

NUDGE COMMUNICATION: A CAUSAL-COMPARATIVE  
STUDY OF INTERVENTIONS THAT IMPACT  
PERSISTENCE OF HIGHER EDUCATION STUDENTS

by

Helene Vance

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

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APPROVED BY:

Michael Shenkle, Ed.D., Committee Chair

Scott Watson, Ph.D., Committee Member

## ABSTRACT

This quantitative causal-comparative study focuses on nudge communication and its impact within online higher education. Due to prior studies confirming the relationship between motivation and persistence, this study focuses on whether or not nudge communication, or intentional interventions that include reminders, encouragement, and other motivational factors, helps students persist toward successful completion of courses within a semester. This study included over 10,000 undergraduate students at a private institution that offers online education. The students were enrolled in over 98,600 general education courses, which were included in the analysis of the test and control populations. Successful course completion was defined as students earning grades of A, B, C, and D. Unsuccessful course completion was defined as students earning grades of F, FN, and W. The results of the study found that students who received nudge communication persisted more in successful completion of grades during a semester and their grade point averages were significantly higher than those who did not receive nudge communication. Additional research is needed to determine if nudge communication is beneficial in residential settings, graduate settings, and specific course settings, rather than just general education in online undergraduate education.

*Keywords:* nudge communication, intervention, persistence, growth mindset, fixed mindset, retention

## **Dedication**

I dedicate this dissertation to my family. To my husband, Jordan, who is my biggest fan and role model for education. His love of learning and desire to always accept new challenges have inspired me to embrace and enjoy this journey. His sacrifices over the years of my education are incalculable and I am forever grateful for his unwavering dedication to me and our life together. This dissertation is also dedicated to our children: May you never become victim to the limits of your mind, and I pray you always have the courage to take the next step that stretches you and points you closer to God's plan for you. I also dedicate this dissertation to my incredible parents and my siblings. Because of your recognition of my personality and gifts from a very young age, God used you and your direction to allow me to accomplish what I have up to this point in my life. I am forever indebted to you.

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## **CHAPTER ONE: INTRODUCTION**

### **Overview**

Retention and persistence in online higher education are topics of focus around the United States and beyond, driving innovative ideas and discussions among academics and market leaders throughout society. The subsequent sections outline the background, analysis, and research approach of this study. Details encompass specific attention to the background and context for course-based persistence in a higher education setting, the problem statement and research to support it, the purpose statement, significance for this study, the research question, and definitions for key terms utilized through the study.

### **Background**

Persistence and completion rates of online education in higher education continue to be an area of concern for higher education institutions (Kilburn et al., 2014). Because higher education tends to provide scholarship for students who are entering or are already in adulthood and that education requires a level of independence and self-motivation, institutions have created environments in the traditional setting that provide an ability to persist. This is done through social engagement, study groups, and interaction that encourages face-to-face experiences (Cotton et al., 2017). In the online setting, socially engaging activities are often obtuse, limiting the institution's ability to engage their students socially, thus facing a challenge of stagnant or inadequate means of connecting their students with other students, faculty, or supportive realms (Cotton et al., 2017; Kilburn et al., 2014). When students feel disconnected, there is a lack of motivation or loyalty toward the institution, thus impacting the online student's ability to feel connected or desire to engage or persist if they are faced with personal or academic challenges. According to Kilburn et al. (2014), persistence and retention are impacted by system availability,

or the student's perception of an instructor, other students, course-related resources, and their program's website, all of which are highly valued when determining loyalty toward an institution.

Historically, institutions with online avenues utilize multiple types of assignments; they may include asynchronous or synchronous classroom styles and involve some deliberation amongst the students and instructors via discussion boards, email, or chats, with discussion boards being a frequent usage of communication (Song & McNary, 2011). If the student feels like the distance in online education is more than just a physical distance, meaning also a psychological distance, the disconnect for the student may create a degraded educational experience (Vlachopoulos & Makri, 2019). While discussion boards are a means of connection, the level of interaction and relationship may or may not connect the student in a way that validates positive psychological proximity (Vlachopoulos & Makri, 2019).

Because of the convenience of online education, enrollment in this vein of scholarship has continued to grow; however, due to the historical context provided above, schools are taking more creative measures to enhance effective intervention approaches for motivation to encourage completion of education (Braithwaite & Corr, 2016; Brown et al., 2019). Since the feeling of physical and psychological distance impacts persistence and retention, institutions are pursuing communication efforts with more scrutiny (Vlachopoulos & Makri, 2019). In an effort to adjust intervention approaches, schools are trying measures to give more direct communication than in prior years (Braithwaite & Corr, 2016; Brown et al., 2019). Adjusting communication efforts for institutions varies for each institution, but in regard to communication, one route that schools are pursuing is the concept of nudging (Thaler & Sunstein, 2009) students toward completing their courses successfully (Derry et al., 2019). A nudge, which is an emerging industry term for a

communication-based intervention aimed at affecting motivation, is being utilized globally in multiple arenas, including education (Arno & Thomas, 2016; Castleman & Page, 2014). Because research supports that nudging in education increases academic performance (Brown et al., 2019), educators are pursuing initiatives that leverage nudge theory to determine if nudging will impact persistence and completion of a single term and, perhaps, eventual program completion (Derry et al., 2019; Kilburn et al., 2014; Warmbold-Brann et al., 2017). The following discussion uncovers the historical, societal, and theoretical approaches for nudge communication and how it continues to evolve as it relates to this topic of retention and persistence in higher education.

### **Historical Context**

Nudge Theory is a straightforward concept, in that a nudge is defined as a gentle push, to seek attention, or urge into action (Merriam-Webster, n.d.). Thaler and Sunstein (2009) founded the theory in an attempt to explain that decisions can be altered when nudged in a certain direction. Thaler and Sunstein proposed that humans often unintentionally make decisions that lead to a negative result but could easily be nudged toward an alternate decision that would result in a positive outcome. Simply stated, the reason for poor decision making is not because of a deficiency in cognitive processing, but rather due to how societal training and biases interact with the human psyche (Thaler & Sunstein, 2009). Conversely, decision making that results in a negative outcome due to cognitive capacity (Abdukadirov, 2016) is what Thaler and Sunstein refer to as limitations of capacities biases, heuristics, and fallacies. Despite numerous implications for sociocognitive enhancement and academic success, the focus of this study is on the motivational aspects of nudge theory and its implications for student persistence.

Nudging is often done through visual stimulation that causes the brain to evaluate options that are placed in front of the decision maker (Thaler & Sunstein, 2009). Common applications

for nudges include food choice, health, political considerations, and academics (Arno & Thomas, 2016; Castleman & Page, 2014).

### ***Origins of Nudging***

Nudge terminology was first introduced in 2008 by the theorists Thaler and Sunstein (2009) as they recommended usage of nudging within public policies, aiding governmental and legislative decision making for better outcomes in retirement, surgeries, and tax compliance (Schmidt, 2017). Nudging was implemented to ensure that individuals were influenced and then, later, had more information to support the outcomes of their decisions (Schmidt, 2017). After nudge theory was introduced into the political realm, the health industry started working with nudge communication to determine if nudging could impact the obesity problem within North America, which has proven to positively impact decision making (Arno & Thomas, 2016). Arno and Thomas (2016) gathered research on health initiations from nudge communication within public and private organizations' pursuits regarding food placement, portion size, and labeling, along with caloric information provided upon initial review of food choices.

### **Societal Context**

Though nudges have shown promise for aiding in the decision-making process, they are not without controversy (Felsen & Reiner, 2015; Mols et al., 2015; Schmidt, 2017). Recent concerns have arisen that nudging borders on coercion due to the lack of transparency and consent on the part of the subject. Still, advocates argue that subject awareness would alter the effect of the nudge, thus rendering it ineffective (Bruns et al., 2018). If the decision-making results are adjusted due to awareness, then the results may entail a suboptimal or skewed outcome (Bruns et al., 2018). The argument for and against awareness of nudging has calmed since recent studies confirm that transparency is a feasible option and nudges are still effective

even when those receiving nudges are aware of them (Bruns et al., 2018).

### ***Nudging Toward Health***

In addition to the political realm, nudging is also being utilized in health and wellness (Arno & Thomas, 2016) and education (Broda et al., 2018; Castleman & Page, 2014). In regard to health and wellness, Abdukadirov (2016) discusses how market economics utilize nudging to advertise certain food choices by positioning food selections in certain orders. Positioning products in a visually stimulating way allows the decision maker to select the most accessible option, which could also be the least healthy option (Abdukadirov, 2016). Rearranging food placement allows healthier food options to be most accessible and the visualization of the options increases the autonomy of the decision (Felson & Reiner, 2015).

### ***Nudging Toward Scholarship***

For academics, nudging is being utilized in online education, as this sector of education has grown tremendously over the past 10 years and retaining students within a program or institution is a growing problem (Kilburn et al., 2014). While nudging has been around for years in the form of interventions, interventions have historically occurred for underachieving students (Patrick et al., 1998). Institutions are more recently taking measures to exercise encouragement and engagement through different communication methods like summer communication and peer mentoring (Castleman & Page, 2014; Pugatch & Wilson, 2018) in hopes of increasing student persistence, achievement, and retention. If nudging produces increased persistence, achievement, and retention and students benefit from earning better grades and completing courses at higher rates (Brown et al., 2019), the higher education realm hopes to observe results of stronger loyalty and completion rather than students continuing to transfer or leave before completion (Kilburn et al., 2014).

### ***Why Nudges Are Practical in Higher Education***

The practicality of nudge theory first needs to be understood from a psychological and intellectual comprehension of choice architecture (Thaler & Sunstein, 2009) that pairs psychology with behavior to form processes in decision making (Markley-Towler, 2018). The behavioral economics that occurs with nudging causes individuals to adjust decision making after being presented with options (Markley-Towler, 2018). As previously mentioned, a nudge does not change behavior to the extent of changing a decision to the opposite of what would have been selected, but it nudges individuals to evaluate options before selecting a decision or predetermined decision (Schmidt, 2017).

Harrison and Ross (2017) argue that nudges assist an individual presented with a decision with selecting a choice that will improve welfare rather than create a self-defeating outcome from an otherwise selected choice. The practicality of nudges argues benefit in higher education since students often neglect or re-prioritize their studies that would determine a suboptimal outcome (Thaler & Sunstein, 2009).

The practicality of nudging in higher education lies within the benefits of producing support for students through a low-cost avenue and also having the result of more proactive and motivated students. Students who are nudged tend to start their assignments earlier and dedicate more focus to produce a better outcome, which develops commitment to achieving better outcomes in course assignments (Brown et al., 2019). The practicality of nudge communication is crucial here, based on the findings of Smith et al. (2017), as personalized nudge communication positively adjusts the amount of time students are studying and working on assignments, since the students are given details about their own progress or other classmates' progress toward coursework; by proactively working on assignments at an earlier rate, the



tendency then provides a more robust product, which increases overall scores and end of term grades (Brown et al., 2019). If the practicality of nudges implies better outcomes within individual course assignments, then nudges could produce more persistence in successful course completion, which was determined throughout this research study.

### **Theoretical Context**

As stated previously from the historical context, nudge theory was founded by Thaler and Sunstein (2009). It is applicable to multiple avenues of society as portrayed in the previous overview. For the purpose of this study, nudge communication is a means to develop encouragement for students to persist in their courses. Because nudge communication creates a more proactive approach toward course assignments, students tend to do better in their coursework and, in turn, persist in course completion at a much higher rate as compared to when they do not receive nudge communication (Brown et al., 2019). Persistence and course outcomes are highest when nudging is personalized, as compared to a generalized piece of communication (Brown et al., 2019). Giving students a visual measure of how they are doing in a course or assignment compared to their peers tends to increase the students' proactive approach, causing them to start on future assignments earlier than if they were unfamiliar with those who were most successful in the course assignments (Brown et al., 2019). Furthering nudge communication in the selected area of higher education is important, as motivation based on mindset may play a large role in the need for nudge communication.

### ***Mindset Theory and Its Role***

Mindset theory is important in this analysis because it is a theory that can be utilized toward impacting personalized communication through nudges. Dweck (2006) published the theory of fixed versus growth mindsets; an individual may have one or the other either in all

perspectives or in only certain areas. Fixed versus growth mindsets impact a person's entire perspective and approach to life, learning, and overcoming challenges (Dweck, 2006). Whether in one capacity, like school or work, or all capacities, mindset determines how individuals deal with challenges (Dweck, 2006). If an individual has a fixed mindset, their ability to change or better themselves is considered a limitation because of their personality or inability to master a subject matter (Dweck & Yeager, 2019). Mindset theory plays a vital role in nudge communication, as nudge communication can impact the psychological beliefs of an individual and move them from a fixed mindset to a growth mindset.

Understanding the historical, societal, and theoretical backgrounds of nudge theory and mindset theory is important, as these backgrounds comprise the reason for the problem that is discussed in the following section. The historical, societal, and theoretical backgrounds also gave determination to the researcher to then configure and establish the purpose of this study.

### **Problem Statement**

Online learning is a nontraditional learning modality (Cotton et al., 2017). The successful completion through this method of nontraditional learning is much less likely than that of a residential, traditional setting (Cotton et al., 2017). The success factor is lowered for nontraditional learning because of the lack of persistence and program completion. Lack of persistence and program completion yields a decrease in credentialed, qualified professionals and an increase in debt with no earned degree. This problem of lacking persistence and how nudge interventions may impact mindset toward persistence is the focus of this study. Research suggests that disparity exists due to an incongruence between the student and the necessary mindset, learning modality, or even motivation necessary for success in a low-context environment (Smith et al., 2018). Online learning often requires self-motivation to complete

necessary course learning outcomes (Smith et al., 2018). Students may lack the mindset that positively impacts motivation, and, while they may believe they can make up for poor performance from earlier in the semester, it may be too late to finish with successful grades (Smith et al., 2018).

The findings of Smith et al. (2018) focus on a study within the UK and New Zealand that analyzed how email nudge communication impacted grades. As retention in online learning continues to be a problem (Kilburn et al., 2014), support for the value of nudge communication is needed. Prior nudge studies (Ferlie & Trenholm, 2018; Kastens & Manduca, 2017) have focused on undergraduate courses, certain majors, or general education courses in other countries within both public and private institutions. Due to the gap in literature, as supported in the following chapter, this study focused specifically on online students in the United States for undergraduate, private education that is in general education courses.

Variables previously studied include exam scores, total time online, total time outside of class, number of non-class days, time spent on class days, time spent on non-class days, and student-received email reminders (O'Connell & Lang, 2018). These data were gathered over three semesters and each class had the variables spread out over 22 lessons of online instruction with in-class instruction and individual lessons completed in class (O'Connell & Lang, 2018). Further research and investigation are necessary to determine if nudge communication will benefit retention at one large private institution that is focused on persistence efforts. The focus of persistence and retention are due to the competitive enrollment and online efforts of institutions within higher education. The problem that drives the need for further research focuses specifically on a US, private institution that will observe the influence of nudge communication in general education at this institution to determine if nudges increase persistence

to complete courses within a semester.

### **Purpose Statement**

The purpose of this causal-comparative design study is to test the hypothesis, which investigates if there is a statistically significant difference in the persistence of courses for students in an online program who received nudge notifications and those who did not receive nudge notifications. More specifically, this study examines the impact to persist in completion of courses through efforts that compare the differing specialized, personalized communication to online undergraduate students. This study investigates if nudges cause a significant improvement in student persistence in completion of coursework within a current semester of enrollment and if the communication aids in their retention for the following semester.

The variables include the dependent variable, persistence to complete courses to the end of the current semester, and the independent variables, which are students who received the nudge communication and students who did not receive the nudge communication. Research supports the variables selected for this study due to prior research also utilizing such data points (O'Connell & Lang, 2018). The variable of prior studies is valid and reliable as the findings confirmed that there was behavior change, study time expansion, and improved exam performance when there were email reminders via nudge communication (O'Connell & Lang, 2018).

Nudges are also supported by research conducted across multiple disciplines (Baldwin, 2014). These disciplines, including the health industry, focus on behavioral changes that support the benefits of nudges that involve adjusting choices such as grocery purchases just by moving a particular healthy fruit item to replace a poor food choice (Baldwin, 2014). The goal of this study is to determine if nudges can and should be replicated in schools within the United States, as

nudges have only recently been adopted in a small number of schools in other countries (Ferlie & Trenholm, 2018; Graham et al., 2014). Other schools have tested whether or not nudges benefit undergraduate behavior and persistence; they encouraged students to persevere in their courses by communicating with them and providing data to them throughout the semester (Ferlie & Trenholm, 2018; Graham et al., 2014).

### **Significance of the Study**

Nudges have the ability to allow higher education institutions to impact society with behavioral adjustments (Ferlie & Trenholm, 2018). Nudges can impact students both inside and outside the classroom, and thus adjust student behavior to have economic, political, and overall psychological and societal benefits (Ferlie & Trenholm, 2018). This aligns with the mindset theory of moving from a fixed mindset to a growth mindset; Rattan et al. (2015) confirm that growth mindset supports the theory of persisting even when the topics become more challenging and subject matters are not easily learned. If students are presented with personalized nudge communication as subjects and assignments continue to become more challenging, they will be more motivated to dedicate the necessary time to complete their work and earn a better grade (Smith et al., 2017).

The purpose of determining if nudge communication belongs in higher education is based on previous studies of postsecondary nudge use that support the concept that personalized, intentionally focused messaging has the most positive impact on student persistence (Pugatch & Wilson, 2018). This is compared to generalized, impersonal nudge communication, in confirming an increase in retention and completion efforts when using personalized, intentional messaging nudge communication (Pugatch & Wilson, 2018). Additionally, Paunesku et al. (2015) provide statistical support of academic achievement of grade point average (GPA) in core

classes for students who were in the bottom third of the students in their sample, showing the benefit of interventions when students received personalized communication as compared to those who received general communication.

This study is important to higher education as well as all of education as a whole, as growth mindset and nudge communication could benefit people even before they reach adulthood, which is when most enter the higher education field. Since there are still barriers for certain ethnic and demographic groups, such as a mindset that believes that learning abilities are limited to certain demographics, introducing nudge communication could aid in adjusting a fixed mindset to a growth mindset, which could truly impact society by introducing and allowing more of society to have the ability to pursue education (Broda et al., 2018). Additionally, as previously discussed, nudge communication, or interventions, impacts other sectors and there is significance in how and what messages are communicated to recipients (Arno & Thomas, 2016; Felsen & Reiner, 2015; Mols et al., 2015). Prior research supports interventions in the form of specific nudges, and research also confirms the importance of transparency in nudges and broadening people's education of nudge communication and its benefits.

### **Research Question**

**RQ1:** Is there a difference in persistence to complete courses with students in an online program who received nudge notifications and those who did not receive nudge notifications?

### **Definitions**

1. *Nudge communication* – Communication that aids an individual in subconsciously making a decision that may be different from the decision that would have been made without the nudge communication (Thaler & Sunstein, 2009).
2. *Intervention* – Provision for learning centers, remediation courses, academic advising,

academic and career skills, and personal counseling that helps improve student study habits and attitudes (Patrick et al., 1998).

3. *Persistence* – A measure of student ability to successfully progress toward educational and academic goals at the level of the student (Bahi et al., 2015).
4. *Fixed mindset* – Type of perspective that individuals hold that limits their ability to learn beyond the level that they have set for themselves; fear of failing or not participating in an activity or subject where the individuals could be wrong (Dweck, 2006).
5. *Growth mindset* – Type of perspective that individuals hold that willingly accepts a challenge, is not afraid of failing, desires to learn and try again rather than be right (Dweck, 2006).
6. *Retention* – Re-enrolling a student from one term to the next; retaining the student at the institution of enrollment as determined by active enrollment (Bornschlegl & Cashman, 2019).

## **CHAPTER TWO: LITERATURE REVIEW**

### **Overview**

After substantial research on nudge communication and the impact it has on decision making, a review is provided to identify what nudges are and the utilization of nudges in political, dietary, and educational avenues. This chapter provides an overview of existing literature pertaining to this study of nudge communication and also how fixed and growth mindsets impact the processing of nudges and decision making. Before delving into the overview details, it is important to note what nudge communication entails. As will be discussed in the theoretical framework below, a nudge is just that—nudging an individual toward making a decision. The purpose of nudging, in this case, is to encourage students both to make a more positive decision in pursuing their studies and to engage and persist further in their education.

The first section of this chapter discusses the mindset and nudge theories that are selected for the framework and how they relate to this topic of research and this causal-comparative study. The second section combines the findings and research on ways that nudge communication is used within health, political, and educational experiments and also how fixed and growth mindsets may impact nudge communication as determined by the recipients that have either the fixed or growth mindsets. The end of the second section addresses the relationship between nudge communication and mindset theory and correlates the impact of mindset and the types of nudges used. A review of the literature reveals a gap in said literature and shows the need for more studies and findings on decision making and persistence in higher education.

### **Theoretical Framework**

The following discussion encompasses two theories that impact the topics of literature as



related to nudge communication theory and mindset theory. These two theories lay the foundation for the discussion later in this study that supports where there is a gap in the literature for this causal-comparative study. The foundation is established in order to determine whether there is a need for this nudge communication, or a push toward an academic decision, within a private institution's online undergraduate higher education realm for building persistence and retention efforts. The following discussion comprises the topics of the two theories, followed by the theoretical framework for this study of nudge communication. The two theories include nudge theory and mindset theory. Both of the theories derive from prior research and collective studies that guide the topic of nudge communication to support the need for additional research. Nudge theory comprises individuals' decisions that are impacted either by communication received and processed through an unconscious or subconscious response, whereas mindset theory involves two types of mindsets with which an individual approaches general life; in this case, the type of mindset approach is within the focused perspective of learning and, more specifically, within an academic environment.

### **Nudge Theory**

As previously defined in Chapter 1, nudge theory was founded by Thaler and Sunstein (2009), who posed their theory on the concept that humanity oftentimes unconsciously or subconsciously makes decisions that are suboptimal and negatively impact society (Abdukadirov, 2016). The reason for poor decision-making capabilities is not that humanity is unable to cognitively process and determine a wise or beneficial decision, but because of how societal training and biases interact with the human psyche (Abdukadirov, 2016). Thaler and Sunstein also argue that if individuals lived free of error, they would make the best decisions and not need any type of nudge or intervention toward a better decision. An easy example of this is

shown in the advertisement of sugar-based products awaiting each child and adult at superstore or grocery market checkout counters (Binns & Low, 2017). The training and assumption of these goods are habitual in the consumer's day; the nudge toward the visualization of the goods triggers a decision-making capability that would otherwise go undecided if the product was not awaiting the individual at the checkout counter (Binns & Low, 2017). Decision making that is considered a poor decision or mistake because of cognitive capacity (Abdukadirov, 2016) is due to what Thaler and Sunstein also call limitations of capacities biases, heuristics, and fallacies. If humanity is nudged through visual communication and discreet messaging, then the theory and testing of the theory show individuals make more positive choices, or perhaps more negative choices (Binns & Low, 2017) toward long-term outcomes, whether it be economically, financially, politically, academically, or other (Thaler & Sunstein, 2009).

### ***The Theory in Action***

Nudge theory is seen as aiding individuals in situations when there may be lack of control (Sugden, 2017) while alternatively seen as stimulating self-control (Dianoux et al., 2019). Dianoux et al. (2019) categorize nudges into six groups: priming nudges, salience nudges, default nudges, incentive nudges, commitment and ego nudges, and norms and messenger nudges. The first three groups of categorized nudges utilize the subconscious for physical, verbal, or sensory nudges for drawing attention to a certain choice for salience nudges (Dianoux et al., 2019). Drawing attention to a certain choice helps define a choice as being an easy selection for default nudges (Dianoux et al., 2019). Incentive nudges are defined as initiatives that strengthen a choice; public engagement involves commitment and ego nudges; and, finally, norms and messenger nudges are used when there is a mobilized social norm that induces certain behaviors (Dianoux et al., 2019).

**Intervening on Decisions.** Building upon nudge theory, Abdulkadirov (2016) stresses that nudge theory is not about why an individual is nudged (Thaler & Sunstein, 2009), but instead who should nudge for one of the aforementioned avenues: economics, finances, politics, academics, or other like health purposes. The reason this is pertinent to this discussion is because of the authority that nudges bring when utilized by an organization (Binns & Low, 2017; Thaler & Sunstein, 2009). It may be as simple as reorganizing shelves in a store to guide a consumer's purchasing decisions (Binns & Low, 2017; Thaler & Sunstein, 2009), but it may be taken even further by making a medicine bottle glow when the consumer forgets to take the medication (Abdulkadirov, 2016). Because of the theory's foundation of choice architecture, or guidance on making choices through nudging (Thaler & Sunstein, 2009), it serves as the basis for this causal-comparative study for nudge communication within higher education to further determine if retention and academic achievement increase when students receive this specific type of communication.

### **Mindset Theory**

Mindset theory is the second theory that is studied and utilized in this study on the impact of nudge communication. Mindset theory was founded by Carol Dweck (2006) and theorizes on two types of mindsets: fixed mindsets and growth mindsets. These mindsets stem from early childhood, either from an individual's being told as a child that he or she is smart, thus avoiding activities that risk challenging that belief (fixed mindset), or recognizing intelligence as a character trait that is nurtured and developed over time as opportunities to improve present themselves (growth mindset) (Shapiro & Dembitzer, 2019).

### ***Background***

From those childhood concepts of mindsets, students, whether in primary, secondary, or

higher education, approach learning and comprehension in two different styles; this determines their type of mindset and impacts their future lifestyle (Dweck, 2006). Dweck and Yeager (2019) discuss how individuals with fixed mindsets are unwilling or believe they are unable to change or better themselves in a subject matter or personality trait, whereas individuals with growth mindsets are willing to pursue new avenues, attempt to become more skilled in unfamiliar concepts, and try again when they fail at something (Nordin & Broekelman-Post, 2019).

**Fixed Mindset.** Fixed mindset individuals tend to become helpless rather quickly in situations that they are not inherently skilled or gifted; they lose confidence in their abilities and start to question their intelligence or resign to their lack of intelligence (Collins et al., 2017). Fixed mindset individuals tend to stay away from situations that are unfamiliar or they are unskilled in to avoid feeling uncomfortable or like a failure (Molden & Dweck, 2006). Other research supports that fixed mindset individuals actually have higher self-confidence in some areas, like moral or empathetic situations, than growth mindset individuals when tested multiple times on failed performance in an area that builds improved behavior (Molden & Dweck, 2006).

**Growth Mindset.** Growth mindset individuals approach life with a desire to succeed in spite of error and failure. That is not to say that growth mindset individuals embrace failure or are not afraid of failure or performing poorly in an area, but they continue to try to succeed without letting the failure hinder them from trying again or doing something else that is unfamiliar (Dweck & Yeager, 2019). Growth mindset individuals, while applauded for welcoming new pursuits, need to recognize how embracing improvement or learning new concepts can negatively impact their behaviors in some cases. This is based on the findings that growth mindset individuals desire an ability to improve in moral or behavioral choices; however, when failure to improve upon empathetic or moral behaviors occurs, the realization of that

continuation of failure in such instances leads to judgment and frustration in themselves since they did not improve upon those behaviors (Ryazanov & Christenfeld, 2018). This does not stop them from trying again, but it can negatively impact their confidence and create a judgmental mindset toward themselves as well as others who fail at improving in those areas (Ryazanov & Christenfeld, 2018). Another study applauds growth mindset in the moral growth mindset arena, as Han et al. (2018) prove that service engagement and civic activities increased with those who maintained growth mindset. Since growth mindset promotes self-efficacy and a motivation to engage in learning processes, it enables an individual to desire to become a better person, motivating them to demonstrate behaviors that better serve the community even when it is challenging or unfamiliar (Han et al., 2018). That said, other traits within growth mindset individuals are found to improve confidence levels since growth mindset individuals have shown results in academic improvements, increased self-discipline, and reduced belligerence and aggression (Yeager et al., 2011).

**Additional Terminology.** While fixed mindset and growth mindset are frequently used terms, other research and studies use terminology like entity theory and incremental theory, which focus on intelligence and perspective of how intelligence impacts learning (Ryazanov & Christenfeld, 2018). The imposter phenomenon, another term that is associated with fixed mindset (Cisco, 2018), is the phenomenon of capable and engaged individuals who pursue areas that are within their grasp of understanding, but feel like intellectual imposters when faced with unfamiliarity or their initial lack of skill in an area to the point of having significant mental or physical consequences (Clance & O'Toole, 1987; Lester & Moderski, 1995; Steinberg, 1987). Imposter phenomenon is an extreme form of a fixed mindset; the realization is that fixed mindsets may prohibit a student's academic goals. Based on this serious detriment, this literature

is important to this study, as research seeks to determine how students can persist to complete a semester and retain to completion of their academic journey.

Student engagement and persistence in education hinge unequivocally from mindset theory, in that the quality of effort that the students devote to their education in purposeful activities contributes directly to desired outcomes (Nordin & Broeckelman-Post, 2019; Paunesku et al., 2015). Because mindset theory shows that people form beliefs and beliefs guide motivations and behaviors (Dweck & Yeager, 2019), persistence, or lack thereof, remains a significant determining factor in whether or not an individual has a fixed or growth mindset. Mills and Mills (2018) discuss the importance of growth mindset in a remedial college math course, supporting the theory that mindset does impact the outcome of changing the results of a challenging task. Growth mindset provides a perspective for improvement and accomplishment within a difficult subject matter, such as math (Mills & Mills, 2018). Among the individuals researched within a developmental college math population, those with growth mindset earned higher grades than those with fixed mindset (Mills & Mills, 2018). Retention was unable to be proved during the study, but the higher grade earned at the end of the semester stresses persistence, the other term of importance for this study.

### ***Pairing Mindsets With Other Factors***

Belief and motivation from growth mindset are not the only driving factors in student persistence (Bahník & Vranka, 2017). Other factors are involved, as argued by Bahník & Vranka (2017), in that students must have a baseline intelligence to be able to attain certain entry scores for admission to higher education institutions. The students are able to achieve their admission based on prior entry scores to an institution, not from their type of mindset (Bahník & Vranka, 2017). However, mindset goes deeper than simply entry test scores, as it shows that students are

willing and able to learn, set, and achieve goals (Bahnik & Vranka, 2017) if they embrace new concepts that may not be an immediate strength, as compared to subject matters that come easily to them (Dweck & Yeager, 2019).

**School Environment and Climate.** Another argument for academic achievement beyond mindset is the school climate and responses to education, as student-centric environments improve students' responses to their self-perceptions, which can increase engagement and improve academic outcomes (Corradi et al., 2019). That said, growth mindset is, or should be, paired with the factors of student-centered environments, because it allows students to pursue opportunities that would otherwise be unavailable. One student-centric environment is a trustworthy relationship with their teachers (Cavanagh et al., 2018). Within the study done by Cavanagh et al. (2018), student-teacher relationships paired with teachers encouraging growth mindset created a positive environment and confirmed a higher level of commitment to assignments and completion of a course.

For the past 40 years or more, education has continued in a traditional setting, standardizing its approach toward subject matters and content (Martin et al., 2017). While standardization is not wrong, it can be seen as a disservice to the many learning styles of students by creating a ceiling for students who meet the standards of assessment but may not invite or encourage them to pursue further study and engagement in a topic where criteria are simply met (Martin et al., 2017). Overhauling the teaching and learning approaches of a school environment, paired with encouraging students to embrace and transform their thinking and beliefs with a growth mindset approach, could drive persistence and retention to a new level as students progress from primary to secondary and on to higher education pursuits. Martin et al. (2017) provide findings of substantive and methodological research on four of their correlational studies

of growth mindset and academic growth goals that focus on the relationship between student achievement and classroom achievement. Their findings confirmed that when academics and studies are applicable to the student, the academic achievement increases because the student relates to the content (Martin et al., 2017). Additionally, they found that pairing students together from multiple learning styles improves classroom efficiency and inclusiveness in pedagogical strategies and different levels of growth mindset for both teacher and students (Martin et al., 2017).

**Welcoming Failure.** Encouraging the process of trying new possibilities within a subject matter, failing, and trying again in a student-centric school helps students approach opportunities with a different perspective than how they may have entered the learning environment. Being receptive to this concept of a growth mindset in an environment that welcomes pursuit, failures, and testing hypotheses and new opportunities creates an atmosphere where a student may embrace learning and new opportunities with less fear and more willingness to pursue challenges (Dweck, 2009).

**Changing Education Through Mindset.** Growth mindset is thought to be a force behind increasing quality in education (Miller, 2019). Critics of mindset theory state that the impact of growth mindset is too limited and request that studies include much larger populations than the selected populations that have been studied and published thus far (Miller, 2019). This stance is appropriate, but while additional populations may be necessary for further study, growth mindset should still be pursued. Growth mindset, paired with changing study habits, goal-setting initiatives, and testing adjustments, may motivate students to approach education and learning more warmly (Miller, 2019).

**Changing Mindset Through Nudging.** Mindset theory relates closely with nudge



communication, as the concept of nudge communication is to intervene in decision making to help guide and encourage; in this case, it applies to students persisting in their academics. If nudge communication helps move a student's mind from a fixed mindset to a growth mindset, the mindset theory plays a vital role in nudge communication. In conclusion, the theoretical framework for this section includes nudge theory and mindset theory. These two theories are crucial to this study, as nudge communication is an approach that ensures the individual receiving the nudge is able to make a comprehensive decision, while mindset theory aids in further understanding the approach to learning styles and comprehension of a topic. There is a need to discuss the literature related to the topic of these theories as they are utilized within the medical field, the advertising field, and the education field.

### **Related Literature**

The two theories of nudge communication and mindset include a variety of supporting literature over the years that aid the analysis of a gap in literature for this study. From the nudge perspective, the foundation came from Thaler and Sunstein (2009) as they focused on the economic impact of nudges; however, as previously mentioned in the theoretical framework, nudge communication can be and is utilized in multiple sectors. There has been extensive research and growth on the topic over the past five years, creating additional support in materials and studies within related literature of the topic. Additionally, as provided in the prior section, the concept of mindset and how it impacts an individual's perception on how to approach life is supported by research in multiple fields, but is heavily related to the field of academics and is supported below. The following section discusses how nudge communication is used, interventions that are utilized with nudge communication to further growth mindsets, and promotion of growth mindset based on nudge communication results as supported with related

literature.

### **Using Nudge Communication**

Nudge communication is proven to impact decision-making capacity and drive change and results in multiple areas of research. Nudges are everywhere in daily life: text messages that remind individuals to pay a bill, mobile “apps” that track and notify individuals of their daily steps taken and calories eaten in a day, and GPS devices that nudge users where to go with directions (Sunstein, 2017). The use of nudges impacts decision making on so many daily practices that they are not even noticed. Research supports the use of nudging; however, not all nudges are created equal, and Sunstein (2017), one of the founders of nudge theory, explains that nudges can and do fail for a few reasons. Because of the potential for failure or success, they must be implemented strategically. Some reasons that nudges fail include communicating a message that confuses the intended audience, causing reactance rather than real behavioral change, decision-making adjustments that have only a short-term effect, and only producing compensating behavior with no net influence (Sunstein, 2017). If an organization finds itself in this situation with a poorly implemented nudge, Sunstein confirms that the choice architects can either do nothing, nudge better the next time, or counter-nudge through incentives to reintroduce the nudge concept.

### ***The Behavioral Economic Push***

The concept behind nudge communication is often behavioral economics (Abdukadirov, 2016; Markley-Towler, 2018), in that behavior impacts the decisions made toward market demands. This is not always directly related, as academics approaches it more from a secondary perspective, but there are multiple areas that impact the economic outcomes when within choice architecture. An example of this is a discussion of innovative marketing techniques—using

nudge communication to make companies more readily adaptable to changes in company strategies (Dianoux et al., 2019). Nudges can be compared to pushing someone gently with an elbow, intervening in the choices of an individual within a certain environment (Dianoux et al., 2019). Nudges can be seen as low-cost implementation of constructing choice architecture toward changing behaviors within individuals, the community, and beyond (Dianoux et al., 2019).

**The Impact on Decision-Making Skills.** Self-control, or lack thereof, plays a vital role in decision-making skills; nudge communication is argued to strengthen individuals who would otherwise make poor decisions because of a lack of self-control within the realms of food, health, or education (Sugden, 2017). Dianoux et al. (2019) argue that nudges improve an individual's self-control, as behaviors toward choice selection adjust based on an individual's attitude and the options available by subconsciously or consciously triggering stimulants to react with choosing the better environment or selecting an option that provides a better outcome.

**Science and Nudge Responses.** Furthermore, nudging is being viewed in a newer lens, neuroscience, in that nudges work based on how the brain reacts to triggers and also how neuroscience can improve nudges and responses to nudges (Felsen & Reiner, 2015). Felsen and Reiner (2015) discuss how neuroscience leads to better nudge communication that impacts better decision-making outcomes; because neuroscience is limited in studying human subjects on nudge communication, it is implied that nudges through food and health, political and economic, and higher educational industries are able to track the brain function and responses to nudge communication. This supports the study that Sunstein (2017) conducted regarding the failed nudge attempts and how to counter-nudge and provide beneficial solutions and choices to the individuals receiving the nudge from the choice architects.

### ***Food and Health Industry***

Obesity is a very real problem; studies support that nudges can positively impact behaviors toward healthier eating choices. Arno & Thomas (2016) use a systematic review methodology to collect and consolidate results from nudge research for healthier choices. In fact, they state specifically that “results were evaluated as a proportional change in behavior, outcome, or status” (Arno & Thomas, 2016, p. 5). Abdulkadirov (2016) discusses how market economics utilizes nudges to market both healthier dietary choices and to advertise worse food options that cause individuals to want to eat food with fewer nutritional benefits. Friis et al. (2017) confirm that nudging food options can hugely impact society toward healthier eating choices due to the fast-food, eat-out culture that many first-world countries have adopted over the past decade.

**Choice Architects and the Placement of Food and Food Information.** Another example of selecting food that determines choice outcomes is whether or not a company promotes a picture or location of a brownie versus a salad, as the visualization increases the autonomy of a decision, whether covert or transparent (Felsen & Reiner, 2015). Circling back to the neuroscience behind the nudge, the visualization of the nudge is not the only factor; there may be a positive memory associated with the brownie that is triggered for the individual who sees the image, which in turn may impact the overall decision. The grocery store visualization of the candy bar may also involve choice architecture, as the options available at the checkout counter may easily persuade the individual to select a candy bar while awaiting checkout, whereas the other locations in the store may not be as compelling.

A certain fast-food restaurant utilized nudge interventions toward selections of food, specifically highlighting calories within foods to determine choice of food selection (Mohr et al.,

2019). Their findings confirmed that choices were based on caloric intake and the selection of foods, based on calories, were reduced for females when nudged toward selecting choices that had fewer calories (Mohr et al., 2019). This study confirmed that this was only the case when calories were highlighted during the decision-making process, thus confirming the importance of nudge communication and its impact on decision-making abilities (Mohr et al., 2019).

A study was done on primary schools to determine if attractive labeling and adjusted positioning of fruits and vegetables would impact the intake and selection of those fruits and vegetables (Mercano-Olivier et al., 2019). Upon evaluating the nudges over a three-week period, the study confirmed that there was an increase in selection and intake of fruits, but not vegetables (Mercano-Olivier et al., 2019). This reiterates that nudging toward a healthier decision is possible, but further education or a change in verbiage may be necessary to increase certain healthy choices if they were not going to be selected to begin with.

**Default Settings for Health Decisions.** Nudges are utilized in other health-related pursuits including decisions to become organ donors. One study confirmed that countries with default settings to opt out of donating organs had significantly higher rates of organ donation compared to countries that had a required opt-in selection as default (Gregor & Lee-Archer, 2016). The difference was a 90-percent rate of organ donors compared to a 15-percent organ-donor rate (Gregor & Lee-Archer, 2016). These results confirm that nudging individuals to review settings that are already on a default option will produce results of individuals choosing the easiest option (Gregor & Lee-Archer, 2016). As discussed in the following section, this can be a controversial topic, but reiterates that nudges help individuals pursue a decision that can better impact society by nudging them toward a decision that is already beneficial and produces positive results for society.

### *The Concerning and Very Real Political Usage of Nudge Communication*

Nudging is very controversial amongst political parties, even more so because of some countries' allowance of nudges but not others. The argument, however, as discussed by Schmidt (2017), supports that transparent and democratically controlled communication can alleviate the opposition to nudges:

So far, nudging initiatives in the United States and the United Kingdom have received a great deal of media attention, plenty of attention in the academic community, and reports about such nudging initiatives are publicly available...the effectiveness of nudging interventions is—typically more so than other public policies—subject to rigorous scrutiny before and after nudges are put in place. (p. 412)

Schmidt concludes with arguing the benefits of increased nudging in public policy, as it will reduce the uncontrolled nudges from private companies that many are unaware of, yet Mols et al. (2015) paint nudges as an overarching negative, regardless of whether they are public or private initiatives.

**The Need for Transparency and the Effectiveness Concern.** Transparency is a viable option for nudges and the results and findings are still effective, reducing the concerns that individuals will be tricked into conformity (Mols et al., 2015). Bruns et al. (2018) discuss a student population at a European university that confirmed results of an increased financial contribution to climate protection when nudges were implemented. This study did not provide evidence of behavioral change or that subjects differed in their proneness to experience reactance with the information of nudges provided to them, confirming that nudges in this method can be transparent and still effective.

As was discussed previously as well as further in this review, there is a gap in

determining how effective transparency is for all avenues of nudges (Bruns et al., 2018); further research is necessary to determine if transparency is always beneficial and how much transparency should be extended to the recipients. Schmidt (2017) discusses how transparency is available in politics, but due to the timeframe of the literature, further research would benefit the argument on the topic of transparency.

### ***Nudges in Social Media***

Nudges in social media are similar to prior discussed examples regarding politics and food placement for choice architecture. Nudges in social media utilize marketing techniques to prompt individuals who are using their websites to select responses based on preselected and prehighlighted choices that come in as multiple selections for privacy and security choices in online platforms (Aquisti et al., 2017). Social media nudges colorful or eye-catching proposals that present choices for privacy and security and displays both nudges that bring awareness to what is dangerous and helpful to the user (Aquisti et al., 2017). The results of default or highlighted selections confirm that the users are typically appreciative, as young individuals choose convenience of nudges in social media over context and familiarity of the purpose of the privacy and security updates (Aquisti et al., 2017).

### ***Default Nudges***

Default nudges, as previously mentioned in health and food choices, are also beneficial in social media and support services (Aquisti et al., 2017). Sunstein (2017) stresses how individuals are living busy lives and default nudges drive positive behavioral response and decision making in the midst of impactful traits like procrastination. The default nudge preselects a beneficial decision while making an alternative decision immediately accessible, but many do not make the effort to pursue the alternative (Sunstein, 2017). Oftentimes, the default nudge implies that a

beneficial decision is being made for the individual and most will not deviate from it unless they have additional, reliable information that would justify a change in the default selection (Sunstein, 2017).

### ***Bridging the Context***

One might ask why the healthcare industry, social media, and politics are brought into the conversation for this study. The purpose of addressing these topics as related to nudge communication is to allow the reader to recognize the broad scope of nudge communication (Binns & Low, 2017; Castleman & Page, 2014; Schmidt, 2017). The purpose of this study is to determine how nudge communication is related to higher education and show how much context literature provides in areas other than education. The following section discusses the further details of nudge communication as it relates specifically to higher education.

### ***Utilizing the Benefits of Nudges in Higher Education Industries***

Higher education and nudge communication have made leaps and bounds with research over the past five years. The types of nudges, whether text, email, or other, as mentioned above, are historically known as “interventions” or “academic interventions,” where higher education utilizes a means to adjust student behavior outcomes (Warmbold-Brann et al., 2017). Some students in higher education hold to the belief that they are partners of “creating educational space” and should not be seen as the consumer or test subject that receive nudges (Zilvinskis & Borden, 2017, p. 105). While that argument is valid, nudge theory goes deeper in that nudges assist any individual, student or otherwise, with behavioral choices that have positive outcomes on individuals and society. The ultimate goal of nudging is a long-term behavioral change based on the intrinsic motivation that the nudge only encouraged, not persuaded, toward a beneficial decision (Damgaard & Nielsen, 2018).



Oftentimes, as seen in the following section which discusses nudges in higher education, the focus is on students as the recipients of nudges. There is benefit and study on faculty and teachers as recipients of nudge communication, validating the importance of behavioral change in the teaching side of education and not just the retention and learning side (Damgaard & Nielsen, 2018). In this case, the focus will remain on nudging students in higher education for the purpose of seeking literature and research already done regarding retention and persistence efforts.

**Terminology Importance.** Higher education often uses the term “intervention” instead of nudge communication in regard to routes that are not visual or written communications. These nudge behaviors toward a certain response or outcome, but do so by modifying a task or assignment, providing adjusted instruction for a subject matter, or utilizing contingent reinforcement or reward-based motivation (Warmbold-Brann et al., 2017). Interventions also serve as tools for student support offices like academic coaching, supplemental instruction, and tutoring (Osborne et al., 2019).

Multiple studies have occurred that discuss methods and comparisons of pilot and control groups, as well as comparing countries and institutions within those countries to other schools located in other countries. Most of the examples following include student-based nudge communication for the purpose of some level of behavioral change. However, before delving into those examples, economic and political agendas may be interested in higher education through the realm of research-based initiatives. Because higher education typically focuses on academic studies and research projects as related to promoting higher education interests, Gunn and Mintrom (2016) argue that policymakers and funding agencies could trigger individual researchers, academics, and universities to pursue and promote nonacademic research that would

impact mainstream and cultural applications.

**Nudging Students Toward Academic Engagement.** One example of nudge communication for retention purposes and analysis of academic achievement includes two cohorts between New Zealand and the United Kingdom (Graham et al., 2017). Independent variables included weekly emails, personal emails, individual visits, and “pop-up messages”; the dependent variables were attendance and participation (Graham et al., 2017). The UK indicated that no conclusive evidence was confirmed, but nudges had a noticeable effect on student engagement (Graham et al., 2017). The use of pop-up messages in the New Zealand cohort was better received than the other nudges offered (Graham et al., 2017). These findings of pop-up messages and the results of nudge communication challenge educators to think carefully about the type of messaging as well as mode of communication they use. The data from New Zealand also showed that one of the key reasons students attend classes is that they believe they are improving their chances of doing well in subsequent assessments (Graham et al., 2017).

**Utilizing Text Message Nudge Communication.** Another example of nudging students toward academic engagement is provided by Brown et al. (2019), who studied the impact of nudges that were utilized in large undergraduate face-to-face lecture statistics courses, as instructors rarely have the opportunity to provide personal feedback to each student who is struggling with the material or grades. The study took place over the course of a year and provided personalized nudges to students that helped them direct their studying and energy toward specific areas within their course (Brown et al., 2019). The students were provided information before a decision was made, were given options that were default answers with the ability to opt out or adjust the answer, and were assisted with execution of decisions via text messages (Brown et al., 2019). The findings of the study confirmed that message type,

frequency, and timing of messages, along with the relative importance of the course for the students' goals, mattered in the nudge communication and outcome of student behavior (Brown et al., 2019). Finally, the students who did not initially prioritize their grades responded positively to the multiple nudges and also received higher grades within the course (Brown et al., 2019).

Another study stressed the effectiveness of text message nudge communication with students since students use text messages approximately 2,000 times a month (Rust, 2018), which is typically much more frequent than their use of email communication. Text messages are read more often than emails and also often acted upon immediately as compared to email communication (Rust, 2018). Text nudges can be done institutionally within campaigns, determined through needs-based data analytics, or done through personalized faculty communication (Rust, 2018). Depending on the institution's budgetary allowances, professors should reach out to their students with reminders, helpful feedback, or to just touch base to reiterate the student's value and the benefit of their education (Rust, 2018).

**Giving Ownership of Achievement to Students.** While the concept may seem obvious, Fritz (2017) focused on a study that provided students the ability to pursue their calling by using predictive analytics and nudges to enhance their ability to analyze the predicted outcome of their coursework. The study had students interact more as partners and less as students within their enrolled institutions (Fritz, 2017). This allowed them to have perspective and a voice in determining the outcome of their academic success (Fritz, 2017).

**Teaming Up.** With retention concerns, another study analyzed the demographics of the students who were not retaining and started finding similarities (Carmean & Frankfort, 2018). The study then utilized an institution's social psychology and student intervention experts rather

than just registrar and information technology staff (Carmean & Frankfort, 2018). Of course, some institutions may already collaborate among their teams to ensure that there is a streamlined communication of goals and retention pursuits, but utilizing the data with guidance on how to use the information effectively as nudges are created and implemented is key (Carmean & Frankfort, 2018). The overall objective for the study was finding the challenge and providing a service for that challenge, with recognition and action on nudges that serve diverse populations, keeping the possibility of needing multiple types of nudges and communication styles in mind (Carmean & Frankfort, 2018).

**Loans and Educational Attainment.** Another study related to higher education deals specifically with loans and educational attainment, as researched by Marx and Turner (2019). There is such a thing as loan nudges in higher education. A study was performed that confirmed that random selection of nonzero loan amounts were given and followed, as were zero loan amounts; the findings showed that those who received nonzero loan amounts were more likely to have a higher GPA as well as go on to a four-year institution from a two-year college, as compared to those who did not receive an amount for loans (Marx & Turner, 2019). While transparency of the nudge may not have been clearly communicated or recognized as such for choice architecture, the amount of loans and choice in types of loans support that the decisions were more educated than other studies previously confirmed (Marx & Turner, 2019).

**Tutoring and Peer Mentoring.** As relating to the previous educational attainment, tutoring and peer mentoring through nudge communication also support the benefits of nudge efforts and persistence and academic achievement (Castleman & Page, 2014; Pugatch & Wilson, 2018). According to Castleman and Page (2014), postsecondary outcomes substantially improved for students when some low-cost interventions, or nudges, were introduced regarding

college financial aid and professional assistance. Because of “summer melt,” the loss of incoming or returning students during the summer, the authors sought to determine if the expected loss of students reduced if nudge communication was utilized to certain cohorts at schools that were willing to implement low-cost interventions (Castleman & Page, 2014).

In the case of summer communication, the cohorts were high school students who were ready to enter college or were considered at risk of not entering college after making plans to attend following high school graduation (Castleman & Page, 2014). One intervention focused on personalized and automated text messages that reminded incoming students of their tasks and took an additional step of connecting them with support from their admissions counselor (Castleman & Page, 2014).

Peer mentoring (Castleman & Page, 2014; Pugatch & Wilson, 2018) is a second intervention that employs mentors who are close in age with the high school and college students and aids the students in support services and outreach options. Both interventions led to a substantial increase in college enrollment, matriculation, and persistence in the term following the term of the communication efforts. Mentoring and tutoring are confirmed as cost-effective routes for further studies and usage in additional initiatives for educational outcomes (Castleman & Page, 2014; Pugatch & Wilson, 2018).

Another example of mentorship is given in Cisco’s (2018) study on postgraduate students learning how to appropriately read academic journal articles and implement literary strategies when writing literary reviews. Intervention is the terminology that is used for the study that Cisco analyzes. The purpose of the interventions is to intervene via a mentor to help students achieve academic success in their postgraduate work (Cisco, 2018). The students used a mentor to identify the feelings of imposter phenomenon, which is related to fixed mindset (Mangum,

2018), explore disciplinary and academic literacies and strategies, successfully read academic journals, and successfully write literature reviews.

**The Impact of Personalized Nudges Versus Generalized Nudges.** As previously discussed, all nudges are not created equal. This is supported by O'Connell and Lang's (2018) study where they selected a random sample of students from a midsized, private university in northeastern United States that was voluntary participation with a participation rate of 66% that spanned across 13 sections of an undergraduate course, CIS 101. The collection of participants and data gathering lasted three semesters (O'Connell & Lang, 2018). There were a total of 281 participants with ages ranging from 18-44 years old; the purpose was to evaluate the personalized nudge communication and when the communication was sent compared to that of their in-class time (O'Connell & Lang, 2018). Another similar scenario, yet focused on high school (Paunesku et al., 2015), split students into three groups to study the results of GPA and academic achievement upon receiving personalized communication and found the results of post-interventions as significant as compared to pre-interventions as not significant.

**Persistence and Performance in First-Year College Students.** Small, but significant findings are supported through the concept of self-efficacy and self-confidence, as related to persistence within higher education (Braithwaite & Corr, 2016). This article uses the term interventions rather than nudge communication, although it is considered the same concept, to focus on a mainly quasi-experimental meta-analysis of the literature for studies focused on enhancing self-efficacy and self-confidence which impacts academic outcomes for university-level students (Braithwaite & Corr, 2016). Small-to-moderate results were confirmed as statistically significant, with studies confirming the largest effect sizes after confirming that subgroup analysis was required to explain the portions of variance within the study (Braithwaite

& Corr, 2016). Overall effect sizes were small-to-moderate with additional rigorous empirical studies necessary to gain psychological insight for educational attainment (Braithwaite & Corr, 2016), but the findings launch this discussion into the next focus, which is mindset and the related mindset theory.

Dobronyi et al. (2019) use personalized interventions via text and email messages for the purpose of persistence with goal-oriented trainings that help students plan for academic success and setting goals to achieve higher grades than previously averaged. The study links higher grades with persistence, desiring for nudges to help students achieve higher grades due to reminders, encouragement, and goal setting (Dobronyi et al., 2019). The results showed that these methods aided in higher grades earned and persistence, but goal setting was more challenging due to tracking the completion of those goals over the course of a two-year and four-year timeframe (Dobronyi et al., 2019).

### **Intervening the Fixed Mindset With the Growth Mindset**

As discussed in the theoretical framework section, fixed mindset and growth mindset are two perspectives individuals use to face the world and deal with day-to-day responsibilities, subjects, and problems (Dweck, 2006). While “fixed” and “growth” are recognizable terms, the following section focuses on the differences and details of these mindset types and how they impact decision-making capabilities. The importance of these capabilities lies within the foundation of the mindsets, as they are vital in how individuals perceive, learn, and acknowledge pursuit of academic achievement and opportunities beyond the baseline educational environment.

#### ***Fixed Versus Growth Mindset***

One assumption that needs to be addressed immediately is that fixed mindset is not bad

and growth mindset is good. Rather, fixed mindset is just that: it creates a fixture mentality that limits its capabilities to the formations of what the individual is already familiar with or good at, whether skill, academic subject, or personality trait (Dweck & Yeager, 2019). Additionally, fixed mindset creates barriers or resistance to learning new and challenging concepts, while growth mindset does not allow an individual's limitations to deter the individual from learning and growing in a subject (Nordin & Broeckelman-Post, 2019). Fixed mindset leads to students' poor performance due to feelings of inadequacy, decreased self-confidence, and a lack of motivation to persevere; a fixed mindset diminishes a student's motivation to learn and study more since they believe there is nothing that can be done with the intelligence level that is already there (Mills & Mills, 2018). When a student has a growth mindset, they recognize that their abilities and performance can and do increase with attention and effort (Mills & Mills, 2018).

### ***Leveraging Growth Mindset to Encourage Academic Achievement***

With the understanding that growth mindset leaves capabilities or pursuit of new opportunities wide open, academic achievement, then, is a viable option to one who may struggle with a subject or concept, whether it be time management or physics. A great example of how mindset is impactful in determining the outcome is mathematics. Collins et al. (2017) implement a study on a math-based mastery test that assesses the students' level of math comprehension. In their study, they stress how math is extremely challenging and implement the mastery-based assessment tool they utilize to test students' mastery on mathematical topics (Collins et al., 2017). Because of the complexity of math, Collins et al. encourage the growth mindset for students, as they need to embrace deep conceptual comprehension of course materials, embrace the unknown, which requires reducing test anxiety, and work closely with teachers, which requires a trust and relationship.



Cartwright and Hallar (2017) focused on elementary science courses and the teachers of those courses and found that science teachers with growth mindset were willing to teach challenging concepts in science with multiple types of teaching and learning options so that their students were more interested and engaged in the necessary content. Teachers, just like students with growth mindset, need to engage in new experiences and options to ensure that their students are able to achieve the academic objectives as placed on them by the school, city, state, or country (Cartwright & Hallar, 2017). Because growth mindset requires taking risks, teachers have to pursue their decision-making abilities and processes in ways that will allow them to implement new approaches while not being comfortable with the immediate outcome, recognizing that the learning and goals may not produce immediate positive results (Cartwright & Hallar, 2017). Utilizing interventions to promote academic achievement suggests that if students can and do adopt a growth mindset, their achievements will be greater from elementary through higher education, regardless of the transition into more challenging topics and subject matters that are not as familiar or easily learned (Paunesku et al., 2015; Rattan et al., 2015). Even if growth mindset is not the only factor in achieving higher academic success, it, paired with other aforementioned factors like environment (Corradi et al., 2019), support and trust from teachers, and a student-centric atmosphere (Cavanagh et al., 2018), creates a strong approach for academic achievement. Furthermore, Paunesku et al. (2015) discuss just how effective nudges are for students pursuing academic goals, as the overall increase in grades and points earned averaged approximately 6.5% in academic achievement.

### **Promoting Growth Mindset With Nudge Communication**

Because growth mindset is something that can be learned (Dweck, 2006), academic institutions have the ability to teach students about their capabilities as related to fixed versus

growth mindset. In this case, if elementary, middle, or high schools do not offer growth mindset learning environments, higher education really is the last stop to ensure that students learn and pursue growth mindset (Braithwaite & Corr, 2016). Means of options are discussed throughout this section. Results do not portray equal achievement scores for growth mindset across all growth mindset students, as other factors, like migrating minorities, may impact the range of academic achievement of minorities due to cultural contextual factors that other types of nudges will more strongly influence than growth mindset (Corradi et al., 2019). Other factors, as supported in previous studies (Cavanagh et al., 2018; Corradi et al., 2019; Miller, 2019), confirm that school climate and teacher relationships play a vital role when paired with advocating for focus on growth mindset. That said, for the overarching issue of persistence in higher education, mindset and nudge communication are instrumental in improving retention and persistence in course completion rates.

### ***The Strength of the Nudge Motivation and a First-Year Student's Mindset***

Nudge and intervention communication support that academic achievement improves across higher education when utilized with gender, first-generation students, and ethnic minorities (Broda et al., 2018). A focused study analyzed over 7,000 first-year college students to determine the impact of nudge communication at a public US institution (Broda et al., 2018). The results confirmed that an ethnic minority within higher education, the Latino minority, improved by 40 points upon receiving the nudge communication, closing the gap in GPA difference by 72% (Broda et al., 2018). Additionally, other studies support that there is an overall 6.5% academic achievement increase in students who receive the personalized, directed communication (Paunesku et al., 2015). Communication on growth and fixed mindset was included in the study of Dobronyi et al. (2019), as the goal of communicating the importance of

having a growth mindset would help college students. These students who were included in the large population of individuals selected for the study welcomed the new concept of growth mindset and pursued wise academic goal-setting techniques (Dobronyi et al., 2019). Previous findings confirm that growth mindset communication is more readily welcomed and impacts significant positive response and action only when fixed mindset is not included in the information regarding mindset education (Dobronyi et al., 2019).

### ***Utilizing Nudge Communication in Underrepresented Populations***

Underrepresented populations are briefly addressed above as shown with migrating minorities and underprivileged economic backgrounds, but Broda et al. (2018) focus their study specifically on how nudge communication adjusts the motivation and fixed mindset to a growth mindset as it relates to academic results and achievement. Light-touch, or noninvasive, interventions showed a positive impact and outcome for underrepresented students in higher education (Broda et al., 2018), but furthermore, they are shown as impactful in high school as underrepresented students determine their next steps after completing high school (Castleman & Page, 2014). Based on the findings that nudge communication benefits both active college students as well as precollege students, nudge communication is supported in continuing further study, whether it be transparent, personalized email communication, or brief text messaging communication in place of email.

### **Summary**

Nudge communication is used in myriad ways across society. In the political and marketing realm, while still controversial, it is a growing and useful tool that multiple markets are using more often (Abdukadirov, 2016; Binns & Low, 2017; Braithwaite & Corr, 2016; Broda et al., 2018; Felsen & Reiner, 2015). Nudge communication benefits the political field by helping

impact decision-making abilities with end-users due to influencing votes and legislative matters (Bruns et al., 2018). The research articulates that there are reasons, such as bias, skewed decision making, and curbing outcomes that would otherwise be driven to another decision, to prohibit nudge communication in politics (Bruns et al., 2018), but if left to private organizations, there is less oversight and potentially larger concern if legislative process is not involved in nudge standards of appropriate communication.

Food and health markets are utilizing nudges through more streamlined communication and advertisements that promote more well-rounded decision-making capabilities of clientele and customer bases. Studies confirm that nudge communication serves as a tool to provide better decisions and health outcomes for food choices. When health organizations are determining important contributions, like organ donations, certain countries are utilizing nudges with preselected options and requiring opt-out action to adjust decision-making requirements (Gregor & Lee-Archer, 2016). Higher education is utilizing nudge communication for retention purposes, underrepresented groups, and academically struggling populations within public universities (Broda et al., 2018; Graham et al., 2017). Higher education studies provide support that personalized nudges are much more effective than generalized nudges, with persistence and performance outcomes representing the significant difference and effect of the prior over the latter type of nudge communication (Brown et al., 2019).

All of the above findings within the related literature of nudge communication couple with the importance of fixed mindset and growth mindset. Both types of mindset, as seen in the related literature, can greatly impact the academic outcomes and achievements for students within higher education. While research supports that mindset is not the only determining factor toward academic achievement scores, it is a driving force when paired with other components

like school climate and environment, teacher relationships and trust (Cisco, 2018), and mentorship (Cavanagh et al., 2018; Corradi et al., 2019).

Based on the above summary, a gap in the literature exists with little to no research currently supporting the persistence of completing coursework within a term within private higher education institutions with an online undergraduate general education basis. Additionally, few studies are available to determine the pre- and post-GPAs and grades earned for online undergraduate courses that receive nudge communication versus those who receive no nudge communication. This study was necessary to research and determine findings for persistence of course completion within a term for online undergraduate students. The study focused on a private institution that encouraged the continued and necessary empirical research that is available on the topic of nudge communication and growth mindset.

## CHAPTER THREE: METHODS

### Overview

The following chapter includes the methods used for the research of this study. The design discusses the causal-comparative research, the variables, and the purpose for selecting the causal-comparative research design. The research question and null hypothesis are also included in this chapter. The participants and setting, instrumentation, procedures, and data analysis aid in the comprehension and importance of pursuing the study based on the design selected.

### Design

A causal-comparative research design was selected for this study, as groups from the institution were previously randomly selected for the test population and control group. This study will determine if the independent variable of nudge communication will have an effect on the dependent variable, which is intent to retain and persist in the semester. The causal-comparative research design is an appropriate fit for this study. The characteristics validate this design with no manipulation since the nudge intervention already occurred and this serves as an independent variable, while the control, or group that does not receive the nudge intervention, which is also an independent variable, is gathered from the selected institution that the population is pulled from (Rovai et al., 2013). Causal-comparative design investigates the past cause-and-effect relationship by exposing one or more groups to treatment conditions (nudge communication) and compares the results to a control group that does not receive the treatment (Rovai et al., 2013).

### Research Question

The research question for this study is:

**RQ1:** Is there a difference in the persistence to complete courses with students in an

online program who received nudge notifications and those who did not receive nudge notifications?

### **Hypothesis**

The null hypothesis for this study is:

**H<sub>0</sub>1:** There is no statistically significant difference in the persistence to complete courses with students in an online program who received nudge notifications and those who did not receive nudge notifications.

### **Participants and Setting**

This study used random sampling of archived data from undergraduate students who are enrolled at a large Christian university located in central Virginia for its participant selection. The selection criteria included students from this institution who were enrolled in online undergraduate general education courses; approximately 50% received nudge emails that included encouragement and reminders regarding course assignments.

For this study, the number of participants sampled were 10,024 undergraduate matriculated students ( $N = 10,024$ ) who completed at least one course prior to the semester that the online students received nudge communication. According to Gall et al. (2007) and Warner (2013), this exceeds the required minimum, which is 66 participants, for a medium effect size ( $\eta^2 = .043$ ) with a statistical power of .7 at the .05 alpha level. The selected population for this study was enrolled at least part-time and in at least one general education course, as defined by the university being studied.

Sample size was selected by power analysis confirmed at .99 (Warner, 2013). The description confirms that the university selected for this study offers online programs and courses for students who are pursuing undergraduate, graduate, and doctoral courses and

programs. This institution was selected because of the emphasis it puts on setting goals for continued registration to help students retain and persist toward their educational goals.

The university in this study is located in central Virginia, but due to the ability to enroll and complete courses completely through an asynchronous mode of education, the online students are located throughout the world. The treatment group consists of 2,061 males and 2,915 females. The control group consists of 2,184 males and 2,867 females. The purpose behind the number selected for this study was due to the size of population that the institution selected for the nudge communication. The institution has a large online student body of over 80,000 students, and their undergraduate population comprises about 60% of that population. Taking 10,000+ students from that group gave the researcher more than 20% of the undergraduate population to analyze the impact of nudge communication.

### **Instrumentation**

The purpose of the primary instrument, institutional data, is to collect, analyze, and measure the institutional data directly from the university. This instrument is a primary and direct source for researching the problem statement and purpose of the study. Additionally, the purpose of institutional data is to maintain necessary records for accreditation, student rights, and external reporting.

Institutional data serves the purpose of usage in this study for myriad reasons, including academic standing, academic record, student identification, honors and records for institutional and external reporting purposes, and much more. Using institutional data for quantitative research analysis is a beneficial usage of the data and has been utilized through IRB permission as a crucial factor of research. Prior research regarding retention and persistence efforts confirms that institutional data is an effective instrument that provides confidence and reliability in its



findings (Boston et al., 2012; Howard et al., 2012; Shenkle, 2017).

Additional instrumentation used in this study is pulled from the institutional data and includes course persistence and student success through course completion (Anderson, 2019). These instruments are considered secondary but are supportive in the analysis by confirming whether or not a student passed via a letter grade while receiving nudge communication and also whether or not they persisted to the end of the term and retained to the following term after receiving nudge communication. This study did not analyze if nudge communication was the reason why students retained following the term of nudge communication but did analyze persistence of coursework for those who received nudges and those who did not. The scoring will be used with a numeric figure of 1 for not completing a course successfully, as defined by earning a grade of F, FN, or W, and a numeric figure of 2 for completing a course successfully, as defined by earning a grade of A, B, C, or D within a term. Upon receiving necessary approvals from the selected university, it took approximately two weeks to gather the data from the institution and then around two days to enter the data into SPSS for analysis. Scoring is determined by the researcher since the scoring is minimal.

### **Procedures**

After the researcher submitted an application to the Institutional Review Board (IRB) and received approval confirmation from them, the data procedures occurred. This review process took approximately three weeks, as the analytics and data review team at the institution needed to add and adjust a few parameters of the data in order to cleanly transfer to SPSS. See Appendix I for IRB approval/exemption, as found in other studies using institutional data (Shenkle, 2017). The data that were gathered and received were already collected and stored by the institution's analytics and decision-making support team. After confirming IRB approval, the researcher

worked with the analytics and decision-making support team to collect the data that were necessary for the analysis and study. A support ticket was submitted for the data collected by the university data analysts. A report was produced in a manner that was comprehensive for the researcher. Data were collected based on time of original enrollment and recent enrollment when the nudge communication was introduced. Data were stripped of personal identifiers with only a numerically created identification that confirmed whether or not a participant took more than one course. Data remaining confirmed gender type, courses by prefix and number, participant end-of-term GPA, and completion of course enrollment that was identified with letter grades. As previously mentioned in the instrumentation section, the researcher was granted approval for the instrumentation and data collection, and there were numbered categories for the variables with 1 being unsuccessful completion of the term and 2 being successful completion of the term.

Because there are no personal identifiers of participants for the researcher, there was no need to administer a consent form. Additionally, there was no need to train individuals on treatment of the procedure, as the nudge communication came from email; the title and body of communication were clear and concise regarding messaging. The data were collected and recorded prior to this study without need for consent, as the institutional data is academic data that the institution is responsible to maintain and uphold.

### **Data Analysis Procedures**

For the purpose of this research study, an independent  $t$  test is the most appropriate statistical test to determine if there is a significant difference in the persistence of course completion between students who receive nudge communication and those who do not (Gall et al., 2007; Warner, 2013). More specifically, an independent  $t$  test is implemented in research when a researcher compares between two independent samples (Walonick, 2010). This test was

chosen in order to determine if the means of two groups are statistically different and will test for differences in the values of the dependent variables and independent variables (Foster, 2017).

This test is applicable in testing when there is a necessary comparison of variables to determine if persistence in coursework for the semester is different across two groups: in this case, the control and test groups for those who received nudge communication and those who did not receive nudge communication (Warner, 2013).

In order to determine whether there were differences between the independent variables (the groups of students who received and did not receive nudge communication) and the dependent variable (persistence of course completion), the researcher used an independent  $t$  test. Using the statistical software, SPSS, the researcher analyzed the data as a whole to determine the effects of nudge communication on students in undergraduate online courses to determine if they persisted more successfully in their coursework than those who did not receive the nudge communication. Finally, the research question was addressed using data from the statistical results.

### **Summary of Methodology**

The researcher used a casual-comparative research design to determine the impact of nudge communication toward persistence in completion of coursework within a semester. The participants were not notified since the data were archived data and no personal identifiers were included in the results provided to the researcher. Data screening was conducted by the researcher by reviewing the results captured in the Excel spreadsheet that contained the independent and dependent variable data. The data were additionally screened as they were entered into SPSS. The independent variables were analyzed to ensure results show either a 1 (student did not retain) or a 2 (student did retain). While often used for independent  $t$  tests for

assumptions of normality, box and whisker plots were not used to scan for extreme data outliers since both independent and dependent variables are categorical data as well as binomial variates; extreme outliers were excluded from the pool (Warner, 2013).

### **Descriptive Analysis**

Descriptive statistics were examined, and the alpha level that is used is  $\alpha = .05$  (Warner, 2013). Chapter 4 provides the descriptive statistics table, which was run through SPSS. The effect size was medium and the results will confirm .01, with the statistical power of .99, with  $N = 10,024$  (Warner, 2013).

### **Assumption Testing**

Assumption testing included level of measurement for assumption of normality to determine if the distributions are normal (Foster, 2017). Additionally, assumption of equal variance is included in Chapter 4. Scatterplot was attempted, but due to the categorical bivariate data, it was not utilized to test for linearity and outliers. There was a test for homogeneity of variances and Kolmogorov-Smirnov's test was used since  $N > 50$  (Warner, 2013). Additionally, Levene's test ( $p < .05$ ) is used and visuals are provided in Chapter 4.

## CHAPTER FOUR: FINDINGS

### Overview

The general purpose of this causal-comparative study was to address the question of whether there was a difference between the dependent variables (persistence to complete) and the independent variables (students who received nudge communication and students who did not receive nudge communication). An independent samples *t* test was used to test the hypothesis. The findings that are discussed in this chapter include the restated research question as well as the null hypothesis, data screening, descriptive statistics, assumptions testing, and results.

### Research Question

**RQ1:** Is there a difference in the persistence to complete courses with students in an online program who received nudge notifications and those who did not receive nudge notifications?

### Null Hypothesis

**H<sub>0</sub>1:** There is no statistically significant difference in the persistence to complete courses with students in an online program who received nudge notifications and those who did not receive nudge notifications.

### Data Screening

Data screening was conducted on each group's dependent variable. The researcher sorted the data on each variable and scanned for inconsistencies. No data errors or inconsistencies were identified. A bar chart was used for the bivariate categorical variables.

### Descriptive Statistics

There were 45.4% ( $N = 44,774$ ) courses completed ( $M = 1.71$ ,  $SD = .451$ ) of the 50.4%

participants ( $N = 5,049$ ) who did not receive nudge communication. There were 54.6% ( $N = 53,887$ ) courses completed ( $M = 1.88$ ,  $SD = .324$ ) of the 49.6% participants ( $N = 4,974$ ) who did receive nudge communication.

Overall, the difference in gender receiving nudge communication and not receiving nudge communication was a difference of an average of .56 GPA points for females and .55 GPA points for males. While males had an overall average of a slightly higher GPA in both the no nudge and nudge data, the adjusted rate of GPA based on nudge communication remains about the same with just .01 points difference between the genders.

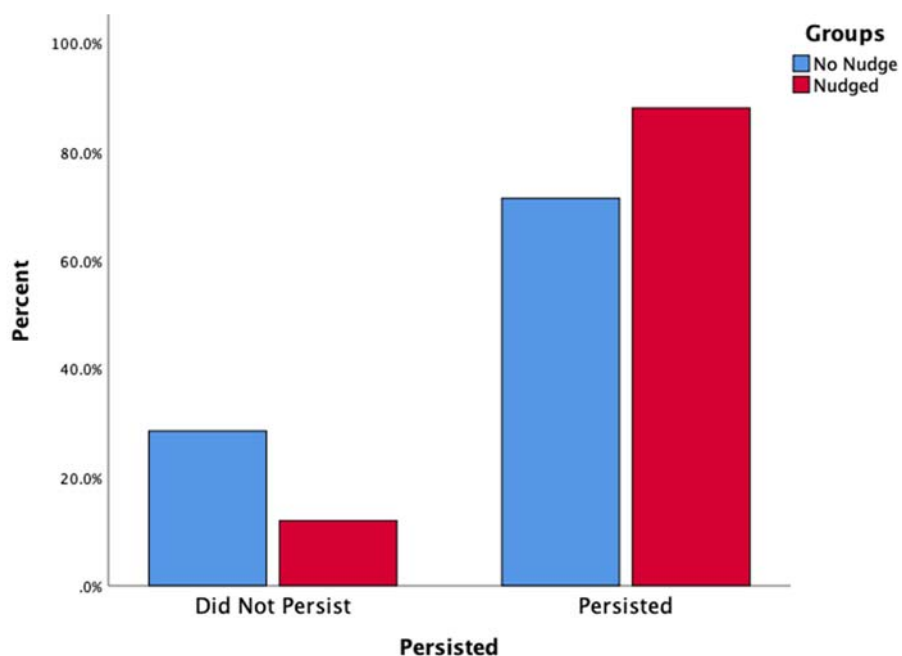
### **Additional Descriptive Statistics**

Descriptive statistics were obtained on the dependent variable for each group. The sample consisted of 10,024 participants. Participants who earned a passing grade (grades of A, B, C, or D) were a numeric value of 2 in SPSS. Participants who did not earn a passing grade (grades of F, FN, or W) were given a numeric value of 1 in SPSS.

There were 49.6% of participants ( $N = 4,974$ ) who received nudge communication and 50.4% of participants ( $N = 5,049$ ) who did not receive nudge communication. Descriptive statistics were obtained on the dependent variable, persistence to complete in courses. In this case, a passing grade, or successful completion of a course, is considered a grade of A, B, C, or D. Not passing, or unsuccessful completion, is considered a grade of F, FN, or W. The data obtained for the dependent variable are found in the graph below.

**Figure 1**

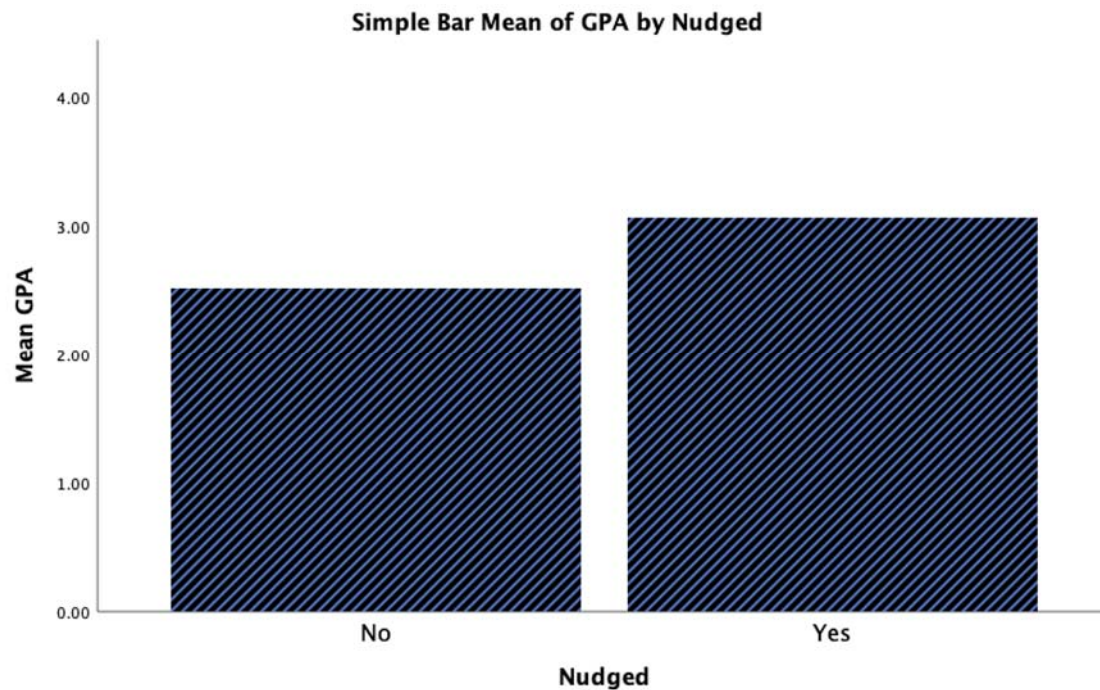
*Persistence of Students Who Received Nudges and Those Who Did Not*



Descriptive statistics were also reviewed to evaluate the end-of-term GPA for the independent variable (students who received nudge communication and students who did not receive nudge communication). The 50.4% of participants ( $N = 5,049$ ) who did not receive a nudge earned 0.55 points lower GPA ( $M = 2.52$ ,  $SD = 1.07$ ) than the 49.6% of participants ( $N = 4,974$ ) who did receive nudge communication ( $M = 3.07$ ,  $SD = .867$ ). The data obtained for the independent variable can be found in Figure 2.

**Figure 2**

*GPA of Students Who Did and Did Not Receive Nudge Communication*

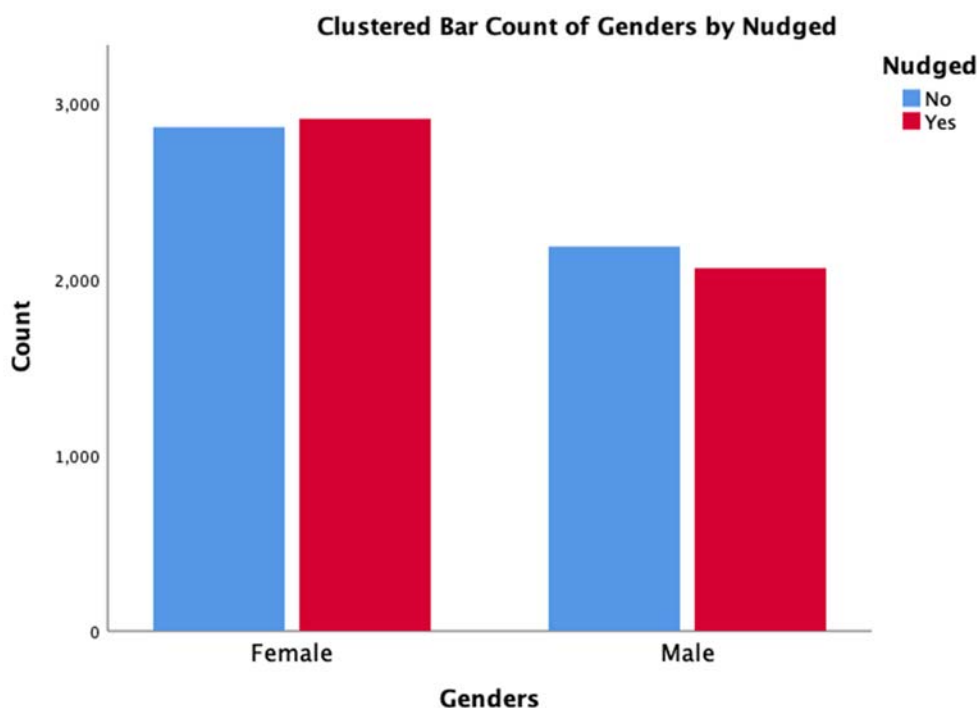


Descriptive statistics were also reviewed by gender to determine if there was a significant difference between males and females who received nudge communication and those who did not receive nudge communication. Of the 4,974 participants who received nudge communication, 58.5% ( $N = 2,914$ ) were female ( $M = 2.57$ ,  $SD = .495$ ) and 41.5% ( $N = 2,060$ ) were male ( $M = 2.63$ ,  $SD = .483$ ). Of the 5,049 participants who did not receive nudge communication, 57.3% ( $N = 2,893$ ) were female ( $M = 2.29$ ,  $SD = .454$ ) and 43.6% ( $N = 2,194$ ) were male ( $M = 2.36$ ,  $SD = .480$ ). The data obtained are found in Figure 3.



**Figure 3**

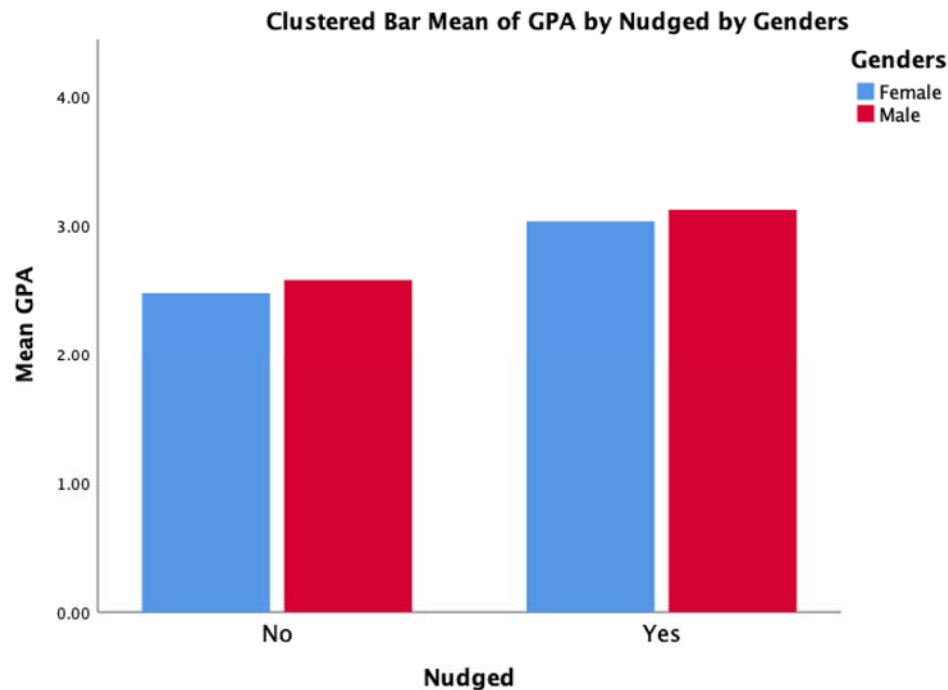
*Count of Female and Male Students Who Received and Did Not Receive Nudge Communication*



When the researcher analyzed term GPA for males and females who received nudge communication, the findings confirmed that males ( $N = 2,060$ ) earned a slightly higher GPA ( $M = 3.12$ ,  $SD = .848$ ) than the females' ( $N = 2,194$ ) term GPA ( $M = 3.03$ ,  $SD = .878$ ). GPA for those who did not receive nudge communication confirmed that the males' ( $N = 2,183$ ) GPAs ( $M = 2.58$ ,  $SD = 1.06$ ) were higher than the females' ( $N = 2,866$ ) GPAs ( $M = 2.47$ ,  $SD = 1.08$ ). The GPAs for both genders who did not receive nudge communication are still significantly lower than those who received nudge communication. The data obtained for this are found in Figure 4.

**Figure 4**

*GPA's Earned for Genders Who Did and Did Not Receive Nudge Communication*



### Null Hypothesis

**H<sub>0</sub>1:** There is no statistically significant difference in the persistence to complete courses with students in an online program who received nudge notifications and those who did not receive nudge notifications.

### Results for Null Hypothesis

A *t* test was used as the primary test to test the null hypothesis regarding whether or not there is a significant difference in the persistence to complete a course with students in an online program who received nudge communication and those who did not. The Independent Samples *t* test requires that the assumption of homogeneity of variance be met. The assumption of homogeneity of variance was examined using Levene's test (Warner, 2013). The assumption of

homogeneity of variance was not met, where ( $p < .001$ ). See Table 1 for Levene's test of Equality of Error Variance.

**Table 1**

*Levene's Test of Equality of Error Variance*

		Levene	<i>df1</i>	<i>df2</i>	<i>Sig.</i>
		Statistic			
Persisted	Based on Mean	18856.606	1	98659	.000
	Based on Median	4467.134	1	98659	.000
	Based on Median and with adjusted df	4467.134	1	89127.191	.000
	Based on trimmed mean	18856.606	1	98659	.000

*Note.* Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

The null hypothesis was rejected at a 95% confidence level where  $t = -27.745$ ,  $p = .000$ . Eta square equaled ( $\eta^2 = .071$ ). The effect size was medium. Eta square was calculated using the formula  $\eta^2 = t^2/(t^2 + df)$ . There was a statistical difference between the persistence of those who received nudges ( $M = 1.60$ ,  $SD = .491$ ) and persistence of those not nudged ( $M = 1.33$ ,  $SD = .470$ ). See Table 2 for Independent Samples  $t$ -test results.

**Table 2***Independent Samples t test*

		Persisted	
		Equal variances assumed	Equal variances not assumed
Levene's Test for	F	220.923	
Equality of	Sig.	.000	
Variances t test	t	-27.745	-27.736
for Equality of	df	10021	9988.269
Means	Sig. (2-tailed)	.000	.000
	Mean Difference	-.266	-.266
	Std. Error	.010	.010
	Difference		
	95% Confidence	Lower	-.285
	Interval of	Upper	.248
	Difference		

## Results Discussion

An independent samples  $t$  test was used as the primary test to test the null hypothesis regarding whether or not there is a significant difference in the persistence to complete a course with students in an online program who received nudge communication and those who did not. The null hypothesis was rejected at a 95% confidence level (-.170 lower bound, -.161 upper bound) with  $t = -27.75$  equal variances assumed and  $p < .05$ . The effect size was medium at .07 (Warner, 2013).

The null hypothesis was rejected since the overall difference in those who successfully persisted in completing their coursework was significant with the p-value equaling less than .05 ( $p = .000$ ) when they received nudge communication compared to when they did not receive nudge communication. Starting with all of the students in this study, and then taking those who received nudge communication, there were 6,445 courses (6.5%) that were unsuccessfully completed with nudge communication. There were 47,442 (48.1%) courses that were successfully completed that were paired with receiving nudge communication. Of the students who did not receive nudge communication, there were 12,767 (12.9%) courses that were unsuccessfully completed. There were 32,007 (32.4%) of courses that were completed successfully with no nudge communication received. Based on the difference of successful completion when nudges were utilized versus when they were not utilized, the findings support the benefit of nudge communication being used within email communication for persistence purposes.

## CHAPTER FIVE: CONCLUSIONS

### Overview

The following chapter provides a review of the purpose of this study and the results, as well as how it impacts the information provided. This chapter discusses nudge communication in higher education, as well as implications, limitations, and recommendations for future research.

### Discussion

The purpose of this study was to determine if nudge communication impacted the persistence of online students to complete courses within a semester of enrollment. As found in Chapter 4, nudge communication positively correlated with the persistence of online students' completion of courses within a semester. While there were fewer students who received nudge communication than those who did not receive nudge communication, those who received nudge communication were enrolled in more courses than those who did not receive nudges. As discussed in Chapter 4, there were 6,445 courses (6.5%) that were unsuccessfully completed with nudge communication, while there were 47,442 (48.1%) courses that were successfully completed that were paired with receiving nudge communication. Additionally, for those who did not receive nudges, there were 12,767 (12.9%) courses that were unsuccessfully completed. There were 32,007 (32.4%) courses that were completed successfully with no nudge communication. These results answer this study's research question that there is a positive difference that nudges correlate with the successful completion of courses within a semester.

In light of the research question, the findings confirm that nudge communication does positively associate the persistence to successfully complete courses in a semester. The persistence to complete courses in a semester was evaluated based on successful completion

versus unsuccessful completion of courses. The grades that denoted successful completion were grades of A, B, C, and D. Unsuccessful grades were F, FN, and W. Further analysis was also done on gender to assess whether males or females varied in their persistence in coursework differently if they received nudge communication compared to when they did not receive it. Males persisted on a slightly higher average ( $M = 1.63$ ,  $SD = .483$ ) compared to females ( $M = 1.57$ ,  $SD = .495$ ) when receiving nudge communication; however, further analysis is needed to determine whether or not this finding is significant.

As a secondary analysis, term GPA was also evaluated to determine if nudge communication significantly correlates with end-of-term GPA. Paunesku et al. (2018) studied the impact of nudges on GPA and found that GPA is significantly higher when students receive nudges. This study yielded a similar result in that there was a statistically significant difference in term GPA when a student received nudge communication versus when they did not. The end of term GPA was higher by more than half of a point on a 4.0 scale for those who did receive nudge communication ( $M = 3.07$ ) compared to those who did not ( $M = 2.52$ ). Further analysis was conducted to determine if there was a difference in GPA by gender to assess if one gender responded differently to nudge communication over the other; the findings indicated that while GPA was higher for both genders when receiving nudge communication, the difference between genders was not significant with a mean difference of .01.

Based on the results of the study, the significance of nudge communication for persistence in successful course completion compared to those who do not receive nudge communication is adequate to reject the null hypothesis and continue to expand studies of nudge communication beyond general education courses in higher education. The limitations section will further discuss areas of future research that would benefit the topic of nudges and expand

research to determine additional outcomes.

As noted in the problem statement, a review of research confirmed that this specific topic had little research supporting persistence in coursework in a term. While prior studies confirm that nudges impact political, marketing, and food and health industries, only recently has academics joined the marketplace with utilizing and researching nudge importance. As previously discussed, the lack of persistence and retention problems in academics that prior studies confirmed have motivated schools to establish resourceful procedures and adjustments for increased student motivation to complete their education (Braithwaite & Corr, 2016; Brown, et al., 2019). However, the prior studies surrounding academics and higher education are still limited and have mainly occurred to determine if nudges can increase academic engagement (Castleman & Page, 2014). As discussed in Chapter 2, academic engagement is positively influenced by nudging students (Castleman & Page, 2014). Nudge communication, in this case defined as email encouragement and reminders, supports the findings in this study as nudges have also been found to increase academic achievement in underperforming groups and demographics (Broda et al., 2018). While underperforming groups have shown a need for additional focus, demographics have also been studied to determine similarities in those underperforming populations to determine if nudge communication is successful across the demographics studied (Carmean & Frankfort, 2018).

Most importantly, when linked to one of the purposes for this study, research supports how personalized nudging increases the proactive effect toward completion of schoolwork (Brown et al., 2019). Personalized nudges, such as emails specific to assignment reminders and grades earned, continue to confirm the significance in nudge communication performance; personalized nudging is crucial for creating a mindset of persistence, as generalized nudging has



not shown this same significant impact on motivation and persistence (O'Connell & Lang, 2018).

As briefly mentioned in Chapter 1 and also further discussed in Chapter 2's literary analysis, mindset theory was researched to determine if a correlation existed between it and nudge theory. While growth mindset and fixed mindset were not directly analyzed and tested in this study to determine a possible direct correlation, a mindset adjustment does occur with nudge communication (Braithwaite & Corr, 2016). As previously noted, Brown et al. (2019) and Smith et al. (2017) confirm that nudge communication presents a change in study habits, as students tend to approach studying and assignment completion much more proactively when presented with results of how their peers are doing via nudge communication. Additionally, self-confidence and self-efficacy, both mindset-related concepts, were studied and found to be directly related to nudge communication; they increased when nudge communication was used within the classroom (Braithwaite & Corr, 2016). Positive aspects, like self-confidence and self-efficacy, confirmed the significance of persistence in successfully completed coursework for students who received nudge communication. Because nudges impact mindset through either encouraging verbiage or providing the student more visual comprehension of their status in their coursework, the motivation to persist is stronger through nudging students towards their end goal (Brown et al., 2019; Smith et al., 2017). Analysis provided in Chapter 4 confirms that the number of those who did not receive nudge communication and did not successfully complete their courses ( $N = 12,767$ ) is more than double of those who received nudge communication and did not successfully complete their courses ( $N = 6,445$ ). Additionally, the result of courses that were successful based on nudge communication ( $N = 47,442$ ) compared to those that were successful without the nudge communication ( $N = 32,007$ ) confirms the benefits of receiving nudge

communication by 60% of the successfully completed coursework.

### **Implications**

The present study has helped establish that nudge communication via email contributes to the completion of online undergraduate general education courses. The research question confirmed that there was a statistically significant difference with persistence in online coursework if students received nudge communication as compared to students who did not receive nudge communication. The study tested and found a statistically significant difference in the analyzed data. The findings can assist current and future educators in determining if persistence in online general education course completion can be increased through nudge communication. Since persistence and retention have been documented struggles for schools that offer online education (Cotton et al., 2017), nudge communication holds strong potential to help institutions change their current trajectory.

There is limited research on nudge communication being used in the higher education setting, but the findings in this study support previous studies' findings. The other studies' findings pointed to contributing factors such as academic engagement, changing the time spent on course assignments, peer and tutoring opportunities, and personalized communication (Broda et al., 2018; Brown et al., 2019; Carmean & Frankfort, 2018; Castleman & Page, 2014; Damgaard & Nielsen, 2018; Dobronyi et al., 2019; Fritz, 2017; Graham et al., 2017). Due to the consistency of positive relational findings between nudge communication and desired institutional outcomes, an increased investment in nudge communication within academics is strongly recommended.

While persistence of course completion is just one area of higher education, the ramifications of adopting personalized nudge communication could have significant long-term

results in retention and mindset shift. Nudge communication can be adopted and utilized toward online and residential educational needs and goals. If integrated, higher persistence and motivation are feasible outcomes. Adopting nudge communication may help improve students' study habits, the time it takes them to complete assignments, and their overall course habits as their mindsets change, allowing them to realize the educational goals they set out to achieve from the beginning.

As previously discussed throughout this study, persistence is related to mindset and the desire to proactively complete course assignments in a timely manner, which allows for more focus, attention to detail, and a better outcome of course assignments (Brown et al., 2019). Nudge communication impacts mindset through engaging a more proactive approach to learning, which significantly impacts persistence (Brown et al., 2019; Graham et al., 2017).

Because of the impact of nudges on persistence, higher education and institutions in general may benefit from seeing an increase in growth mindset on their online campuses, as well as their residential campuses, as prior research has shown (Brown et al., 2019; Graham et al., 2017).

### **Limitations**

There are several limitations to this study. While the sample size was large, only one school was selected for this study. Additional research with other types of private or public institutions would be beneficial for further study and determination of the impact of nudge communication. The study also used only email communication. The study did not include text message communication as other studies have included (Dobronyi, et al., 2019; Paunesku et al., 2018) and does not determine if text communication produces higher persistence in courses, lower persistence, or if it does not differ from emailed nudge communication. The email

communication that was used for this study's nudge data was archived email communication. This means that there was a limitation of confirming the open and read rate of nudge emails due to the timeframe it was collected from. The researcher did not receive data confirming read and open rate. Because advancement in technology now allows for analyzing open rates and read rates of email communication (Sutton, 2017), limitations of this study confine the researcher to being unable to analyze a further relationship between nudge emails on persistence.

Another limitation includes the broad spectrum of general education courses that were selected for the study. Other studies have included secondary education, remedial coursework in higher education, and some graduate level coursework (Castleman & Page, 2014; Cisco, 2018; Mills & Mills, 2018), but there are still outstanding areas that need further research. While general education courses encompass a variety of topics, further research could be pursued to determine if nudge communication is beneficial for certain subjects or majors and levels of coursework. While previous studies have focused on math (Bahi et al., 2015; Mills & Mills, 2018), additional research can expand beyond just math and focus on other subjects within both undergraduate and graduate work.

Another limitation of this study is that its focus, undergraduate courses within higher education, was too general. This study did not examine multiple levels or investigate nudges within specific disciplines. Further research could be developed at the elementary and secondary education levels to determine how nudging does or could impact students at a younger age. It would be interesting to determine if there is a difference in persistence or successful completion of coursework between the demographics.

This present study focused on multiple years that nudge communication was administered. While the data gathered are vast, tracking specific pre- and post-nudge

communication for individual students and within specific years or terms could be more precise. The study was limited to primarily focusing on persistence of courses and secondarily focusing on the impact to GPA based on nudge communication. Because of this, the study did not analyze detailed data of grades prior to nudges.

### **Recommendations for Future Research**

Additional research needs to be conducted to further understand the relationship between nudge communication and persistence to complete courses. Suggestions for additional studies related to this study include, but are not limited to, the following:

1. A related study that reviews content of email communication that was used for the current study to determine if adjustments were made year over year or term over term and if content had a correlation on persistence of successful completion of coursework.
2. A related qualitative study should be conducted to gather feedback from academic faculty and academic support teams at the institution to determine if personalized communication should differ across major types and program levels.
3. A related qualitative study should be conducted to focus on specific subjects and courses that have the least persistence and successful completion in the institution.
4. A similar study should be conducted to focus on genders and their GPA based on taking specific subjects and receiving nudge communication.
5. A replicated study should be conducted with a reduced group of participants with more focused areas of undergraduate coursework to determine if nudge communication is most beneficial in certain areas of education or if it is applicable regardless of the coursework being pursued.
6. A replicated study in residential courses to determine if there is a difference in students'

persistence to successfully complete courses within a semester.

7. A replicated study by analyzing text messaging data to analyze text message nudge communication results in varied persistence results as emailed nudge communication.
8. An expanded study to include other private and public institutions at small, medium, and large enrollment sizes that offer online undergraduate coursework and programs.
9. An expanded study to focus on nudge communication and graduate coursework in an online or residential setting.
10. An expanded study to determine how much nudge communication impacts mindset with pre- and post-analysis from surveying and research from a qualitative or quantitative study.
11. An expanded study to determine if there is a difference in how nudge communication impacts persistence based on the level of student (first-year freshmen, second-year sophomores, etc.).
12. An expanded study to determine if nudge communication impacts persistence differently with first-time students versus transfer students.
13. An expanded study to determine if nudge communication impacts persistence differently with first generation students versus students with collegiate familial backgrounds.

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## Appendix I: IRB Exemption Letter

# LIBERTY UNIVERSITY

## INSTITUTIONAL REVIEW BOARD

March 6, 2020

Helene Vance  
Michael Shenkle

Re: IRB Application - IRB-FY19-20-10 NUDGE COMMUNICATION: A CAUSAL-COMPARATIVE STUDY OF INTERVENTIONS THAT IMPACT DECISIONS OF HIGHER EDUCATION STUDENTS

Dear Helene Vance, Michael Shenkle:

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study does not classify as human subjects research because:

(1) it will not involve the collection of identifiable, private information.

Please note that this decision only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at [irb@liberty.edu](mailto:irb@liberty.edu).

Sincerely,

**G. Michele Baker, MA, CIP**  
*Administrative Chair of Institutional Research*  
**Research Ethics Office**