* items correlated with themselves as do all *growth* items. *Growth* and *fixed* items are negatively correlated with each other. In terms of domestic students, the mean scores for *fixed mindsets* were  $\bar{x} = 2.91$  and the mean scores on the *growth* variable were  $\bar{x} = 5.08$ , indicating that domestic students self-reported having a stronger *growth mindset* than *fixed mindsets*.

**Table 4**

*Domestic & International Descriptive Statistics (n = 1802, n = 275)*

	f1	f2	f3	f4	g1	g2	g3	g4	
Domestic ( $n = 1802$ )									
Correlations	f1	1.0000							
	f2	0.8169	1.0000						
	f3	0.7291	0.7838	1.0000					
	f4	0.6607	0.6572	0.6458	1.0000				
	g1	-0.5954	-0.6250	-0.6193	-0.5480	1.0000			
	g2	-0.5814	-0.5978	-0.6023	-0.5606	0.7258	1.0000		
	g3	-0.5605	-0.5816	-0.5974	-0.5954	0.6994	0.7343	1.0000	
	g4	-0.5680	-0.5940	-0.5847	-0.6668	0.6634	0.6829	0.7365	1.0000
<i>M</i>		2.861	2.694	2.592	3.491	5.292	4.983	5.025	5.014
<i>SD</i>		1.466	1.378	1.316	1.595	1.364	1.392	1.328	1.349
International ( $n = 275$ )									
Correlations	f1	1.0000							
	f2	0.8171	1.0000						
	f3	0.7274	0.7060	1.0000					
	f4	0.6769	0.7115	0.7106	1.0000				
	g1	-0.5562	-0.5409	-0.5894	-0.6036	1.0000			
	g2	-0.5226	-0.5295	-0.5551	-0.5859	0.7609	1.0000		
	g3	-0.4112	-0.4570	-0.4947	-0.4466	0.5823	0.5307	1.0000	
	g4	-0.5006	-0.4887	-0.5649	-0.5867	0.7488	0.6739	0.6934	1.0000
<i>M</i>		3.698	3.618	3.262	3.760	4.964	4.815	4.993	4.749
<i>SD</i>		1.788	1.829	1.688	1.668	1.600	1.607	1.492	1.561

*Note.* f = *fixed*; g = *growth*

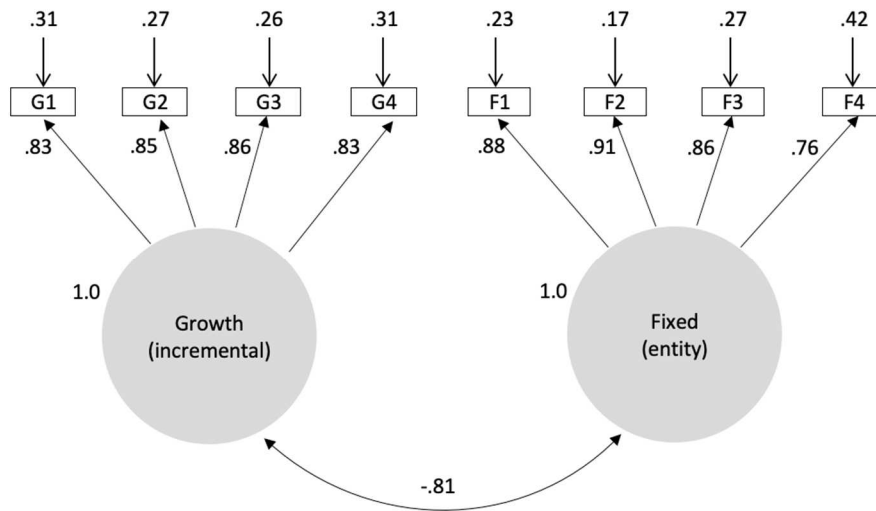
Correlations for international students ( $n = 275$ ) expectedly show that all *fixed* items correlated with themselves as do all *growth* items. *Growth* and *fixed* items are negatively correlated with each other. For international students, the mean scores for *fixed mindsets* were  $\bar{x} = 3.58$  and mean scores on the *growth* variable were  $\bar{x} = 4.88$ , indicating that international students self-reported having a stronger *growth mindset* than *fixed mindsets*. Compared to domestic students, international students reported a lower mean *growth mindset* score ( $\bar{x} = 5.08$  domestic vs  $\bar{x} = 4.88$  international).

### **Research Question 1**

The primary research question for this study was: Is Dweck's (1999) 8-item *Mindset* subscale valid for international college students studying in the United States? A multiple-sample confirmatory factor analysis with invariance was used to analyze the data. The initial model was specified for both groups (domestic and international students). Parameters were estimated using maximum likelihood using STATA (version 15). Both the model trimming ("step-down") and building approaches arrived at the same final model (see Figures 6 and 7). The model showed general configural invariance (i.e., "equal forms") regarding the number of factors and assigned loadings with both latent variables *fixed* to 1.0. There was a slight structural noninvariance across the groups for the correlation between the two factors. Partial metric invariance was achieved across groups. Specifically, the loadings for item f4 on the *fixed* factor and item g2 on the *growth* factor were the only invariant loadings. However, all corresponding parameter estimate pairs that were noninvariant were in the same orientation (e.g., both were positive).

**Figure 6**

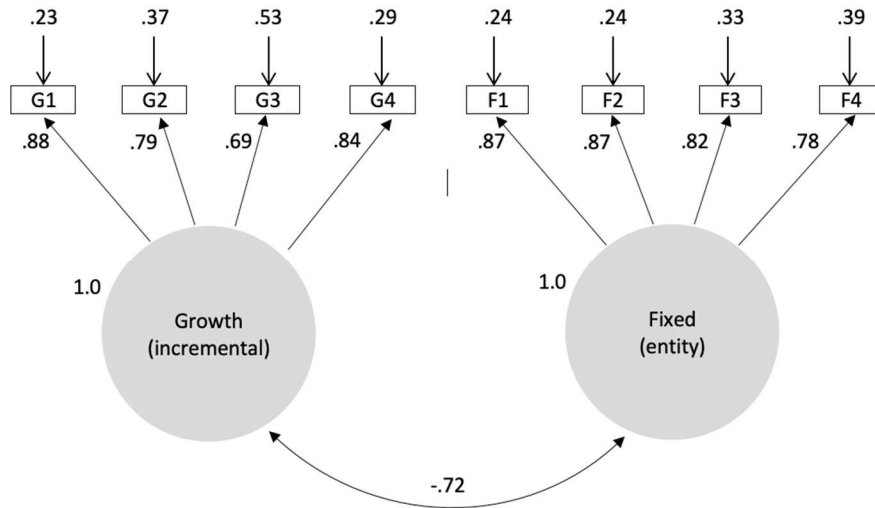
*Standardized Solution for the Domestic Measurement Model (n = 1802)*



*Note.* Single-headed arrows (and associated numbers) represent regression weights (loadings), double-headed arrows represent covariances, and stand-alone numbers represent variances. F1-4 and G1-4 represent questions seen in Appendix C.

**Figure 7**

*Standardized Solution for the International Measurement Model (n = 275)*



*Note.* Single-headed arrows (and associated numbers) represent regression weights (loadings), double-headed arrows represent covariances, and stand-alone numbers represent variances. F1-4 and G1-4 represent questions seen in Appendix C.

In the domestic student measurement model, all factor loadings were relatively high and statistically significant with a  $p$  value of  $< .001$ . The factor variances were set to 1.0 and the covariance between the two constructs ( $r = -.0812$ ) was statistically significant with a  $p < .001$  (see Table 5).

**Table 5**

*Unstandardized and Standardized Parameter Estimates for Domestic Students (n = 1802)*

Parameter	Unstandardized	Standardized	SE	$z$	$p$	[95% Conf. Interval]		
Loadings								
<i>Fixed</i>	f1	1.295	0.877	0.028	46.99	$< .001$	1.241	1.349
	f2	1.264	0.911	0.025	50.06	$< .001$	1.215	1.314
	f3	1.135	0.857	0.025	45.14	$< .001$	1.086	1.185
	f4	1.228	0.762	0.031	40.24	$< .001$	1.169	1.288
<i>Growth</i>	g1	1.144	0.834	0.027	42.88	$< .001$	1.092	1.197
	g2	1.200	0.854	0.026	46.60	$< .001$	1.149	1.250
	g3	1.150	0.860	0.025	45.16	$< .001$	1.100	1.200
	g4	1.124	0.828	0.027	42.39	$< .001$	1.072	1.176
Variances								
	e.f1	0.501	0.230	0.022			0.459	0.547
	e.f2	0.330	0.171	0.017			0.297	0.365
	e.f3	0.466	0.266	0.020			0.429	0.506
	e.f4	1.088	0.419	0.041			1.011	1.171
	e.g1	0.575	0.305	0.024			0.529	0.624
	e.g2	0.535	0.271	0.023			0.491	0.583
	e.g3	0.464	0.260	0.021			0.425	0.507
	e.g4	0.579	0.314	0.024			0.534	0.628
<i>Fixed</i> <sup>a</sup>		1.000	1.000				---	---
<i>Growth</i> <sup>a</sup>		1.000	1.000				---	---
Covariance								
<i>Fixed, Growth</i>		-0.812	-0.812	0.010	-77.66	$< .001$	-0.833	-0.792

*Note.* Variances of both factors set at 1.0.

In the international student measurement model, all factor loadings were relatively high and statistically significant with a  $p$  value of  $< .001$ . The factor variances were set to 1.0 and the covariance between the two constructs ( $r = -.071$ ) was statistically significant with a  $p < .001$  (see Table 6).

**Table 6***Unstandardized and Standardized Parameter Estimates for International Students (n = 275)*

Parameter		Unst.	Stand.	SE	z	p	[95% Conf. Interval]	
Loadings								
<i>Fixed</i>	mi_f_1	1.490	0.870	0.072	20.72	< .001	1.349	1.631
	mi_f_2	1.529	0.873	0.073	20.97	< .001	1.386	1.672
	mi_f_3	1.332	0.820	0.071	18.87	< .001	1.194	1.470
	mi_f_4	1.228	0.783	0.031	40.24	< .001	1.169	1.288
<i>Growth</i>	mi_g_1	1.343	0.876	0.063	21.37	< .001	1.220	1.466
	mi_g_2	1.200	0.793	0.026	46.60	< .001	1.149	1.250
	mi_g_3	0.996	0.686	0.073	13.70	< .001	0.854	1.139
	mi_g_4	1.263	0.842	0.066	19.22	< .001	1.134	1.392
Variances								
	var(e.mi_f_1)	0.714	0.243	0.088			0.560	0.910
	var(e.mi_f_2)	0.732	0.238	0.092			0.572	0.937
	var(e.mi_f_3)	0.867	0.328	0.094			0.701	1.073
	var(e.mi_f_4)	0.950	0.386	0.098			0.777	1.162
	var(e.mi_g_1)	0.547	0.233	0.076			0.416	0.719
	var(e.mi_g_2)	0.851	0.371	0.090			0.691	1.047
	var(e.mi_g_3)	1.115	0.529	0.108			0.923	1.348
	var(e.mi_g_4)	0.655	0.291	0.081			0.515	0.833
	var(F)	1.000	1.000				---	---
	var(G)	1.000	1.000				---	---
Covariance								
	cov(F,G)	-0.718	-0.718	0.033	-21.49	< .001	-0.784	-0.653

*Note.* e.mi\_f\_1-4 = error.mindset\_fixed\_item #; e.mi\_g\_1-4 = error.mindset\_growth\_item #

Reliabilities of the *growth* and *fixed* constructs were measured using Cronbach's alpha (see Table 7). The data indicated the two groups are highly comparable in nature with differences that are very small. The reliabilities are all above  $\alpha = .89$ , which indicates the constructs are highly acceptable in the good to excellent range (Gliner & Morgan, 2000).

**Table 7***Reliabilities of Mindset Subscales by Group*

Subscale	Group	Cronbach's alpha
<i>Fixed</i> (k = 4 items)	Domestic	.9060
	International	.9134
	Combined	.9087
<i>Growth</i> (k = 4 items)	Domestic	.9060
	International	.8886
	Combined	.9031

*Note.* International n = 275; Domestic n = 1802

Goodness of fit (Table 8) was achieved at the global level as well as at the group level (Table 9). Good local fit was achieved with a standardized loading  $\geq .40$  and no cross-loadings (all standardized loadings were salient with good measurement). Select fit indices are indicated below to demonstrate goodness of fit for the specified model. The study utilized the most commonly reported fit indices. These included root mean square error of approximation (RMSEA) whereas a number less than 0.08 indicates good fit (Kline, 2005), standardized root-mean-square residual (SRMR) a number less than 0.10 indicates good fit (Kline, 2005), Tucker Lewis Index (TLI) whereas a number greater than .90 indicates good fit, and comparative fit index (CFI) whereas a number greater than 0.90 indicates a good fit (Hu & Bentler, 1999).

The resulting measurement model for international students has good fit and is consistent with the domestic student model. These results indicated that Dweck's (1999) *Mindset* Scale is valid to be used with international college students studying within the U.S. This data addresses research question one.

**Table 8**

*Global-Fit Statistics*

Statistic	Value
Likelihood-ratio $\chi^2$	458.170 <sup>a</sup>
RMSEA	0.100
CFI	0.968
TLI	0.955
SRMR	0.072

Note. <sup>a</sup> $df = 40, p < .001$ .

**Table 9**

*Group-Level Fit Statistics*

Type	<i>N</i>	SRMR
Domestic	1802	.037
International	275	.095

Note. Reference values for good global fit: RMSEA  $\leq .08$ ; SRMR  $\leq .10$ ; CFI  $\geq .90$ ; TLI  $\geq .90$ .

## Research Question 2

The second research question for this study was: Does international student GPA, age, first-generation status, English speaking skills, year-in-school, or gender have any impact on scores for Dweck's (1999) 8-item *Mindset* sub-scale? To answer this question, the study employed Zellner's (1962) seemingly unrelated regression model (SUR) to analyze the independent variables of gender, first-generation status, academic rank, GPA, English language proficiency, and age on the latent variables (*growth, fixed*). SUR (Zellner, 1962) estimates all of the parameter equations simultaneously while taking the information from other equations into account. This results in efficiency in estimations by combining the information from all equations. With higher sample sizes and correlations among error terms, efficiency gains also increase.

Frequencies for the categorical variables of international students shows the sample size at 268. The number of males ( $n = 153$ ) to females ( $n = 115$ ) are somewhat similar in size. Interestingly enough, the first-generation college student number showed a much higher number of second-generation students ( $n = 202$ ) compared to first-generation students ( $n = 66$ ). Class ranks for the international student sample shows a fair representation across freshman through doctoral students (see Table 10).

**Table 10***Frequencies for Categorical Variables (International Students Only)*

Variable/levels	<i>n</i>	Percent
Gender		
Male	153	57.09%
Female	115	42.91%
Total	268	100.00%
Generation		
First-generation college student	66	24.63%
Second-generation college student	202	75.37%
Total	268	100.00%
Academic rank		
Freshman	23	8.58%
Sophomore	26	9.70%
Junior	45	16.79%
Senior	64	23.88%
Master's	29	10.82%
Doctorate	81	30.22%
Total	268	100.00%

Descriptive statistics for the international student sample ( $n = 268$ ) using SUR (see Table 11) showed an overall composite score for *fixed* to be  $\bar{x} = 3.586$  whereas the *growth mindset* composite score was relatively higher with  $\bar{x} = 4.878$ . The GPA of the sample was  $\bar{x} = 3.502$ , which was very similar to the GPA of the domestic student sample (domestic GPA  $\bar{x} = 3.50$ ). The mean score for English proficiency was  $\bar{x} = 4.134$  out of 5 (extremely well). The mean age of the international group sample was  $\bar{x} = 24.332$ .

**Table 11***Descriptive Statistics for Numerical Variables (International Students Only)*

Variable	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Composite score— <i>fixed</i>	3.586	1.557	1.000	7.000
Composite score— <i>growth</i>	4.878	1.362	1.000	7.000
GPA	3.502	0.437	2.000	4.000
English proficiency	4.134	0.837	1	5
Age	24.332	4.780	18	50

*Note.* All statistics are based on a sample of  $n = 268$ .



Based on the results of the SUR for the sub-groups within the international sample (see Table 12), there were five significant differences within the *fixed mindset* construct and three within the *growth mindset* construct. Within the *fixed mindset* construct, significant differences were found between gender whereas female respondents scored 0.39 points less ( $p < .05$ ) than males. In terms of academic rank, juniors scored 0.96 more than sophomores ( $p < .05$ ), seniors scored 1.02 more than juniors ( $p < .01$ ), and doctoral students scored 1.31 more points than masters students ( $p < .01$ ). Finally, older international students scored .078 fewer on *fixed mindsets* scores ( $p < .01$ ). For *growth mindset* scores, significant differences included second-generation students scored 0.073 points lower than first-generation students ( $p$  value  $< .001$ ) and the data on academic rank showed doctoral students scored .84 points less on *growth mindset* items than masters level students (see Table 12).

**Table 12***Seemingly Unrelated Regression Results: Fixed-Mindset and Growth-Mindset Composite Scores*

Terms	Coef.	SE	t	p	[95% Conf. Interval]	
<i>Fixed Score</i>						
<u>Gender</u>						
Male	0	(base)				
Female	-.3909638	.1905115	-2.05	0.041*	-.7652425	-.0166851
<u>Firstgen</u>						
First gen.	0	(base)				
Second gen.	.0122551	.2216787	0.06	0.956	-.4232546	.4477648
<u>Acrank</u>						
1	0	(base)				
2	.5998664	.4342673	1.38	0.168	-.2532947	1.453027
3	.961074	.3915156	2.45	0.014*	.1919029	1.730245
4	1.02672	.3812283	2.69	0.007**	.2777588	1.77568
5	.5334995	.4816112	1.11	0.268	-.4126735	1.479672
6	1.311891	.4752631	2.76	0.006**	.3781896	2.245592
<u>GPA</u>	.08309	.2335828	0.36	0.722	-.3758066	.5419866
<u>Engprof</u>	-.2042204	.1103588	-1.85	0.065	-.4210312	.0125905
<u>Age</u>	-.0786581	.0305234	-2.58	0.010**	-.1386242	-.0186919
Intercept	5.292592	1.185847	4.46	0.000	2.962878	7.622305
<i>Growth Scores</i>						
<u>Gender</u>						
Male	0	(base)				
Female	-.3446216	.2822902	-1.22	0.223	-.8992087	.2099655
<u>Firstgen</u>						
First gen.	0	(base)				
Second gen.	-.7337913	.2165801	-3.39	0.001**	-1.159284	-.3082981
<u>gender × firstgen</u>	.7383767	.2924643	2.52	0.012*	.1638017	1.312952
<u>acrank</u>						
1	0	(base)				
2	-.1277722	.3805315	-0.34	0.737	-.8753641	.6198197
3	-.2568162	.3432755	-0.75	0.455	-.9312149	.4175825
4	-.3001297	.3340568	-0.90	0.369	-.9564174	.3561579
5	-.2631785	.4221283	-0.62	0.533	-1.092491	.5661343
6	-.8382171	.4164711	-2.01	0.045*	-1.656416	-.0200183
<u>GPA</u>	-.0741591	.2050107	-0.36	0.718	-.4769229	.3286046
<u>Engprof</u>	.1787371	.0967275	1.85	0.065	-.0112936	.3687677
<u>Age</u>	.0462772	.0267826	1.73	0.085	-.0063399	.0988944
Intercept	4.12077	1.04134	3.96	0.000	2.074953	6.166586

Note. Residuals for the two equations have a significant correlation,  $r = -0.6827$ ; \*  $p < .05$ ; \*\*  $p < .01$ .

The final significant difference was found after interactions by number and categorical variables were checked. Specifically, second-generation international male college students scored lower on their overall *growth mindset* scores compared to first-generation males; indicating first-generation male college students had a higher *growth mindset*. No significant differences were observed for first-generation females (Table 12, 13).

**Table 13**

*Mean Growth-Mindset Scores for Gender and First-Generation College Student Status*

Gender	First gen.	Second gen.
Male	5.33 (n = 46)	4.60 (n = 107)
Female	4.97 (n = 20)	4.96 (n = 95)

Table 14 outlines the SUR model summary ( $n = 268$ ). Since  $R^2$  indicates relative measure of fit and describes the percent of variance explained by the predictors, the  $R^2$  numbers (*fixed* = .0796 and *growth* = .0758) indicate approximately .08 of the variation can be explained by the *growth* and *fixed mindset* model inputs. The RMSE provides an absolute measure of fit indicating the square root of variance and the standard deviation of the unexplained variance. Lower RMSE scores indicate a better fit. The overall model numbers for the SUR ( $n = 268$ ) were statistically significant ( $p < .01$ ).

**Table 14**

*SUR Model Summary*

Equation	$n$	RMSE	$R^2$	$F$	$p$
<i>Fixed</i>	268	1.522861	.0796	2.32 <sup>a</sup>	.0114
<i>Growth</i>	268	1.337039	.0758	2.24 <sup>b</sup>	.0115

<sup>a</sup>  $df_{\text{reg}} = 10$ ,  $df_{\text{res}} = 513$

<sup>b</sup>  $df_{\text{reg}} = 11$ ,  $df_{\text{res}} = 513$

## Summary

Chapter four provided the final measurement model for international students through the use of the multiple-sample confirmatory factor analysis with maximum likelihood estimation. In response to research question one, results indicated that Dweck's (1999) *Mindset* Scale is valid to be used with international college students studying within the U.S. In response to research question two, significant differences in the international student sub-populations within the *fixed mindset* construct were found for gender, academic rank, and age. Within the *growth mindset* construct, first-generation status and academic rank indicated a significant difference. Finally, an interaction effect indicated first-generation males had a higher *growth mindset* versus second-generation males.

## CHAPTER 5. DISCUSSION

The purpose of this study was to determine whether or not Dweck's (1999) 8-item *Mindset* sub-scale could be used with international students studying within the U.S. A multiple-sample confirmatory factor analysis using maximum likelihood estimation was used to assess measurement invariance on the data set for the study. Furthermore, the study investigated whether or not participant differences such as GPA, age, first-generation status, English speaking skills, year-in-school, or gender had any impact on survey scores of international students. The following research questions were utilized to achieve the study's purpose:

Thus, the research questions for this study included:

1. Is Dweck's (1999) 8-item *Mindset* sub-scale valid for international college students studying in the United States?
2. Do GPA, age, first-generation status, English speaking skills, year-in-school, or gender have any impact on the use of Dweck's (1999) 8-item *Mindset* sub-scale with international college students studying within the U.S.?

Research participants ( $n = 1802$  domestic students,  $n = 275$  international students) responded to Dweck's (1999) 8-item *Mindset* sub-scale. The scale is comprised of questions regarding intelligence and talent. For the purposes of this study, only questions regarding intelligence were analyzed.

### Summary of Findings

A multiple-sample confirmatory factor analysis with maximum likelihood estimation was used for the study. Results of this study confirmed that Dweck's (1999) *Mindset* scale can be extended to be used with international students studying within the U.S. Compared to the domestic student sample ( $n = 1802$ ), the final measurement model for the international student

sample ( $n = 275$ ) showed good fit and was consistent with the model for domestic college students. Using a seemingly unrelated regression analysis, the study also found significant differences within the *fixed mindset* construct for gender, academic rank, and age. Within the *growth mindset* construct, first-generation status and academic rank also indicated significant differences. Finally, an interaction effect indicated first-generation males had a higher *growth mindset* versus second-generation males.

### **Discussion**

This study began as a way to look at how students view themselves and their intelligence in order to understand which factors contributed to college student retention and persistence. The study then examined international college students as this population of students experience additional challenges when coming from countries with different languages, structurally different academic systems, cultural differences, as well as how they view success and intelligence. Dweck's (1999) *Mindset* scale was hypothesized to extend to international students as international students must have minimal English language proficiency (TOEFL scores) and due to Dweck's (1999) scale being fitted for domestic elementary students. However, it was unclear to what degree it would extend to international students or if there existed differences within the international students themselves. As the study revealed, Dweck's (1999) *Mindset* scale is valid with international college students studying within the U.S. and there were significant differences within the international student sub-population group.

Upon analyzing participant characteristics, a few important differences stood out. First, sample size for domestic students ( $n = 1802$ ) and international students ( $n = 275$ ) were very different. At Iowa State University (ISU), approximately 4,546 international students attend the university out of the 34,000+ student population. Within the domestic student sample population,

female respondents were almost twice the number of male respondents; even though the data showed the male population percentage is 56% of the student population at ISU.

The data regarding the international student countries of origin indicated study participants were from Europe (5), South America (26), Asia (216), and Africa (16). A high concentration of international students came from Southern Asia (78) and Eastern Asia (91). Out of the sample population ( $n = 275$ ), 226 reported that they spoke English somewhat (4) to extremely (5) well. International student mean scores for English language proficiency ( $\bar{x} = 4.12$ ) was somewhat similar to the mean of the domestic student sample ( $\bar{x} = 4.89$ ). The mean GPA of the international student sample ( $\bar{x} = 3.48$ ) compared to the mean of the domestic student population was  $\bar{x} = 3.50$ . There appeared to be a slight difference in *growth* and *fixed* mean scores between international students ( $G = 4.88$ ,  $F = 3.58$ ) compared to domestic students ( $G = 5.08$ ,  $F = 2.91$ ). The data indicated that the international student sample population were similar in nature to their domestic counterparts. The similarity is not surprising as the concept of being able to improve intelligence is not difficult to understand and the fact that Dweck's (1999) *Mindset* scale used for this study was extensively researched and validated.

Results of research question one showed that both measurement models for Dweck's (1999) *Mindset* scale had similar as well as strong factor loadings (see Table 5 & 6), similar reliabilities for Cronbach's alpha (see Table 7), and similar goodness of fit statistics showed a good fit (see Table 8 & 9). The difference in the growth and fixed correlation between domestic ( $r = -.812$ ) and international ( $r = -.718$ ) shows a difference of .094. Speculation about this difference may be attributed to how international students interpret the meaning of item statements. For example, research has posited Chinese students learn differently than their domestic counterparts due to differences in language structure and meaning (Biemans & Van

Mil, 2008; Pinheiro, 2001). Thus, international students could be interpreting various words differently than their domestic counterparts. It is also speculated that the difference could be due to how international students see their *mindsets* in relation to the added struggles and challenges in which they need to contend.

These results demonstrated that Dweck's (1999) *Mindset* scale can be used with international students studying within the U.S. This outcome seems to support other studies utilizing the *Mindset* scale with international students while in their home countries including studies conducted in Hong Kong (Dweck, 2007), Germany (Spinath & Stiensmeier-Pelster, 2001) and the Philippines (Hondanero, 2019).

Results of research question two revealed several significant differences within the international student sample ( $n = 268$ ) for GPA, gender, year-in-school, and age (see Table 12). Specifically, within the *fixed mindset* construct, data indicated significant differences showed international females scored .39 points less on *fixed mindset* items than international males. This provides some interesting contradictory findings to Dweck and Leggett's (1988) research which reported domestic women had higher *fixed mindset* scores than domestic men, though the population samples are obviously different and are from an earlier study. Two other studies showed women with higher *growth mindset* scores than men (Karras, 2014; Kloosterman, 1988). Though it is not clear why these opposing findings exist, research by McNamara and Rupani (2017) suggest that differences in upbringing, stereotypes, and different life experiences may have influenced the differences. The significant differences within academic rank, showed *fixed mindset* scores increased from sophomores to juniors by .96 points, and 1.02 for juniors to seniors. The initial inclination was *fixed mindset* scores would decrease as a student would progress to the next academic level as they were able to achieve the necessary GPA and



complete the necessary academic requirements. The finding that doctoral students scored 1.31 points higher on *fixed mindset* items than masters students was interesting as this accomplishment seems similar to traversing from freshman to senior, if not more so. As the research is scarce regarding *mindsets* and international college students studying in the U.S., more research is needed to determine why *fixed mindset* scores rise with academic rank with international college students studying in the U.S. In terms of age, a significant difference was found to show *fixed mindset* scores decreased as age increased slightly by .08 points. This result countered the results regarding *fixed mindset* scores increasing as students graduated to higher academic levels. As there were no significant interactions within this area, more research needs to help uncover the reason for this difference.

Significant differences for academic rank were found within the *growth mindset* construct (see Table 12). Specifically, doctoral students scored .84 points less on the *growth mindset* items than masters level students. As with the previous finding within the *fixed mindset* construct, this finding can be attributed to many variables. As a doctoral student at the end of the doctoral journey, the idea of having a lower *growth mindset* near the beginning of the journey compared to the end would seem typical. Being closer to potentially graduating, a person's *growth mindset* is probably higher than a *fixed mindset* at this time. Thus, knowing where the doctoral student is within their journey, may make a difference on *growth* and *fixed mindset* scores.

International students report that some of their difficulties lie within differences between their home country and the U.S. including academic structure, cultural differences, English language difficulties (not significant within this study), lack of familial support, difficulty developing domestic student friendships, and even financial challenges. I would imagine that doctoral students have dealt with many of these challenges for a longer period of time and the

time and challenges have weighed on them longer; possibly resulting in lower *growth mindset* scores within this study. This would reinforce the idea, more so for international doctoral students, that institutions of higher education need to provide more resources for international students throughout their entire time in college.

The final significant difference found second-generation international students scored .73 points less than first-generation international students (see Table 12). This may be a result of the need for a *growth mindset* to counter the lack of knowledge and parental guidance on how to enter and navigate college as well as how to successfully graduate from college. The result may also be due to the amount of work a first-generation student needs to perform in order to acquire the necessary grades and knowledge it would take to get into and graduate from college; this supports earlier research posited by Gofen (2009). There are too many variables and possible interactions to uncover (e.g., motivation to succeed, self-efficacy, emotional intelligence) to determine what factors contributed to this outcome. An interesting result was also found regarding first-generation status. Specifically, an interaction effect was found between gender and first-generation status. Results indicated that male second-generation international college students had lower *growth mindset* scores than male first-generation international college students. No significant interactions were found for female international students (see Table 12 & 13). One possible reason for this may be due to upbringing, as males sometimes infer that it is not okay to show weakness and thus tend to focus on performance goals rather than learning goals as outlined in Dweck and Leggett's (1988) *Mindset* research.

### **Implications on Theory and Practice**

With the finding that Dweck's (1999) *Mindset* scale can be extended to be used with international students, colleges and universities can start to determine how they might use this

tool to further support and retain international students studying within the U.S. Institutions of higher education can also begin to design early *Mindset* intervention programs during international student orientation and throughout the students' college career. Results of this data can also be shared with other countries to help prepare international students for the challenges they may face studying abroad; both academically and personally. This study has shown that it is important for all faculty and staff at higher education institutions to help international students foster a positive belief around how intelligence can be developed (Dweck, 2006)

Finding significant differences in gender, academic rank, and first-generation status is a significant finding and should place all academic institutions on notice that a stronger support system needs to be developed for international students in order to counter the effect that *fixed mindsets* can grow over time and impede academic success. As the results have shown within this study, progressing through academic rank does not promote a *growth mindset* automatically; nor does it mean that second-generation status improves *growth mindsets*. Some studies have already found that without *mindset* intervention, *growth mindsets* could decline over time (Spinath & Stiensmeier-Pelster, 2001). If a *growth mindset* is not identified and fostered, this study supports the idea that while students persist in college, it does not mean that their *growth mindset* improves over time; further putting students at academic risk. One significant question this study raised was, "Is there a threshold for *growth mindset* that can predict whether or not a student will persist in college, or are there too many variables to consider? More research is needed to determine this.

In terms of theory, early research by Dweck, Chiu, and Hong (1995) showed the Mindset model had good internal consistency (.85 and .80 retest at two weeks) for a one factor *Mindset* model; arguing that individuals could simultaneously possess a *fixed* and *growth mindset*

(Ingebrigtsen, 2018). However, correlations for the *growth* and *fixed* mindset constructs ( $r = -.19$  to  $-.74$ ) were too low and more recent research supported a two-factor model (DeCastella & Byrne, 2015; Luftenegger & Chen, 2017). These early results could explain the differences in the research where some research supports the mindset scale while other studies did not (Odom, 2015). This has certain implications on how international students could either have a *growth* or *fixed* mindset in different academic areas (math vs science) and how this view could hinder their academic success. In addition, Ingebrigtsen's (2018) research summarized Hong, Chiu, Dweck, Lin, and Wang's (1999) work on the isolation of various *Mindset* elements (goal orientation, effort beliefs, failure attribution, achievement strategies, achievement outcomes) for domestic students in order to determine how they attribute success or failure to different internal or external elements such as level of effort (internal) or poor instruction (external elements). This work should be extended to include international students as they may differ in each of the *Mindset* model elements and how they view each element. Thus, the practical implication is that faculty and staff could learn to amend their approaches to better serve students based on their *mindset* differences.

### **Limitations**

As reported in the literature (Ingebrigtsen, 2018), Dweck, Chiu and Hong's (1995) original *Mindset* model were defined as one construct and had poor fit ( $RMSEA = 0.186$ ,  $CFI = 0.86$ ,  $SRMR = 0.078$ ). But, according to Ingebrigtsen (2018), Dweck's (1999) revised scale provided a two-factor structure with a much stronger fit ( $RMSEA = 0.036$ ,  $CFI = 0.99$ ,  $SRMR = 0.023$ ). Much like this study, a two-factor model was tested across domestic and international students. Since there is no specified *mindset* scale to be used across studies and many adaptations exist in the literature, a more specified scale should be utilized in future studies.

Due to sampling issues, acquiring a higher number of international student participants from a stronger cross-section of countries was not possible with this study. Generalizing the study to more countries across the globe, would help advance the results of this study further.

A longitudinal study could prove helpful in determining *mindset* trajectories with students across time, academic rank, age, and GPA to further determine if any additional interactions exist. Finally, the use of a mix-method approach would extend the current study from a singular quantitative study to a qualitative study where participants can be interviewed and data analysis could further explain the interaction with other variables found to challenge international students including financial capabilities, familial support, domestic student friendships, faculty-student interactions, the effects of acculturation, and the lack of an internationalized institution, to name a few.

### **Recommendations for Future Research**

A longitudinal study could further uncover how *mindsets* remain constant or evolve with interventions. Longitudinal combined with mix-method studies can better analyze individual differences overtime and further examine internal and external forces that impact individuals and their *mindsets*, including age, year in school, socio-economic status, level of motivation to succeed, level of internationalization of the institution, and other programs and services offered to international students.

This study included international students from various parts of the world. A larger concentration of this study's sample populations included students from India and China. Future research needs to ensure there is a larger sample from various countries around the world to ensure the *Mindset* scale can be extended to all international students.

Research on *Mindset* interventions with international students should also be included to further inform institutions on how to better support and help international students succeed. As some research suggests, not all interventions are effective (Sisk, Burgoyne, Sun, Butler, & Macnamara, 2018). This same research also purports that *mindsets* stagnate or decline with age. Thus, a more comprehensive age-related interaction study would also be informative. Additional research could further uncover differences across all genders, specifically individuals who identify as non-binary.

With current issues facing the world, the Covid-19 pandemic has forced institutions to conduct many classes, programs, and services on-line. Thus, future research might also consider studying in-person versus online interventions and scalability of interventions.

### **Conclusion**

Within this study the validity and reliability of Dweck's (1999) *Mindset* scale for use with international students studying in colleges within the U.S. has been shown to be compelling. The study also examined sub-populations for international students. Within the *fixed mindset* construct significant differences showed that international females scored .39 points less on *fixed mindset* items than international males indicating that international females viewed their intelligence as more malleable than their male counterparts. *Fixed mindset* scores increased from sophomores to juniors by .96 points, 1.02 for juniors to seniors, and doctoral students scored 1.31 points higher than masters students indicating that students saw their intelligence as less malleable the longer they remained in college. Finally, *fixed mindset* scores decreased with age by .08 points indicating that age has some positive impact on *fixed mindsets*. Within the *growth mindset* construct, doctoral students scored .84 points less on the *growth mindset* items than masters level students indicating that doctoral students struggle more with how they view the

malleability of intelligence and could possibly impact their overall academic success. Second-generation international students scored .73 points less than first-generation international students indicating that first-generation international students view their intelligence as more malleable than second-generation international students. This could possibly indicate that, unlike their second-generation counterparts, first-generation students understand and may appreciate that a stronger *growth mindset* is needed in order to attend and succeed in college. Finally, an interaction effect showed first-generation males had a higher *growth mindset* than second-generation males indicating differences between gender and first-generation status.

Overall, results indicated that there are differences in how international students view intelligence as a fixed or malleable concept, especially between gender, age, first-generation and academic ranks. Institutions should understand how these differences impact international student success and more research needs to be conducted on the *Mindset* constructs and latent variables to further validate and further develop the model's reliability across cultures. Important limitations and future research on Dweck's (1999) *Mindset* scale were discussed and was noted to include additional participants from countries not represented in this study, the development of effective interventions for international students, and finally incorporating a mix-method longitudinal study to acquire a clearer picture on how *mindsets* can be studied and fostered for international students with a specific suggestion to include those who identify as non-binary.

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## APPENDIX A. EMAIL TO POTENTIAL PARTICIPANTS

August 1, 2020

Dear <Student Name>

This might be the easiest \$50 you ever earn! Just help me answer a few questions about your *mindset* as an international student, and you have a chance of winning a gift card to Starbucks, Amazon, or the Iowa State Bookstore!

My name is Steve Winfrey. I am a doctoral candidate at North Dakota State University in Fargo, ND, and I work here at Iowa State University. For my dissertation, I am examining how international students are motivated to succeed based on their views of their own intelligence.

I am asking for less than five minutes of your time to respond to the statements in the scale. Participation is voluntary and there are no known risks for responding to this brief scale. However, as an added incentive, anyone who completes the scale will be invited to a workshop on how to develop a *growth mindset*. This workshop will provide you with information and techniques that could help you overcome academic or personal challenges. You do not have to attend the workshop if you do not want to.

This study has been approved by the Institutional Review Board of both Iowa State and North Dakota State. Please click on the [Mindset Scale Link](#) to take the scale.

Thank you very much for your help,

Steve Winfrey  
Doctoral Candidate, North Dakota State University  
[swinfrey@iastate.edu](mailto:swinfrey@iastate.edu)

## APPENDIX B. INFORMED CONSENT FORM

### Consent for Participation in Research for:

A study to determine whether or not Dweck's *Mindset Scale* is valid for use with international students.

### Why am I being asked?

You are being asked to be a participant in a research study to determine the validity of a scale on international students. The research is being conducted by Steve Winfrey, a doctoral candidate at the North Dakota State University. The study is being conducted at Iowa State University due to the large number of international students studying at Iowa State. You have been identified for this study as an international student at Iowa State. We ask that you read this form and ask any questions you may have before agreeing to be in the research.

Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future relations with Iowa State or North Dakota State University. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

### What is the purpose of this research?

The purpose of this study is to determine whether or not Dweck's *Mindset Scale* is valid to be used with international students studying at an institution within the United States.

### What procedures are involved?

If you agree to be in this research, we would ask you complete the attached scale.

-The total participation time is less than 5- minutes.

-Approximately 200 students will be involved in this research at Iowa State University.

### What are the potential risks and discomforts?

There are no foreseeable risks associated with participation in this study. If at any time you become uncomfortable with the scale, you may opt out of the study

### Are there benefits to taking part in the research?

If you choose to participate, you will have the opportunity to win a \$50 gift card to Starbucks, Amazon, or the ISU Bookstore, be given the results of the scale, and have the opportunity to attend a workshop on how to develop a *growth mindset*. The outcome of this research may also benefit future students and higher education practitioners, through identification of characteristics that are predictive of persistence in higher education.

### **What about privacy and confidentiality?**

The only individual who will know that completed the scale is myself, Steve Winfrey. No information about you, or provided by you during the research, will be disclosed to others without your written permission. If the results of the research are published or discussed in conferences, no information will be included that would reveal your identity.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

- The data will be stored on a password-protected computer and backed up on a password protected external hard drive.
- Upon completion of the analysis of the research, identifiable information will be removed from the record.
- After 10 years, all data files will be destroyed using data destruction software.
- If any other uses of this data not specified in this consent are contemplated, the researcher will contact you via email for additional informed consent.
- No data will be used without permission.

### **Will I be reimbursed for any of my expenses or paid for my participation in this research?**

There are no anticipated expenses for participation in this research. There is no additional compensation for participation in this research other than the chance of winning a \$50 gift card.

### **Can I withdraw from the study?**

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study.

### **Who should I contact if I have questions?**

The researcher conducting this study is Steve Winfrey. You may ask any questions you have now. If you have questions later, you may contact the researcher or dissertation advisor at:

Steve Winfrey, Researcher Email: [swinfrey@iastate.edu](mailto:swinfrey@iastate.edu).

or

Dr. Chris Ray, Dissertation Advisor Email: [chris.ray@ndsu.edu](mailto:chris.ray@ndsu.edu).

## **What are my rights as a research subject?**

If you feel you have not been treated according to the descriptions in this form, or you have any questions about your rights as a research subject, you may contact the Institutional Review Board (IRB) at:

North Dakota State University at:

Kristy Shirley, BS, CIP

(701) 231-8995

[kristy.shirley@ndsu.edu](mailto:kristy.shirley@ndsu.edu)

Or

Sarah Kaatz, Director

(515) 294-3115

[skaatz@iastate.edu](mailto:skaatz@iastate.edu)

**Remember:** Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future relations with Iowa State University or North Dakota State University. If you decide to participate, you are free to withdraw at any time without affecting that relationship. You are encouraged to print a copy of this form for your information and to keep it for your records.

Clicking “*Mindset Scale Link*” below indicates that you agree to participate in this research.

[\*Mindset Scale Link\*](#)

**APPENDIX C. DWECK MINDSET SCALE (1999)**

Directions: Read each sentence below and then mark the corresponding box that shows how much you agree with each sentence. There are no right or wrong answers.

	<b>1</b> <b>Strongly</b> <b>Agree</b>	<b>2</b> <b>Agree</b>	<b>3</b> <b>Somewhat</b> <b>Agree</b>	<b>4</b> <b>Neither Agree</b> <b>or Disagree</b>	<b>5</b> <b>Somewhat</b> <b>Disagree</b>	<b>6</b> <b>Disagree</b>	<b>7</b> <b>Strongly</b> <b>Disagree</b>
1) You have a certain amount of intelligence, and you really can't do much to change it.							
2) Your intelligence is something about you that you can't change very much.							
3) No matter who you are, you can significantly change your intelligence level.							
4) To be honest, you can't really change how intelligent you are.							
5) You can always substantially change how intelligent you are.							
6) You can learn new things, but you can't really change your basic intelligence.							
7) No matter how much intelligence you have, you can always change it quite a bit.							
8) You can change even your basic intelligence level considerably.							
9) You have a certain amount of talent, and you can't really do much to change it.							
10) Your talent in an area is something about you that you can't change very much.							
11) No matter who you are, you can significantly change your level of talent.							

	<b>1</b> <b>Strongly Agree</b>	<b>2</b> <b>Agree</b>	<b>3</b> <b>Somewhat Agree</b>	<b>4</b> <b>Neither Agree or Disagree</b>	<b>5</b> <b>Somewhat Disagree</b>	<b>6</b> <b>Disagree</b>	<b>7</b> <b>Strongly Disagree</b>
12) To be honest, you can't really change how much talent you have.							
13) You can always substantially change how much talent you have.							
14) You can learn new things, but you can't really change your basic level of talent.							
15) No matter how much talent you have, you can always change it quite a bit.							
16) You can change even your basic level of talent considerably.							

**1) Please check your current level of schooling**

- First Year Undergraduate
- Second Year Undergraduate
- Third Year Undergraduate
- Fourth Year Undergraduate or more
- Masters Student
- Doctoral Student
- Post-Doctoral Student

**2) Please provide your current cumulative GPA:**

\_\_\_\_\_

**3) Which gender identity do you most identify?**

- Female
- Male
- Transgender Female
- Transgender Male
- Gender Variant/Non-conforming
- Not listed
- Prefer not to answer

**4) Please indicate your age:**

\_\_\_\_\_



**5) Did one or more of your parents graduate from college?**

- One or more parents attended college
- None of my parents attended college
- Unsure

**6) Please tell us how well you believe you speak English:**

- Extremely well
- Somewhat well
- Neither well nor poor
- Somewhat poor
- Extremely poor

**7) In the box below, please enter what you consider to be your main nationality; for example: Japanese, Chinese, Korean, Indian, Russian, etc.:**

---

**8) If you wish to receive the results of your scale, please type your email in the box below.**

---

**Gift card scale questions and link (seen by participant after completing *Mindset* scale):**

Thank you for taking this scale. Click [\*Mindset Gift Card\*](#) to enter your information for a chance to win a free gift card and/or indicate that you wish to attend a workshop on how to develop a *growth mindset*. This link can only be used for you and you can enter only once. Best of luck.

**1) To be entered into the gift card drawing, please enter your first and last name in the box below.**

---

**2) Please type your email in the box below.**

---

**3) Check all that apply:**

- I wish to be contacted when the *Mindset* Workshop is available.
- I DO NOT wish to be contacted when the *Mindset* Workshop is available.
- I would REALLY like to win the gift card!