

HOPE AS A MEDIATOR BETWEEN PROFESSOR–STUDENT RAPPORT  
AND STUDENT ACHIEVEMENT

by

Analisa M. Wellington

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

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## ABSTRACT

The United States experiences unfavorable outcomes in undergraduate academic achievement despite years of research, especially for historically marginalized students. Accepting that student achievement is the result of the complex interplay between individual and environmental characteristics, tertiary institutions seek useful levers by which to raise academic achievement. Previous research has established that the relationship between a teacher and student can affect student achievement, making professor-student rapport one of the aforementioned levers. However, the mechanism through which professor-student rapport acts remains unclear. The current study explores the mediating effect of hope on the relationship between professor-student rapport and achievement. Utilizing a quantitative correlational design, the researcher conducts a mediation analysis to determine if student hope has a significant mediating effect in a sample of 218 undergraduate students at a mid-sized university in the United States. Participants responded to a survey with demographic data and completed the Adult Dispositional Hope Scale and the Student-Instructor Rapport Scale-9. The total number of points in a specific course out of possible points was paired with participants' survey data. Analysis of the data did not support the presence of a significant relationship between the mediator hope and the outcome variable achievement and therefore the conditions for mediation were not present. However, the researcher found that hope and rapport were significantly related. This research was completed during a global pandemic which may have confounded the results; therefore, this researcher recommends that it be replicated at another time when social restrictions are not in play.

*Keywords:* professor-student rapport, hope theory, undergraduate achievement, undergraduate student success

**Dedication**

To Pop:

one of the most hopeful people I ever knew.

### **Acknowledgments**

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### **List of Abbreviations**

Adult Dispositional Hope Scale (ADHS)

Coronavirus Disease (COVID 19)

Grade Point Average (GPA)

Institutional Review Board (IRB)

Scholastic Aptitude Test (SAT)

Scholarship of Teaching and Learning (SoTL)

Student Instructor Relationship Scale-9 (SIRS-9)

Trends in Mathematics and Science Study (TIMSS)

## **CHAPTER ONE: INTRODUCTION**

### **Overview**

This chapter provides background information related to the topic of undergraduate achievement. This chapter also offers a problem statement and a purpose statement related to the achievement issue, the current study's significance, and research questions pertaining to a gap in the literature regarding the relationships between professor–student rapport, students' hope, and students' achievement. The chapter ends with a list of definitions applicable to the present study.

### **Background**

Without exception, student learning is at the core of any higher education institution's academic mission. Through a combination of classroom and practical experiences, colleges and universities strive to educate students to the highest levels of academic achievement as they ultimately earn a degree. Student achievement is regarded as an indicator of success for individuals, schools, and even countries; therefore, student achievement is a shared concern among practitioners, school leaders, policy-makers, and governments (Nyström et al., 2019; Wood & Breyer, 2017).

Concerns about student achievement are well-founded. Of all entering students who drop-out of college, 28% do so due to academic disqualification (Bustamente, 2019). In fact, a 2016 YouthTruth poll found that although 85% of high school seniors indicated a desire to attend college or university, almost half felt that they were unprepared to meet the demands (YouthTruth, n.d.). Today, many undergraduate students are enrolled in remedial courses due to substandard achievement scores from standardized college readiness tests. About 75% of colleges and universities offer remedial courses (Selingo, 2013). These necessary classes represent a substantial financial burden to institutions and students, yet do not count for credits

toward graduation and can become a bottleneck for students already struggling to graduate on time and keep tuition costs under control (Bustamente, 2019; Selingo, 2013; Tough, 2020). Almost 75% of college students taking remedial coursework do not declare a major and graduate (Bustamente, 2019).

Addressing the student achievement issue in higher education is not a straight-forward endeavor. Extensive research in cognition, motivation, and other aspects of human behavior has undoubtedly demonstrated that student intelligence, previously thought to be the primary link to achievement, only partially accounts for achievement outcomes (Almlund et al., 2011; Borghans et al., 2008; Deary et al., 2007; Farrington et al., 2012; Gustafsson & Undheim, 1996; Jackson, 2015; Mischel et al., 2007, 2011; Moffitt et al., 2011; Naglieri & Bornstein, 2003; Yeager & Walton, 2011). Today, student achievement is universally recognized as the result of a complex interplay among student, instructional, and environmental characteristics rather than the product of a singular process (Borghans et al., 2016; Duckworth & Yeager, 2015; Dweck, 2007; Heckman et al., 2006, 2014; Krapohl et al., 2014; Tough, 2012, 2020). Therefore, to ensure student success, colleges and universities must engage in efforts to facilitate student achievement that consider individual and situational complexity. Today, over 70% of college students are described as having nontraditional characteristics (Fishman et al., 2017). The typical student does not come to college straight from high school, attend classes full-time, or live on campus. Currently, about 44% of college and university students are 24 years of age or older. Thirty percent of students attend part-time, 28% are caretakers of children or other dependents, and 26% work full-time while enrolled. Further, over half of those attending college or university are first-generation higher education students, 42% are from communities of color, and 18% are nonnative English speakers (Miller et al., 2019). Because of this, there has been a shift from

making students “college-ready” to universities becoming “student-ready” (McNair et al., 2016). To do so, universities are striving to employ all useful levers by which to raise student achievement by highlighting interpersonal, intrapersonal, and structural strategies that promote academic success (Condon et al., 2016; McNair et al., 2016; Tough, 2020; Wade et al., 2015).

Historically, teacher–student relationships, and their association with educational outcomes, have been the focus of K–12 studies (Birch & Ladd, 1998; Brinkworth et al., 2018; Cornelius-White, 2007; Decker et al., 2007; Klem & Connell, 2004). However, researchers are now finding evidence that professor–student relationships are a protective factor at the higher education level (Robinson et al., 2019; Wade et al., 2015). Some university leaders are organizing strategies to raise awareness of the critical role faculty play in strengthening the relational bonds that lead to better outcomes (Miller et al., 2019). However, there is a dearth of research of how and why professor–student rapport yields positive academic outcomes at the university level. To leverage faculty to support student achievement, professors require both good command of what does and does not support student learning and actionable steps for their practice (Miller et al., 2019).

One possible explanation of the mechanism connecting professor–student rapport and achievement lies in hope theory (Snyder, 1994). Hope theory defines hope as a goal-directed, two-component cognitive process comprised of an individual’s propensity to generate pathways toward a goal and a sense of agency to begin the pursuit (Snyder, 1994). Individuals high in pathways thinking produce realistic goals, creative plans of action to reach a goal, and alternate routes to accomplish a goal when a particular pathway becomes untenable (Snyder, 2002). Individuals high in agency thinking believe strongly that they can reach their goal, are persistent, and demonstrate high levels of motivation to engage in the work required to meet the target

(Snyder, 2002). According to hope theory, an individual's hope tendencies are formed from even the most fundamental and nascent interactions with their caretakers and environments. Further, these individuals continue to be sensitive to external pathways and agency messages from their environments and from those around them throughout their lives (Kibby, 2015; Lopez, 2013). Snyder (2005) applied hope theory to pedagogy with the assertion that interactions between teachers and students influence student hope (Lopez, 2013). Studies have shown that college students' hopefulness (Dixson et al., 2017; Gallagher et al., 2017; Feldman & Kubota, 2015) and professor–student rapport are associated with achievement (Froiland et al., 2019; Lammers & Gillasp, 2013; Lammers et al., 2017). However, no studies examine the relationship between professor–student rapport and student hope.

### **Problem Statement**

Unsatisfactory undergraduate achievement poses an ongoing challenge for the United States. Nearly a third of students who drop out of college do so as the result of academic disqualification (Bustamente, 2019). Students who perform better in their classes are more likely to stay enrolled in college (Tinto, 1975, 1993, 2012); in fact, college grades embody the strongest within-college contributor to undergraduate persistence and bachelor's degree attainment (Mayhew et al. 2016; Pascarella & Terenzini, 2005). Prior research indicates that a significant relationship exists between professor–student rapport and student achievement (Demir et al., 2019; Lammers et al., 2017); that is, students who feel a stronger sense of personal connection to their professor tend to achieve more. Prior researchers have described a significant relationship between student hopefulness and student achievement (Froiland et al., 2019; Gallagher et al., 2017; Marques et al., 2017); more hopeful students do better academically. Although professor–student rapport has been established as one predictor of student



achievement, mediating effects such as hope have not yet been explored adequately in the research literature.

### **Purpose Statement**

The purpose of this study was to advance an understanding of the mechanisms through which undergraduate college student achievement is enhanced via examination of the mediating effect of hope on professor–student rapport and student achievement. These relationships were explored in a quantitative study with a nonexperimental correlational design. The outcome variable in the current study was student achievement. Student achievement was measured by the ratio of the total number of points earned by a student in a course as compared to total possible points. The predictor variable was professor–student rapport. Professor–student rapport is defined as “an emotional connection between individuals based on understanding, caring, and mutual respect” (Lammers & Byrd, 2019, p. 127). Professor–student rapport was measured using the Student–Instructor Rapport Scale-9 (SIRS-9; Lammers & Gillaspay, 2013). The mediating variable in the current study was student hope. Student hope is defined as “a positive cognitive motivational state based on an interactively derived sense of successful: (1) agency (goal-directed energy) and (2) pathways (planning to meet goals)” (Snyder et al., 1991, p. 571). Students’ hope was measured using the Adult Dispositional Hope Scale (ADHS; Snyder et al., 1991). The mediating variable, student hope, also served as the second predictor variable in the mediation analysis. The population of the current study was comprised of undergraduate students attending 4-year institutions of higher education in the United States. The current study used a sample of undergraduate students from a mid-sized southeastern Christian university.

### **Significance of the Study**

The United States continues to experience inauspicious outcomes related to undergraduate achievement despite decades of research and institutional awareness (Kena et al., 2015; Selingo, 2013, Tough, 2020). Past research clearly demonstrates that student achievement predicts persistence toward a college degree (Campbell, 2019; Hillman, 2019; Petty, 2014; Tinto, 1993, 2012); therefore, the consequences of unsatisfactory academic achievement in college can be debilitating for individuals and for society as a whole (Cahalan et al., 2018; Duncan, 2015; Trostel, 2017). Even among those who complete their degrees, deficits in literacy, math, and problem solving among millennial graduates has earned them unsatisfactory ratings in career readiness by employers (Goodman et al., 2015). Understanding how students gain skills is critical to grasping how Americans will meet or fall short of the shifting demands of the global marketplace (Goodman et al., 2015). Because of this, institutional leaders continually seek to understand formal and informal practices that positively influence undergraduate achievement.

Previous researchers have examined the relationships between student achievement, professor–student rapport, student achievement, and student hopefulness (Dixson et al., 2017; Feldman & Kubota, 2015; Gallagher et al., 2017; Robinson et al., 2019; Wade et al., 2015). However, researchers describe a need for further studies to develop a finer understanding of the mechanisms through which these constructs confer academic benefit (Demir et al., 2019; Hagenauer & Volet, 2014; Robinson et al., 2019). This study contributes to the existing literature by exploring the dynamics between the professor–student relationship and the students’ degrees of pathways and agency thinking. In other words, this study examined the relationship between professor–student rapport and students’ hope, which has not yet adequately been explored in the research literature. Undergraduate professors may use the findings of the current study to

develop a clearer understanding of how rapport with students confers benefit to students and thus supports their subsequent achievement in a course. This, in turn, would inform specific and actionable steps in professors' classroom practices. This paper examines the mediating effects of hope on the relationship between professor–student rapport and student achievement through the assumption that institutions of higher education have a stake and responsibility to address student achievement within the context of their comprehensive efforts toward nondiscriminatory quality education. The following question is addressed in this study:

### **Research Question**

**RQ 1:** Does hope mediate the relationship between professor–student rapport and student achievement in an undergraduate population of a mid-sized southeastern university in the United States?

### **Definitions**

1. *Agency* - The sense of efficacy (or “will”) in working toward one’s goals present within the two-factor definition of hope by Snyder et al. (1991); the energy to begin working toward the achievement of goals (Snyder, 1994).
2. *Hope* – A positive cognitive motivational state based on an interactively derived sense of successful agency (goal-directed energy) and pathways (planning to meet goals; Snyder et al., 1991)
3. *Pathways* - The development of plans (or “ways”) to achieve desired goals within the two-factor definition of hope by Snyder et al. (1991); the perceived ability to generate avenues to reach a goal (Snyder, 1995, 2000)
4. *Professor–student rapport* - “an emotional connection between individuals based on understanding, caring, and mutual respect” (Lammers & Byrd, 2019, p. 127)

5. *Student academic achievement* – individual course marks or grade point average (GPA; Marques et al., 2017).

## **CHAPTER TWO: LITERATURE REVIEW**

### **Overview**

This literature review will begin with discussion of the theoretical framework of the study. This discussion will be followed by a brief overview of the use of academic achievement as a measure of student success. The literature examining broad factors influencing achievement will then be explored in three categories: intelligence, individual characteristics other than intelligence, and external characteristics. The chapter will then explore specific studies on instructor–student rapport and its impact on achievement. This exploration will be followed by a brief history of the hope construct and a review of the literature on the relationship between student hope and student achievement. The literature on hope as a mediator will then be introduced. The literature review will conclude with a summary and discussion of the gap in research that has emerged from the review, thus prompting this study.

### **Theoretical Framework**

The present study uses the theoretical framework of Snyder et al.'s (1991) hope theory. Hope theory will be discussed followed by an explanation of the developmental nature of hope.

### **Hope Theory**

Hope theory has been studied and applied across contexts including mental health, physical health, and education (Hirsch & Sirois, 2016; Marques et al., 2015, Visser et al., 2013). According to Snyder et al. (1991), hope is a cognitive construct based on the assumption that goals are the endpoints of all purpose-driven behaviors. Goals may be short-term or long-term; however, goals must be of value to the individual and considered attainable. A goal can be accompanied by a degree of uncertainty; however, the individual must perceive that the goal is possible (Snyder, 1994).

According to hope theory, in the process of organizing toward goals, the individual engages in two cognitive processes that contribute to the valence of hopefulness: agency thinking and pathways thinking. Agency thinking is the person's sense of goal-directed determination. Agency thinking represents the mental push to begin and sustain movement toward goals; thus, it is the motivational aspect or willpower of the hope construct and is manifested in the self-talk that individuals engage in as they work toward a goal (e.g. "I can do it"; Snyder, 1994). High hopers tend to engage in positive self-talk, even when faced with barriers (Snyder, 2002). Pathways thinking, or waypower, is the individual's sense of successful goal-directed planning (Snyder, 1994). Pathways thinking represents the individual's self-perceived ability to develop routes or strategies to achieve goals (Snyder, 1994). High hopers tend to believe that they can think of multiple routes and are able to generate multiple routes. As with agency thinking, pathways thinking is typified by positive messages (e.g. "I'll find a way"; Snyder et al., 1991).

Hope theory posits that the agency and pathways components work reciprocally to create an individual's sense of hopefulness (Snyder, Shorey et al., 2002). Thus, "hope is defined as a cognitive set that is based on a reciprocally derived sense of successful (a) agency (goal-directed determination) and (b) pathways (planning of ways to meet goals)" (Snyder et al., 1991, p. 571). That is, pathways thinking increases agency thinking, which in turn increases pathways thinking, and so on (Snyder, 2002). An important aspect of hope theory is that hopefulness is thought to spur emotions and well-being (Snyder, 1994). Positive emotions flow from perceptions of successful goal pursuits and negative emotions flow from perceptions of unsuccessful goal pursuits (Snyder, 2005). Implicit to hope theory is that hope is considered to be variable-not all or none, making it possible to develop a scale to measure its strength and stability (Snyder, 1994). To measure hope, Snyder et al. (1991) first developed the ADHS, an individual measure

of enduring positive future goal-directed thinking representing dispositions formed by one's life goals and goal-related competencies. Snyder et al. (1996) then created the State Hope Scale to capture subjects' hopefulness for more immediate goals. Subsequent measures of hope were created to address differences in age (Snyder et al., 1997), context, and even subject areas such as math and writing (Robinson & Rose, 2010).

Specific to education, the central role of student hope relates to identifying and setting meaningful personal goals for learning, identifying ways to realize those goals, and engaging in actions in support of those goals (Snyder, 1994, 2005). Hope theory would conceptualize college achievement as an overarching goal with many smaller subgoals required along the way. Each course, each assignment, and each interaction with peers and professors in formal and informal contexts would represent a goal. According to hope theory, students need to visualize each goal, or desired outcome, and determine pathways to achieve the goal (Snyder et al., 2002). When facing an obstacle, the student must quickly generate a new plan and find the incentive to act. Just having the mental willpower to act toward the goal is not sufficient (Snyder, 1994). Regardless of a student's enthusiasm and determination to achieve, students will not succeed if they cannot think of pathways to get things accomplished and, even more importantly, cope with and manage barriers. Just having waypower for goals is also enough (Snyder, 1994). A student may recognize a repertoire of avenues to high achievement and be able to define many ways to work around impediments; however, without initiating and mobilizing to act toward those goals, students will remain unfulfilled (Snyder, 1994).

Hope theory asserts that an individual's level of hope is influenced by the actions of those around them and their environment (Lopez, 2013). For example, Snyder (2005) applied hope theory to classroom pedagogy along several parameters, such as instructors being clear in setting

and communicating goals, creating pathways for academic success, and encouraging student agency to act toward goals. Snyder suggested that these teacher actions exist on the foundation of interpersonal connection and responsiveness, which promote positive emotions in the learner.

The present study aims to advance the current understanding of hope theory by providing empirical evidence that external social support in the form of professor–student rapport can exert influence on an individual’s motivational and affective state, as defined by hope.

### **The Developmental Basis of Hope**

Hope theory includes an interpretation of how individuals develop hopeful thinking, which supports the assumption that an educator can have a significant impact on a students’ hope orientation (Snyder, 1994). Snyder et al. (1991) proposed that, from birth, children engage in pathways thinking as they attempt to make sense of what links one phenomenon to another. This process continues as the child grows and interacts and is clarified over time until an understanding of causation develops. At about 1 year of age, the child understands that they are a separate entity who, as such, can precipitate causation. This, in turn, yields a sense of agency. The pathways and agency thinking of hope are therefore a product of the acquisition of goal-directed thought that a child first engages in when attempting to understand their environment (Shorey et al., 2018). In this sense, caregivers and parents are the initial key instillers of hopeful thinking because they help children navigate and understand their surroundings (Snyder et al., 2000). As children develop into adolescents and young adults, they continue to internalize pathways and agency themes from other sources such as teachers, professors, and coaches as they formulate responses to their environment. Therefore, hope theory aligns with the assumption that college students will be sensitive to pathways and agency messages from their professors (Kibby, 2015).



## **Related Literature**

### **Academic Achievement and Grade Point Average as a Measure of Student Success**

According to Kuh (2007), postsecondary student success is a comprehensive outcomes-based framework describing the college experience as one including “academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills, and competencies, persistence, and attainment of educational objectives” (p. 10). The exact definition of student success may vary; however, without exception, modern models and conceptualizations describe academic achievement as a critical factor. The student’s level of achievement helps determine how well the student integrates with the institution and ultimately persists to a degree (Astin, 1984; Bean & Eaton, 2001; Spady, 1971; Tinto, 1975). For example, Tinto’s (1975, 1993) Institutional Departure Model—one of the most widely accepted, referenced, and studied models of student persistence in higher education in America and abroad (Krause, 2005; Yorke & Longden, 2008; Zepke et al., 2005)—conceptualizes student persistence in terms of the student’s academic and social congruence with an institution. According to Tinto, academic performance is a fundamental determinant of the student’s ability to establish congruence with the formal structures of the academic system.

Postsecondary student success depends upon a variety of skills, competencies, and factors, and the complex interplay between them can be difficult to measure in outcome-oriented terms of an academic setting (Borghans et al., 2016; Meadows et al., 2019). Predicting performance depends on being able to measure it (Richardson et al., 2012); as such, performance measures to assess academic achievement have existed for well over 100 years, and have therefore exerted pervasive influences on contemporary educational policy and instructional practice (Brookhart et al., 2016; Duckworth & Yeager, 2015). Academic achievement describes

the students' acquired skills and knowledge (Duckworth & Yeager, 2015). Student GPA, or the mean of marks from weighted courses contributing to assessment of the final degree, is widely regarded as a readily available and universally comprehensible measure of academic achievement (Meadows et al., 2019); therefore, undergraduate students' academic performance is typically expressed in terms of GPA. GPA is an index of performance directly relevant to training and employment opportunities (Plant et al., 2005) and has been shown to substantially predict a variety of outcomes related to education, career, and wellness (Hasl et al., 2019). Although GPA has limitations due to questions of reliability and validity arising from concerns of grade inflation (Johnson, 2003; Selingo, 2015) and institutional grading differences (Selingo, 2015), it remains the most widely studied measure of postsecondary academic performance (Richardson et al., 2012) and embodies a highly relevant and meaningful index of student success (Borghans et al., 2016; Plant et al., 2005).

### **Factors Influencing Achievement**

This section of the literature review will examine the factors related to achievement along three broad categories: intelligence, individual characteristics other than intelligence, and external characteristics.

#### ***Achievement and Intelligence***

The subject of human intelligence requires at least a brief but explicit discussion of the complications that accompany it (Deary, 2012). Namely, the topic of human intelligence is associated with political, social, economic, and cultural issues such as social mobility, race, gender, and the nature versus nurture debate (Geisinger, 2019). These issues are emotionally charged and highly resistant to resolution (Geisinger, 2019). Further, many questions have been raised concerning the cultural bias in intelligence testing (Elliott, 1987). The ongoing

interpretation of the role of intelligence has prompted continued efforts to seek the ideal balance between accepting the understood variability within and between groups and the individual (Fuerst, 2014). Although the subject matter concerning intelligence, how to interpret it, and how to use its measurement is well beyond the scope of this review, it merits mention that analysis of the role of intelligence on achievement may depend on whether one adopts a paradigm aligned with correlational stability in populations or that of manipulations leading change (Cronbach & Snow, 1977; Rushton & Jensen, 2005).

There is no universally agreed upon definition of human intelligence; however, human intelligence is acknowledged as a psychological construct and generally conceptualized as an individual's ability to think, reason, solve problems, learn, and process information (Naglieri & Bornstein, 2003; Wechsler, 1944). Highly accepted models of intelligence synthesize human cognitive differences into three strata of cognitive abilities: (a) an overarching third level of intellect (*g*), (b) second-level broad domains related to things such as language, memory, and novel problem solving, and (c) narrow abilities that speak to more test specific variation. Individuals who perform well with one mental task tend to be good at other types of mental task (third level; *g*). Likewise, individuals who perform well within one domain (e.g., verbal ability) tend to do well at other tasks in that domain. Individuals may also show specific strengths in narrow mental skills. When using a broad battery of cognitive tests with a representative sample to measure intelligence across these strata, the broadest measure of intelligence, *g*, often accounts for nearly half the variance. Relatively little of the variance lies at the domain level. Many tests of intelligence are designed around this conceptualization, albeit with variation on the focus with which abilities, *g*, broad or narrow, are interpreted (Flanagan et al., 2000; Kaufman et al., 2012). In all cases, individual's intelligence is assessed by way of method of measurement and

interpretation. However, researchers may disagree on the nature of the domains, which can vary in number, name, and content depending on the specific instrument. Further, there is longstanding debate about whether the nature of  $g$  might vary between cognitive batteries.

Intelligence, despite its conceptualizations and controversy, is one of the most widely studied and clearly established predictors of academic achievement (Colom & Flores-Mendoza, 2007; Deary et al., 2007; Geisinger, 2019; Kaufman et al., 2012; Kyttälä & Lehto, 2008; Lemos et al., 2013; Primi et al., 2010; Richardson et al., 2012; Roth et al., 2015; Taub et al., 2008).

Identification of students with learning disabilities is often done when, despite adequate effort and motivation, the student's level of achievement does not align statistically, in significant and unusual ways, with intelligence measures, however they are interpreted (Flanagan et al., 2007).

Further, achievement and intelligence are inexorably entwined in both historical and current contexts. General intelligence as a construct was discovered partly through scrutiny of individual differences in academic tests (Binet & Simon, 1916; Spearman, 1904). Thus, predicting individual differences in academic achievement was the pretext for the first broad tests of cognitive ability (Binet, 1916/1905; Neisser et al., 1996; Spearman, 1904). The Scholastic Aptitude Test, today referred to simply as the SAT (Tough, 2020), was developed in 1925 following construction of the Stanford-Binet Intelligence Test (Terman, 1916). Today, aptitude and achievement tests such as the SAT, Armed Forces Qualification Test, the Armed Services Vocational Aptitude Battery, and American College Testing are commonly used as proxies for individual intelligence measures so as to predict future achievement outcomes (Borghans et al., 2016; Heckman, 2011; Heckman et al., 2006). In fact, the predictive validity of cognitive ability tests is often established via educational outcomes (Deary et al., 2007).

Intelligence accounts for somewhere between half and two-thirds of the total variance in academic achievement and from 56% to 70% of variance in academic achievement attributable to student characteristics (Detterman, 2016). In a longitudinal study of over 70,000 secondary students, Deary et al. (2007) extracted an educational achievement general factor (educational *g*) from standardized achievement tests and a general factor of intelligence (cognitive *g*) from tests of cognitive abilities given 5 years earlier. Deary et al. found a .81 correlation between the academic achievement general factor and the intelligence general factor. In other words, intelligence predicted about two-thirds of the general factor of academic achievement. Deary et al. also found that general intelligence predicted achievement in specific courses like mathematics. Similarly, Lynn and Mikk (2007) posited that intelligence is important at the national level in determining educational achievement. Lynn and Mikk used the results from Trends in Mathematics and Science Study (TIMSS) to show that TIMSS results and mean country intelligence quotient are correlated between .92 and 1.00 after correction for attenuation and between .85 and .93 before correction. More recently, Kaufman et al. (2012) found similar results using Kaufman intelligence and achievement tests ( $n = 2,520$ ) and Woodcock-Johnson intelligence and achievement tests ( $n = 4,969$ ). For each battery of intelligence and achievement tests, Kaufman et al. obtained and correlated general factors for cognitive ability and academic achievement. Very similar to Deary et al., Kaufman et al. found a .83 mean correlation between cognitive *g* and educational achievement *g*.

### **Achievement and Individual Characteristics Other Than Intelligence**

Although intelligence is widely accepted as a robust factor predicting achievement, studies have consistently demonstrated that intelligence cannot account for all the variance in achievement outcomes (Almlund et al., 2011; Bergold & Steinmayr, 2018; Borghans et al., 2008:

Chamorro-Premuzic & Furnham, 2008; Dixson et al., 2016; Farrington et al., 2012; Jackson, 2015; Li & Bates, 2019, Mischel et al., 2007, 2011; Moffitt et al., 2011; Yeager & Walton, 2011, Yeager et al., 2016). Studies have shown that correlations between general intelligence and achievement most often range from .3 to .5 depending on different factors. With a maximum correlation of .5, the predictive power of intelligence never exceeds 25% of the variance explained; thus, other variables contributing to academic achievement must be at work. In other words, cognitive ability may reflect what a student can do; however, other individual characteristics beyond intelligence may better reflect what a student will do (Furnham & Chamorro-Premuzic, 2004). Because of this, researchers have strived to understand how aspects of human learning relevant to instruction, other than intelligence, are related to academic success. This line of research seeks to identify potentially important individual differences apart from cognition that influence learning and may be used to assess learning outcomes. Research on nonintellective antecedents of achievement, especially over the past 20 to 30 years, has been further reinforced by doubts regarding the cultural and socioeconomic biases in standardized intelligence, aptitude, and achievement testing (Fuerst, 2014; Tough, 2020).

The parlance around competencies and traits not described by cognitive abilities has caused concern for deep-seated terminological issues (Duckworth & Yeager, 2015; Jones et al., 2016). Conation, a well-established term in psychology used to categorize a broad array of human mental processes connecting affect and behavior, perhaps summarizes the field best; however, the term is not often used in prevailing educational vernacular (Bahrami & Cranney 2018). Constructs in the conative domain are numerous and include those that describe motivational distinctions, the need for achievement, will to learn, regulation of actions leading toward personal goals, fear of failure, self-efficacy, volitional aspects related to persistence, work

ethic, mindfulness in learning, and others along these lines; thus, the term is indeed comprehensive (Bahrami & Cranney, 2018; Snow et al., 1997).

Within a narrower focus, constellations of constructs related to motivational factors, personality traits, self-regulation, and overall executive functions categorize much of the research on broader representations of student capacities that facilitate achievement (Farrington et al., 2012). For example, cursory Google Scholar searches for “motivation and academic achievement,” “self-efficacy and academic achievement,” and “self-regulation and academic achievement” yielded, 2,720,000, 619,000, and 330,000 results, respectively. Personality traits described by Costa and McCrae’s (1992) five-factor model (conscientiousness, extraversion, neuroticism, openness, and agreeableness) have all been found to predict achievement (Poropat, 2009, 2011, 2014; O’Connor & Paunonen, 2007), with conscientiousness having the strongest relationship to GPA (Connelly & Ones, 2010; Richardson et al., 2012; Roberts et al., 2014). Motivational constructs such as attributions, optimism, pessimism, expectancies, and perceived control have also been the focus of research on achievement outcomes at all levels of education (Arnold & Rowaan, 2014; Huie et al., 2014; Wurf & Croft-Piggin, 2015).

One the most extensively studied constructs associated with achievement is self-efficacy (Bowman et al., 2018), which is the belief that one is able to complete a task successfully (e.g., Bandura 1977, 1985). Over 25 years ago, Multon et al. (1991) conducted a quantitative meta-analysis and found that academic self-efficacy had a strong relationship with college academic achievement ( $r = .35$ ). Subsequent researchers who examined various psychological, behavioral, and demographic constructs indicated that self-efficacy was one of the strongest predictors of college grades ( $r = .38$  in Robbins et al., 2004;  $r = .31$  for “academic self-efficacy” and  $r = .59$  for “performance self-efficacy” in Richardson et al., 2012).

Farrington et al. (2012) systematically reviewed research studies on factors apart from intelligence that are related to student achievement and subsequently provided a theoretical framework organized around five antecedents: (a) academic behaviors associated with engagement such as attending class, participating in class, doing homework, studying), (b) academic perseverance even in the face of obstacles or challenges (e.g., grit, self-regulation), (c) academic mindsets regarding beliefs about oneself in relation to academics (e.g., academic self-efficacy, relevance of schoolwork to one's life, sense of belonging), (d) learning strategies for academic tasks (e.g., study skills, metacognitive strategies, time management, goal setting), and (e) social skills that may help students interact successfully with instructors or peers (e.g., interpersonal skills, empathy, cooperation, responsibility). Farrington et al. found evidence that academic behaviors associated with engagement, academic mindsets, and learning strategies affect students' grades across K–12 and higher education settings. Farrington et al. further proposed that academic mindsets have a direct effect on each of the other four factors. That is, students are more likely to exhibit effective behaviors and achieve well when they believe that they belong within the academic community, feel that they could improve their performance with effort, and perceive that they were capable of succeeding academically. Importantly, Farrington et al. specified that the dynamics between these factors may be modified by individual student background characteristics as well as the classroom, school, and sociocultural contexts in which they occur.

More recently, research on the construct of emotional intelligence has gained attention as a facilitator of achievement and other positive life outcomes (Okwuduba et al., 2019; Parker et al., 2004; Suleman et al., 2019). Emotional intelligence, introduced by Salovey and Mayer (1990) and further refined by Goleman (1996), is characterized as a collection of skills or



capacities related to self-awareness, social skills, self-regulation, motivation, and empathy. Depending on the conceptualization, emotional intelligence is categorized as reflecting abilities, traits, or both (Parker & Bar-On, 2000; Zeidner et al., 2008). People who are emotionally intelligent can better understand the beliefs and rules concerning the meaning of emotion as well as evaluate situations and express their feelings adeptly (Matthews et al., 2006). Studies show a positive relationship between emotional intelligence and academic success that is distinct from general intelligence (Bar-On, 2004; Brouzos et al., 2014; Derksen et al., 2002; Downey et al., 2008; Low & Nelson, 2004; Okwuduba et al., 2019; Parker et al., 2004; Suleman et al., 2019; Van Rooy & Viswevaran, 2004).

Mindset (Mueller & Dweck, 1998) is another nonintellective construct that has been widely accepted across educational circles as predictive of achievement outcomes (Pollard, 2020; Slack, 2020). Mindset refers to whether an individual believes that their basic ability is stable (fixed mindset) or malleable (growth mindset; Yeager et al., 2019). According to mindset theory, a learner with a fixed mindset believes that they are unlikely to succeed when feeling challenged and having to put in effort, whereas a learner with a growth mindset believes that they may find success in response to dedicated effort (Yeager et al., 2019). Mueller and Dweck (1998) focused on manipulating mindset in learners through different forms of praise. Mueller and Dweck reported that children in the growth mindset condition performed significantly better on tasks. However, these findings, and the implications for focus on instructional interventions along these lines, have recently been challenged with findings that suggest mindset is less important than continued focus on conventional yet effective teaching strategies like systematic practice and feedback (Li & Bates, 2019).

The construct of grit has been identified as an attribute that contributes to academic success. Duckworth et al. (2007) defined grit as a combination of perseverance and passion for long-term goals; however, grit is sometimes argued to be a component of conscientiousness (Credé et al. 2017; Roberts et al., 2014). Credé et al. (2017) completed a meta-analysis that showed grit to be positively correlated with college GPA, intent to persist, and college retention. Further, individual studies have demonstrated that grit significantly predicts college grades and intent to persist even when controlling for potential confounding variables (Akos & Kretchmar 2017; Bowman, 2014; Duckworth et al., 2007; Duckworth & Quinn, 2009; Strayhorn, 2014).

Colleges and universities have engaged in efforts to measure individual students' capacities and target interventions based on the trend in research to examine individual traits other than intelligence as predictors of achievement. For example, Educational Testing Service markets the Student Success Navigator program to colleges and universities to help identify factors other than academic ability or academic intelligence that contribute to student learning (Holzman & Markle, 2018). The Student Success Navigator provides individual measures of 12 separate characteristics such as social support, team work, self-efficacy, response to stress, institutional commitment, conscientiousness, goal-setting, and metacognition. Based on a series of self-report questions, a student's score is calculated and analyzed to create an action plan for intervention based on the individual at-risk areas.

### **Achievement and External Factors**

Research on external factors associated with student achievement varies widely. For example, studies have been completed on student achievement and its relationship to physical plant (Baker & Bernstein, 2012; Cleveland & Fisher, 2014; Earthman & Lemasters, 2011; Lumpkin et al., 2014; Uline & Tschannen-Moran, 2008), socioeconomic status (Hasl et al., 2019;

Hillman, 2019; Tough, 2020), and teacher preparation and training (Arghode et al., 2017; Chick et al., 2019; Condon et al., 2016; Pozo-Rico & Sandoval, 2020). Lumpkin et al. (2014) found that the percentage of students passing standardized mathematics and reading subtests increased after transitioning from an old school building into a new code compliant facility. The College Board National SAT Validity Study over the past 10 years illustrated student performance on the SAT track with family income brackets (Tough, 2020). College Board statistics from 2013 indicated that students' SAT scores follow a direct line starting at an average score of 1326 increasing to an average of 1714 (out of 2400) among students whose parents earned less than \$20,000 to those earning more than \$200,000, respectively (Tough, 2020). Teacher training studies have demonstrated gains in achievement outcomes; however, the focus of these studies is found mostly with the early childhood and K–12 population (Didion et al., 2020; Pozo-Rico & Sandoval, 2020).

Researchers who have shifted away from a focus on students' intrinsic and individual dispositions as primary antecedents of achievement outcomes express concern for laying the onus for improvement on individuals who are largely subject to historic and systemic barriers that preclude their success (Herold, 2015; McNair et al., 2016). For example, students who experience weak achievement outcomes in college are often the first in their family to pursue higher education, from low income households, and disproportionately students of color, all characteristics outside the scope of individual motivation and effort (Miller et al., 2019; National Student Clearinghouse Research Center, 2019). Researchers and practitioners in higher education argue that—instead of subscribing to a narrative of traits like grit, self-efficacy, and motivation—students, especially those from disadvantaged backgrounds, require an ecosystem of facilities, support structures, and external assistance to recover from setbacks and reach

academic achievement goals. Moreover, functional practices are exemplified by academic support provided in small classes, peer mentoring, extra tutoring, and attentive faculty advisors (McNair et al., 2016; Wade et al., 2015). Examining how such external structures, forces, and practices may contribute to student achievement thus communicates a message of institutional responsiveness and shared responsibility (McNair et al., 2016). This message was best expressed by former Supreme Court Justice, Thurgood Marshall, when he asserted, “None of us got where we are solely by pulling ourselves up by our bootstraps. We got here because somebody—a parent, a teacher, an Ivy League crony or a few nuns bent down and helped us pick up our boots” (Gallagher, 2012, paragraph 6).

### ***In Search of Good Teaching***

Faculty actions at the tertiary classroom level are one of the most effectively influenced extrinsic variables related to facilitating postsecondary student achievement (Tinto, 2012; Tinto & Pusser, 2006). Because of this, studies of teaching in higher education often explore the traits and characteristics of instructors who achieve strong student outcomes and ultimately focus on how to define and operationalize what these instructors do (Bain, 2004; Samples & Copeland, 2013). College and university faculty are often not well trained in instructional methods and novice or parttime faculty are often assigned to critical first-year courses (Tinto, 2006), making attention to the pedagogy of higher education even more urgent. A seminal work on effective college teaching was presented by Lowman (1995) in his book *Mastering the Techniques of Teaching*. Based on an analysis of over 500 teaching award nominations submitted mainly by students, Lowman presented good teaching in a two-dimensional model characterized by intellectual excitement and interpersonal rapport. Samples and Copeland (2013) revisited Lowman’s dimensions via faculty discussion, peer identification, surveys, and student input to

corroborate Lowman's model. Samples and Copeland found that definitions of good teaching in their study almost universally included success of the student.

A relatively young and dynamic movement with an implicit shared responsibility focus in student achievement at the higher education level is that of the Scholarship of Teaching and Learning (SoTL). SoTL describes the scholarly inquiry of learning and teaching practices of individuals, departments, and institutions (Lawrence & Herrick, 2019). The seminal work of SoTL was that of Boyer's (1990), *Scholarship Reconsidered*, in which Boyer challenged traditional research, teaching, and service conceptions of faculty work and replaced it with domains of scholarship: "the scholarship of discovery; the scholarship of integration; the scholarship of application; and the scholarship of teaching" (p. 16). Boyer's elevation of teaching as a scholarly activity was embraced, debated, defined, further advanced, and eventually renamed the SoTL. The SoTL movement proposes that faculty are better equipped to respond and adapt to changes in the classroom and become better teachers when they are well-informed by educational research. With this reframing came multidisciplinary and collaborative efforts to draw on expertise, publish and share findings, and engage in iterative opportunities to learn, practice, and reflect on the professor's pedagogical role in ensuring student success (Condon et al., 2016). Today, SoTL has devoted publications at the national, international, and subject area levels and informs quality assurance, policy, professional development, and government funding for institutions of higher education (Haigh et al., 2011; Vardi, 2011).

The rise of SoTL reflects findings from studies that refute long-standing assumptions that faculty care less about teaching than other aspects of their work as tertiary educators (e.g., research). The pejorative discourse from Arum and Roksa's (2011) *Academically Adrift*, Delbanco's (2014) *College: What It Was, Is, and Should Be*, and Keeling and Hersh's (2011)

*We're Losing Our Minds: Rethinking American Higher Education* uniformly pointed to lack of prioritization of teaching in higher education as a major reason for unsuccessful achievement outcomes. Because of this, the prevailing assertion was that professors devalued teaching; however, this assumption is not supported by studies that show that the majority of higher education faculty spend half their time either preparing for teaching or engaged in scheduled teaching (Eagan et al., 2014). Scholars included in the Tracer Project at Washington State University and Carleton College researched the impact of faculty development on student learning outcomes in an extensive mixed-methods study and indicated that tertiary faculty are not only interested in teaching practices, but will actively engage in ways to develop practices to improve student outcomes (Beyer et al., 2013; Condon et al., 2016).

### **Teacher–Student Rapport**

Studies support the importance of emotionally positive, structured, and cognitively stimulating classrooms (Allen et al., 2013; Vandenbrouke et al., 2018). Teacher–student rapport describes mutual trust and understanding between two individuals in the context of interpersonal interactions in learning; thus, teacher–student rapport represents one manifestation of supportive classroom environments (Carey, 1986; Frisby & Housney-Gaffney, 2015; Rimm-Kaufmann & Sandilos, n.d.). Quality relationships, including those between teacher and students, have an impact on motivation, social competence, engagement, and well-being (Froiland et al., 2019; Wood et al., 2017). Teachers who experience close relationships with students report that their students are less school avoidant, appear more autonomous, are more cooperative, and more likely to assert discretionary effort toward learning (Birch & Ladd, 1998; Decker et al., 2007; Klem & Connell, 2004; Mantzicopoulos et al., 2018). Teachers who show rapport building behaviors such as sensitivity to individual student differences and inclusion of students in

decision-making processes while acknowledging students' developmental, personal, and relational needs produce greater motivation in their students than those who employed fewer of such practices (Daniels & Perry, 2003; Wood et al., 2017). Studies have shown that elementary students with positive relationships with teachers were willing to exert more effort toward understanding a task and reported enjoyment in thinking about and solving problems (Gehlbach & Robinson, 2016; Rimm-Kaufman et al., 2014).

Teacher–student rapport is recognized as important to learning across developmental levels (Bernstein-Yamashiro & Noam, 2013; Roorda et al., 2011) and the research on professor–student rapport in higher education signals a recognition of the importance of this quality of human interaction for older learners (Arghode et al., 2017; Benton, 2011; Demir et al., 2019; Estepp & Roberts, 2015; Lee, 2015; Lowman, 1995; Robinson et al., 2019; Tierney, 2011). However, professor–student interpersonal dynamics remains significantly underresearched compared to the breadth and depth of K–12 efforts (Hagenauer & Volet, 2014; Robinson et al., 2019). Yet, what has been examined historically and in contemporary research regarding professor–student rapport in higher education contributes to at least a basic understanding of teaching and learning as social acts, no matter the stage of learning (Robinson et al., 2019).

In his model of effective college teaching, Lowman (1995) suggested that teacher–student rapport “deals with an instructor’s awareness of these [classroom] interpersonal phenomena and with his or her skill as [sic] communicating with students in ways that increase motivation, enjoyment, and predictor learning” (p. 27). In support of Lowman’s position, many studies at the university level have focused on certain professor behaviors that foster positive relationships with students (Wilson & Ryan, 2013), including studies on professor verbal and nonverbal immediacy behaviors (Schutt et al., 2009; Wise et al., 2004). Being approachable,

using encouraging language, getting to know students, calling students by name, and maintaining contact that shows concern are all behaviors that promote rapport (Wilson & Ryan, 2013); however, Ryan et al. (2011) found that professor immediacy measures like eye-contact or perceived friendliness do not account for the full benefit to student outcomes. This suggests that the benefit conferred to students by professor–student rapport is not just through student perceptions that the professor is a “nice” professor. Wilson and Ryan (2013) described student perceptions of rapport with their professor as being associated with proacademic behaviors such as attentiveness and participating in and attending class. Still, contemporary research efforts examining professor–student rapport only speculate about the mechanisms through which it impacts students’ thinking and behavior (Demir et al., 2019). Researchers stress how little we really know about professor–student relationships, describing them as an untapped resource for improving student outcomes (Lammers & Gillasp, 2013; Robinson et al., 2019).

### ***Rapport Predicts Achievement***

Multiple studies have demonstrated the relationship between teacher–student rapport and academic achievement (Hughes et al., 2012; Kosir & Tement, 2014; Sulaiman Al Nasser et al., 2014; Violanti et al., 2018). These investigations have primarily focused on the K–12 population (Brinkworth et al., 2018; Cornelius-White, 2007; Hagenauer & Volet, 2014; Klem & Connell, 2004; Midgley et al., 1988; McCormick & O’Connor, 2014; Roorda et al., 2011; Wentzel, 1998); however, the positive relationship between professor–student rapport and achievement at the university level has also been firmly established (Lammers & Bird, 2019; Lammers et al., 2017; Sybing, 2019). Students who perceive higher rapport with their professors not only tend to have higher final course grades than students who perceived lower rapport with their professors, but students’ rapport scores measured at different points during the semester positively correlate with



final grades (Lammers & Bird, 2019; Lammers et al., 2017). Students who have consistently high rapport with their professor demonstrate the best achievement outcomes; however, these outcomes are not significantly better than those of students whose rapport with their instructors increased over time (Lammers & Bird, 2019; Lammers et al., 2017). This suggests that professor–student rapport is quickly established, dynamic, and malleable.

### **A Brief History of Hope**

The topic of hope was not a focus of scientific study until the latter part of the 20th century. Prior to that time, hope was regarded as a highly personal and perhaps primitive human mechanism that was better suited to religious or philosophical discourse than to that of science (Elliott, 2005). At the time, scientists tended toward the study of negative personality dimensions and deficit models of behavior through constructs such as pessimism and hopelessness. However, the field of psychology shifted in the second part of the 20th century (Callina et al., 2017; Elliott, 2005). Psychologists became interested in positive aspects of adaptive human behavior and thinking after learning that mechanisms like hope may assist the healthy and the sick, facilitate recovery from mental illness, and help individuals lead more productive lives (Callina et al., 2017). This sentiment gained momentum in 1959 when psychiatrist Karl Menninger delivered a lecture on hope to the American Psychiatric Association (Gallagher & Lopez, 2018). In this speech, Menninger argued some key points regarding hope. First, Menninger qualified hope as necessary to the field of psychiatry and to the field of medicine, in general. Second, Menninger pointed out that studying hope would require focused effort from the scientific community because there were yet no established ways in which to scrutinize hope via scientific analysis (Elliott, 2005). The scientific community responded to this call for research about hope. Theoretical perspectives and empirical evidence thus began to shape hope into

legitimate subject matter that was worthy of objective study. Early researchers such as Frank (1968), Tiger, (1979), Mowrer (1960), and Stotland (1969) all contributed work to advance the argument that hope is a positive, valuable, and even essential human resource (Elliott, 2005). Although these early conceptualizations of hope varied, they shared an assertion that hope represented a positive expectation about achieving goals. Ezra Stotland particularly influenced the study of hope. Using a cognitive–behavioral perspective, Stotland sought answers to the “causes and consequences of different levels of expectation of goal achievement” (p. 3) across contexts. In doing so, Stotland offered a highly pragmatic interpretation of hope as a psychological variable operating on an individual. Further, Stotland proposed that hope was a mediating process that paired “antecedent and consequent events... to explain why a given antecedent event led to a given behavioral outcome” (p. 3).

Although criticized as overly simplistic and arbitrary, Gottschalk (1974) developed the first quantitative measure of hope via rating scale, which opened the door to transform hope into an empirically quantifiable and measurable construct. Gottschalk paved the way for future quantitative analysis of hope, such as comparing populations and correlating hope with other psychological measures (Elliott, 2005). Today, hope is the focus of continued funded research in the fields of medicine, genetics, social science, and philosophy. For example, hope has been studied as it relates to treatment outcomes for spinal cord injury (Blake et al., 2018), cancer treatment (Germann et al., 2015), and type 1 diabetes (Van Allen et al., 2016). From 2014–2017, the Hope & Optimism Initiative, representing a \$5,000,000, 4-year grant at Notre Dame, Cornell, and the University of Pennsylvania, awarded funding to 29 researchers from North America, Europe, and the Near East to further understand the nature and role of hope and related states (Hope and Optimism, n.d.).

### ***Hope: A Unique Construct in Positive Psychology***

Positive psychology is a strengths-based movement that has gained momentum since its inception in the late 1990's (Seligman, 1998). Instead of focusing on deficits, disease, damage, and pathology, positive psychology practitioners aim to identify what is right in an individual or organization and seek to make needed changes from that point (Lambert, 2007). According to a positive psychology framework, the struggling student may have areas of weakness that require management and intervention; however, the greatest gains and improvements will not be yielded by highlighting these deficits but rather by highlighting the student's talents and skills (Clifton & Harter, 2003; Lopez et al., 2007). The construct of hope belongs to the positive psychology family (Snyder, 1991). Historically, the hope construct has been compared to other positive psychosocial constructs such as self-efficacy (Bandura, 1982), optimism (Abramson et al., 1978; Scheier & Carver, 1985), and self-esteem (Hewitt, 1998). As such, hope has been investigated numerous times to determine if, in fact, it describes something unique about the way individuals perceive and relate to their internal and external states of being (Ben-Naim et al., 2017; Feldman & Kubota, 2015; Fowler et al., 2017). Optimism is different from hope in that optimism does not focus on an individual's personal control in realizing outcomes in the way that hope does (Feldman & Kubota, 2015). Additionally, optimism may result from an individual's fundamental beliefs about the world and others; however, hope can emerge from core beliefs about the self (Rand, 2009). General self-efficacy is conceptually similar to hope; however, it describes more the belief that a person *can* do something, not that they *will* do something (Feldman & Kubota, 2015). General self-efficacy runs against the original definition of self-efficacy as being a domain-specific or situation-specific expectancy (Bandura, 1982). Alarcon et al. (2013) conducted a meta-analytic examination of hope and optimism in articles published from 1966

through 2012. In the 95 articles on hope and the 280 articles on optimism, hope and optimism were determined to be predictor constructs; however, both constructs were related to aspects of physical and psychological well-being. Fowler et al. (2017) sought to replicate past findings regarding the uniqueness of the hope and optimism construct. Fowler et al.'s analysis supported a bifactor model for hope and optimism against a unidimensional structure of global expectancy. As such, separate dimensions of hope and optimism were supported; however, Fowler et al. concluded that both hope and optimism play an important role in understanding future orientation.

### ***The Organization of Hope***

According to hope theory, hope beliefs are hierarchically organized into levels of abstraction: global or trait hope, domain-specific hope, and state hope (Snyder et al., 2002). Snyder et al. (2002) proposed that the fullest understanding of hope-related beliefs is gained from consideration of all levels of hope. An individual's overall perception of their ability to develop pathways and generate agency thoughts to achieve goals is described as global or trait hope (Snyder et al., 2002). Domain-specific hope is a more concrete manifestation of hopeful thinking. Domain hope posits that one develops different standards and expectations for hopeful thinking in different life arenas (Lopez et al., 2000; Rose & Sieben, 2017) and therefore conceptualizes adolescent or adult hope in six domains: social relationships, romantic relationships, family life, academics, work, and leisure (Rose & Sieben, 2017). For example, an individual may have low hope with respect to work but very high hope about romantic or interpersonal issues. Domain-specific hope was prompted by the finding that even individuals with high global hope displayed low hope in the academic domain (Snyder et al., 2002), suggesting that individuals tend to differ in hope perceptions depending on context (Rose &

Seiben, 2017), Further studies have supported that measures of domain-specific hope can reveal subtle differences in hope that would not be detected with a global measure (Berg et al., 2011; Campbell & Kwon, 2001, Kwon, 2002; Robinson & Rose, 2010). State hope describes an even more consolidated aspect of hopeful thinking that pertains to a particular proximal goal. For example, even if global or domain-specific hope is high, an individual may experience low hope regarding a specific goal in any one domain (Rose & Sieben, 2017).

To capture hope in its iterations, Snyder and his colleagues developed different scales to measure hope in children, adolescents, and adults (as cited in Rose & Sieben, 2017). Global or trait hope is measured with the ADHS, sometimes referred to as simply the “Hope Scale” or, in populations under 15 years of age, the Children’s Hope Scale (CHS; Snyder et al., 1997). The Domain-Specific Hope Scale is a 48-item instrument on which respondents indicate their level of agreement to domain specific prompts across an 8-point Likert-type scale. Goal-specific hope is measured with the State Hope Scale, which uses the ADHS as a base with transformed items to reflect a more current orientation and capture an individual’s momentary hopeful thinking (Snyder et al., 1996). The State Hope Scale has three agency items and three pathways items that have been reworded from the ADHS to reflect the present (e.g., “At the present time, I am energetically pursuing my goals”; Snyder et al., 1996, p. 322).

### ***Hope Predicts Achievement***

Hope has a significant relationship to academic achievement across samples of K–12 and college students in the United States and abroad (Akos & Kurz, 2016; Ciarrochi et al., 2007; Day et al., 2010; Dixson et al., 2017; Feldman & Kubota, 2014; Gallagher et al., 2017; Marques et al., 2015; Rand et al., 2011; Shek & Li, 2016; Snyder et al., 2002; Yarcheski & Mahon, 2016). Three longitudinal studies established a firm basis for the unique hope–achievement relationship. The

first was that of Snyder et al. (2002), who conducted a 6-year longitudinal study of entering college freshman. Snyder et al. found that hope scores predicted better overall GPA and likelihood of earning a degree. The second longitudinal study conducted by Day et al. (2010) examined college freshman in the United Kingdom using measures of hope, intelligence, and achievement. Day et al. found that hope significantly predicted academic achievement even when controlling for intelligence and other factors. Finally, Rand et al. (2011) considered incoming law students' college GPA, Law School Admission Test scores, and hope scores to predict academic achievement in the first semester. Rand et al. found that student hope better predicted first semester law school achievement than college GPA or the Law School Admission Test score.

Marques et al. (2017) found via meta-analysis that hope accounts for 12% of the variance in academic performance. Similarly, Gallagher et al. (2017) used a sample of over 200 college students from a Midwestern American university to investigate the relationship between hope and academic achievement, school retention, and the 4-year graduation rate. Gallagher et al. administered measures of academic hope, academic self-efficacy, and student engagement before students in their sample completed their first semesters. Gallagher et al. hypothesized that hope would be the most robust predictor of academic success outcomes among the measured constructs. Controlling for educational history, self-efficacy, and engagement, Gallagher et al. in fact found that hope uniquely predicted the number of enrolled semesters, whether students returned for the second semester, whether the students graduated in 4 years, and the students' GPA across 4 years of college. Furthermore, Dixson et al. (2017) examined students according to four categorical hope profiles: those that are high in both agency and pathways (high hopers), high agency thinkers, high pathways thinkers, and those that have both low agency and low

pathways (low hoppers). Dixon et al. found that participants in hope clusters differed meaningfully in academic achievement as well as on perceived stress, educational expectations, self-esteem, academic investment, consideration of future consequences, academic self-concept, perceived life chances, and school belonging. The most robust differences existed between low hoppers and high hoppers.

### ***Hope as a Mediator***

According to Fairchild and MacKinnon (2009), the study of mediation effects “offers an explanation for how, or why, two variables are related where an intervening or mediating variable, M, is hypothesized to be intermediate in the relation between a predictor variable, X, and an outcome, Y” (p.89). Researchers have recently investigated the mediating effects of hope. For instance, Nie et al. (2019) observed a sample of 1108 adolescents aged 14–18 in their study on life satisfaction of Chinese adolescents. Participants took the Delaware School Climate Survey-Student, the Chinese version of the Children’s Hope Scale, and the Satisfaction with Life Scale. Nie et al. found statistically significant positive relations between hope, teacher–student relationships, and life satisfaction. However, Nie et al. also found that teacher–student relationships influenced life satisfaction directly and indirectly through its impact on hope at the within-person and between-person levels. Thus, Nie et al. found that hope mediated the associations between teacher–student relationships and life satisfaction at the between-person and within-person levels. Nie et al.’s work suggests that for a given student, positive perceptions of teacher–student relationships at one point in time significantly predicted hope (pathways and agency) for that individual. In turn, hope predicted life satisfaction of that student at that particular time point. Nie et al. concluded that, “In the context of teacher–student relationships, it

behooves teachers to foster students' feelings of hope by developing pathway thoughts and motivation for students to achieve their goals" (p. 2379).

Feldman et al. (2016) found that hope served as a mediator between loneliness and academic self-efficacy in students with learning disabilities. In their study, loneliness levels after 1 month of school were mediated by initial loneliness, by initial hope levels, and by optimism and hope levels 1 month into the academic year. Feldman et al. concluded that students with learning disabilities who experienced higher levels of loneliness after 1 month may have done so because of lower hope and optimism levels. Further, outcomes after 1 month's transition to college were not predicted directly by learning disability status. Instead, outcomes were mediated by students' hopeful thinking and future expectations.

Dixson et al. (2018) found that hope mediated between socioeconomic status and achievement. Dixson et al. hypothesized that hope would partially mediate the relationship between SES and GPA as a consequence of the different environmental effects of socioeconomic status on the perceptions of low- and high-socioeconomic status populations. Dixson et al.'s findings suggest that socioeconomic status affects students' levels of hope, which influences their academic achievement. When investigating the mediating role of hope and feelings of vulnerability, resilience, and well-being, Satici (2016) found that hope fully mediated the relationship between resilience and subjective well-being and partially mediated the relationship between psychological vulnerability and subjective well-being.

### **Summary**

Hope theory, a member of the positive psychology family, describes an individual's motivational framework for goal-directed behavior. According to hope theory, the identification and pursuit of goals is influenced by the combination and reciprocal relationship of an



individual's agency (willpower) and pathways (waypower) thinking (Lopez, 2013). Based on this conceptualization, hope is a cognitive set that is measurable and malleable. Studies have established hope as a construct that is distinct from other constructs in the positive psychology family, such as self-efficacy and optimism. High-hope thinking has been demonstrated to have significant positive effects on educational, physical, and behavioral outcomes (Lopez, 2013; Snyder, 2002; Snyder et al., 2002). Importantly, hope is influenced and promoted by one's developmental experiences, environment, and the actions of others (Lopez, 2013; Snyder, 1994). In the realm of education, the mechanisms of hopefulness as they relate to student achievement outcomes are well defined by hope theory. As a student contemplates a goal such as successful performance on a test, in a class, or overall, they must engage in thinking about the ways in which to get things accomplished as well as how to organize the energy to start along the path. This, in turn, gives emotional valence to the achievement goal and influences further thinking and action. Along this path, the student is continually integrating their internal processes with external input from their environment, including the interpersonal dynamics they engage in with teachers.

Academic achievement, a meaningful and universally accepted measure of undergraduate student success, has been shown to be influenced by both individual characteristics and external factors. For example, research has established strong relationships between achievement and intelligence, conative abilities, socioeconomic status, physical environments, and teacher training. For this reason, tertiary institutions have embraced the benefits of using a broad lens of shared responsibility toward improving achievement outcomes, especially for students from poverty and historically marginalized populations. This, in turn, has supported movements at the postsecondary level to collaborate on teaching and learning research, termed the SoTL, in an

organized and deliberate way. Although the complexity of the interactions between the internal and external forces impacting student achievement is hard to overstate, faculty and undergraduate students' relationships and student hopefulness have recently been identified as important to undergraduate student achievement outcomes. That is, research has shown that student–instructor rapport and student hope predict academic achievement. Increased awareness and empirical evidence toward these findings make positive rapport between instructors and students and engagement in practices that encourage student hopefulness a focused objective for postsecondary institutions.

Although the mechanism of hopeful thinking on achievement is putative, the mechanism through which professor–student rapport confers benefit to the student is not yet clear (Robinson et al., 2019). There exists a gap in the literature for understanding how, when, and to whom exactly rapport confers academic benefit and improves students' learning. The mediating effects of hope may explain the mechanism connecting rapport and achievement. For example, past research has shown that hope has mediating effects between constructs such as teacher–student relationships and life satisfaction, socioeconomic status and achievement, and resilience and well-being. The current study tests the basic tenets of hope theory as a malleable construct and proposes that student hope, in the form of goal-directed pathways and agency thinking, is a possible mechanism through which instructor–student rapport influences achievement. In other words, I sought to investigate whether instructor–student rapport affects student hope which, in turn, affects achievement. Knowing this may help professors prioritize rapport-building interpersonal interactions in specific and intentional ways that support and reinforce pathways and agency thinking among undergraduate students.

## **CHAPTER THREE: METHODS**

### **Overview**

This chapter details the research design, the research question, and the null hypothesis for the current study. The study sample is then described as well as the population from which the sample was taken. This chapter reviews the instruments used, the study procedures, and the statistical analyses used to examine the data generated from the instruments.

### **Design**

I explored the relationships between professor–student rapport, hope, and student achievement in a quantitative study with a nonexperimental correlational design. The current study is nonexperimental because (a) the variables in question are preexisting and were not manipulated, (b) the setting was not controlled, (c) treatments were not introduced (Gall et al., 2007). Correlational design is appropriate in cases where the researcher seeks to describe and measure the association or relationship between two or more variables or sets of scores (Creswell & Creswell, 2018). The current research used paired observations of continuous variables to determine if a statistical linear relationship was present between the two variables (Gall et al., 2007). The outcome variable in the current study was student achievement. Student achievement was measured by the ratio of the total number of points earned by a student in a course as compared to total possible points. The predictor variable was professor–student rapport. Professor–student rapport is “an emotional connection between individuals based on understanding, caring, and mutual respect” (Lammers & Byrd, 2019, p. 127). I measured professor–student rapport using the SIRS-9 (Lammers & Gillaspay, 2013). The mediating variable was student hope. Hope is “a positive cognitive motivational state based on an interactively derived sense of successful: (1) agency (goal-directed energy) and (2) pathways (planning to

meet goals)” (Snyder et al., 1991, p. 287). Students’ hope was measured with the ADHS (Snyder et al., 1991).

A quantitative method was the most appropriate method for several reasons. First, quantitative research reflects postpositivist philosophical assumptions that stress the importance of using numeric systems to measure behavior, test theories, and develop relevant statements that can describe the relationships among variables (Creswell & Creswell, 2018). As such, quantitative research tests or confirms research hypotheses or predictions about how two or more variables are related (Creswell & Creswell, 2018). In the current study, I presented a hypothesis involving three variables: professor–student rapport, hope, and student achievement. The specific hypothesis was that hope is a significant mediator between professor–student rapport and student achievement. This prediction was tested through quantitative research.

Second, quantitative research is deductive and confirmatory in nature, testing theories rather than generating them (Warner, 2013). The current study tested hope theory (Snyder, 1994), specifically that hope could promote achievement in higher education through its mediating effect. Third, quantitative studies seek to generalize findings from a sample to a larger population (Warner, 2013). In the current study, the study findings were based on a sample of undergraduate students from a mid-sized Christian university in Virginia from which generalizations were made to the larger population of undergraduate students in the United States. Finally, quantitative research supports a correlational design through which the relationships between variables can be examined to find evidence of associations between variables (Warner, 2013). A mediation analysis was required via quantitative methods to describe the extent that hope accounted for the relation between the predictor variable, professor–student rapport, and the outcome variable, student achievement (Fairchild &

MacKinnon, 2009; Nie et al., 2019). The strength of the relationship was described and quantified through quantitative research methods.

### **Research Question**

The research question for this study was as follows:

**RQ1:** Does hope mediate the relationship between professor–student rapport and student achievement in an undergraduate population of a mid-sized southeastern university in the United States?

### **Hypothesis**

The null hypothesis for this study was as follows:

**H<sub>0</sub>1:** Student hope does not have a significant mediating effect on the relationship between professor–student rapport and student achievement in an undergraduate population of a mid-sized southeastern university in the United States.

### **Participants and Setting**

The population of the current study was undergraduate students attending 4-year institutions of higher education in the United States. The current study used a convenience sample of undergraduate students from a mid-sized southeastern Christian university. A power analysis was conducted for a simple trivariate mediation model using the application for Monte Carlo power analysis for mediation models to determine sample size for the mediation analysis (Schoemann et al., 2017). Within the app, the objective for the power analysis was selected by utilizing the “Set Power, Vary N” option. This option uses the varying sample size approach to calculate the sample size required to achieve a specific level of power. In the app, I selected a conventional target power level of .80, a minimum sample size of 50, a maximum sample size of 200, and a step size of five. The total number of replications needed was set to 5,000 (Mundform

et al., 2011), and the number of coefficient draws per replication was set to 20,000 (Preacher & Selig, 2012). Confidence intervals were set to 95% or  $\alpha = .05$ . Next, I entered values into a correlation matrix based on previous studies (Schoemann et al., 2017). Previous studies on the relationship between professor–student rapport and student hope have not yet been completed; however, the best estimates for matrix coefficients were found by Ahmed et al. (2010), who explored mediational roles of motivational beliefs in perceived teacher support and achievement. Coefficient values and standard deviations were based on the reported statistics of relationships between perceived teacher support and student competence (.26;  $SD = .75$ ), student competence and achievement (.62;  $SD = .69$ ), and teacher support and achievement (.43;  $SD = .94$ ) to yield a required sample size of 115. In the current study, the sample included 43 males and 175 females. Participants included 15 Freshman, 44 Sophomores, 72 Juniors, and 87 Seniors. Students' ages ranged from 18 to 21 and over. The percentage of students' ethnic demographics were as follows: 87.6% White, 3.9% Black or African American, .9% American Indian or Native Alaskan, 5% Asian, and 2.8% Other.

The convenience sample was identified through students' enrollment in any psychology class. I aimed to secure 200 participants to obtain the required sample size of 115 for the current study. The private evangelical university from which the sample was taken offers a broad range of liberal arts majors as well as professional and preprofessional programs through its 15 colleges and schools. Since its establishment in 1971 as a small college with 154 students, the target institution has undergone significant transformation. By 1985, the institution was recognized as a fully accredited university. Today, the target institution is regionally accredited by the Southern Association of Colleges and Schools Commission on Colleges. It serves a residential student body of about 15,000 (13,500 undergraduate and 1,500 graduate) and

manages 380 buildings and structures to meet its academic, housing, administrative, and facility needs. About 57% of residential students live on campus. The residential student body is approximately 46% male and 54% female. The university has a total enrollment of about 100,000 representing residential and online students. Minorities comprise about 25% of the total student population and international students from about 75 countries comprise about 4% of the total student body. The university has a Freshman retention rate of 84.7% and a 4-year graduation rate of 36.5%. Total in-state undergraduate tuition and fees as of 2020 are \$24,906 and over 88% of students receive some form of financial aid. The university offers over 700 degree programs: 300 residential and 450 online. Of the residential programs, 200 are undergraduate and 100 are graduate programs. Of the 450 online degree programs, 100 are undergraduate and 350 are graduate.

The university employs about 2,500 full-time and part-time faculty. The residential undergraduate student to faculty ratio is 24:1. Residential graduate student to faculty ratio is 8:1. The university is organized according to its 15 colleges and schools: School of Aeronautics, College of Arts and Sciences, School of Behavioral Sciences, School of Business, College of Osteopathic Medicine, College of Applied Studies and Academic Success, School of Communication & the Arts, School of Divinity, School of Education, School of Engineering, School of Government, School of Health Sciences, School of Law, School of Music, and School of Nursing.

### **Instrumentation**

The current study utilized the ADHS, the SIRS-9, and a student achievement measurement (course grade). The subsections below will outline the specific instruments. This discussion includes reliability and validity as well as scoring procedures.

### **The Adult Dispositional Hope Scale**

I used the ADHS (Snyder et al., 1991) to measure hopefulness in undergraduate students (see Appendix A). The purpose of ADHS is to measure global or trait hope in individuals over 15 years of age. The ADHS has been used in multiple studies of adult hope (Fadardi & Azadi, 2017; Li et al., 2018; Oliver et al., 2017; Trezise et al., 2018) and is the most widely used assessment tool for quantifying hope in adults (Gallagher, 2018).

The ADHS is a 12-item self-report questionnaire. When respondents complete the scale, it is referred to as the “Goals Scale” to disguise its purpose (Edwards & McClintock, 2018). The ADHS uses an 8-point Likert-type scale where 1 = definitely false, 2 = mostly false, 3 = somewhat false, 4 = slightly false, 5 = slightly true, 6 = somewhat true, 7 = mostly true, and 8 = definitely true. When factor analyses of the ADHS were originally conducted, the two-factor structure (pathways and agency) of the hope construct emerged (Babyak et al., 1993; Lopez et al., 2000; Snyder et al., 1991). The ADHS has four agency items, four pathways items, and four filler items. Three scores are created: (a) overall hope by summing agency and pathways items, (b) an agency score from the agency items sum, and (c) a pathways score from the sum of pathways items. Total hope scores range from 8 to 64. High scores reflect high levels of hope. Snyder (2002) suggested that a person with a history of successful goal attainment is more likely to have higher dispositional hope. The ADHS has demonstrated good levels of reliability with Cronbach alphas of .74 to .84 for overall hope, .71 to .76 for agency thinking, and .63 to .80 for pathways thinking (Snyder et al., 1991). Test-retest was reported at .80 or above over a 10-week period (Snyder et al., 1991).

The ADHS is a valid instrument (Snyder et al., 1991). Through various studies on convergent validity of the instrument, Snyder et al. (1991) showed a pattern of predicted



correlations with concepts that are similar to the theorized process of hope. Snyder et al. also demonstrated that the ADHS contributed unique variance in relation to other individual-difference cognitive and emotionally based dispositional measures of constructs such as optimism, self-esteem, and goal-expectancy. Fowler et al. (2017) sought to replicate past findings regarding the uniqueness of the hope and optimism constructs. Fowler et al.'s study was notably different in that participants were not from a college student population. In Fowler et al.'s study, participants completed the ADHS, the Life Orientation Test-Revised, and the Positive and Negative Affect Schedule. Fowler et al.'s analysis supported a bifactor model for hope and optimism against a unidimensional structure of global expectancy. As such, separate dimensions of hope and optimism were supported. Similarly, Alarcon et al. (2013) conducted a meta-analytic examination of hope and optimism in articles published from 1966 through 2012. In the 95 articles on hope and the 280 articles on optimism, the Life Orientation Scale was used to measure optimism and the ADHS was used to measure hope. In their analysis, Alarcon et al. determined hope and optimism to be independent constructs; however, both constructs were related to aspects of physical and psychological well-being. Cheavens et al. (2019) also found evidence to further validate the ADHS. Using a correlational design, Cheavens et al. completed their investigation through two studies. For Study 1—using 162 undergraduate students at a large Midwestern university—Cheavens et al. hypothesized that hope scores would be associated with skillful goalsetting, higher ratings of goal specificity, higher level of goal difficulty, and objective importance. The researchers expected that higher-hope participants would generate prosocial goals and goals that were less reliant on others. In Study 2, using 118 undergraduates from the same setting, Cheavens et al. hypothesized that hope scores would be associated with the number of pathways the individual was able to generate when presented with a standardized

set of goals. The researchers also guessed that hope scores would be associated with the quality of pathways, including its relevance to goals and its ability to be measured. Cheavens et al. hypothesized that the number of pathways generated would be uniquely related to hope scores and not merely accounted for by scores on other measures of generalized positive future expectancies. Furthermore, Cheavens et al. found that higher scores on the ADHS predicted goal-setting that was objectively important, prosocial, long-term, and challenging. Hope (but not optimism or self-efficacy) was associated with the ability to generate more pathways toward a goal. Finally, Redlich-Amirav et al. (2018) examined the psychometric properties of the ADHS. Redlich-Amirav et al. found evidence of excellent structural validity and content validity.

The ADHS may be used for clinical or research purposes without further permission from the author; however, I was granted permission from the publisher to use the ADHS for the current study. See Appendix B for request for permission to use the instrument.

### **Student Instructor Rapport Scale-9**

For the current study, I used the SIRS-9—a scale used in recent studies—to measure professor–student rapport (Lammers & Byrd, 2019; Lammers et al., 2017; see Appendix C). Lammers and Gillaspay (2013) created the 36-item SIRS to measure the degree of personal connection that a student feels toward the teacher. The SIRS was adapted to the SIRS-9, a shortened version of the original scale (Creasy et al., 2009). As suggested by its name, the SIRS-9 contains nine questions and is rated on a 5-point Likert-type scale. Respondents are asked to select a rating for each of the nine statements on a scale from one to five, with one being “not at all” and 5 being “very much so.” Scores on the SIRS-9 range from 9 to 45, with higher scores representing better perceived rapport between the student and the instructor. The SIRS-9 scores demonstrate high internal consistency (Cronbach’s  $\alpha = .96$ ) and concurrent validity with the

Connectedness subscale of the Student–Instructor Relationship Scale (Creasy et al., 2009). The SIRS-9 demonstrated construct factorial validity with a sample of university students in online courses and predictive validity for grades in online courses (Lammers & Gillaspay, 2013) and in traditional courses (Lammers et al., 2017). See Appendix D for permission to use the instrument.

### **Student Achievement**

Student achievement is commonly measured through GPA or a calculation based on points earned in a course or courses as compared to total points (Gallagher et al., 2017; Lammers & Gillaspay, 2013; Marques et al., 2017). In the current study, student achievement was measured by the ratio of total points earned out of total points possible in the course.

### **Procedures**

I obtained permission to use the survey instruments, the ADHS and the SIRS-9, from the instrument publishers (see Appendix B and D). In addition, I received approval to conduct the present study from the Liberty University Institutional Review Board (IRB; see Appendix E). The following required materials were outlined in the IRB application checklist and submitted in August 2020: dissertation chair endorsement letter, recruitment materials, permission request letters, all consent and assent materials, the ADHS instrument, and the SIRS-9 instrument. My overarching goal was to gain IRB research approval by September 2020.

The researcher contacted the Psychology Department chair via e-mail to obtain permission to conduct the study with one department, as per IRB and institution procedures for internal researchers at the institution (see Appendix F). After receiving IRB approval, I submitted the recruitment message with an embedded survey link to the Psychology Department chair (see Appendix G). The Psychology Department chair posted the recruitment message with

survey link on the Department of Psychology research and surveys web page from mid-October to the close of term at the end of December.

The recruitment text for the web page described participation requirements, the purpose and procedures of the study, the time required for students to complete the survey (10 minutes), the credit incentive for completing the survey, and a hyperlink to the survey placed in the online survey tool, Qualtrics. The recruitment information specified that participants gave permission for access to their final grade in the course. Interested participants who clicked the survey link were first directed to a statement of informed consent that discussed the risks and benefits of the study, security and confidentiality, participation and withdrawal procedures, and where and how results may be published or shared. The informed consent form also stated that all records would be destroyed 3 years after the completion of the study with final aggregate results made available to participants on request. I provided my contact information in both the recruitment posting and informed consent. Signed consent was needed because students were providing their student identification number. The consent information also specified that students gave permission for access to their final grade in the course. Written agreement to participate was gained via the participant typing their name into a designated field of the survey instrument. See Appendix H for informed consent.

The survey required students to meet the age of majority, be currently enrolled in a psychology course, and have not previously completed the survey to continue. The survey asked for participants' university identification number, gender, age, race, and their class year (Freshman, Sophomore, Junior, Senior). Additionally, the participant entered the name of a psychology professor with whom they were currently taking a course and the course name. The ADHS and the SIRS-9 were placed into the Qualtrics survey tool in a format compatible with

computer or mobile device administration. Instructions for completing each instrument were available to students in the survey. See Appendix I for full survey text.

After all survey data were collected, I provided an electronic file of survey data to the Analytics and Data Services Department. When course grades were posted, the Analytics and Data Services personnel entered the final course grade for the specified course of each participant, stripped the student identification numbers from the data set, scrambled the data, and returned the data set to me. I stored all information and survey results on a password-protected computer at my residence and/or in my password protected files.

### **Data Analysis**

The purpose of the current study was to explore the mediating effect of hope on the relationship between professor–student rapport and achievement. To do this, the current study ran descriptive and inferential statistics. For the descriptive statistics, minimum, maximum, mean, and standard deviation were reported for student hope, professor–student rapport, and student achievement. In addition, I used scatterplots to visualize the data. A mediation analysis was conducted to test the inferential statistics; this analysis provides a quantitative assessment of how a predictor variable is exerting its effect on an outcome variable or an outcome variable of interest (Creswell & Creswell, 2018). Mediation analysis in the current study was comprised of three sets of regression analyses where (a) professor–student rapport is the predictor variable and student achievement is the outcome variable, (b) professor–student rapport is the predictor variable and student hope is the outcome variable, and (c) the combination of professor–student rapport and hope is the predictor variable and student achievement is the outcome variable (Warner, 2013). I used R version 3.6.3 to run the appropriate analyses. The Alpha value was set at .05.

The data must meet several assumptions before a mediation analysis can be run. First, the level of measurement must be continuous on the outcome variable. Next, each participant must have pairs of values. In this case, each student had paired value of the SIRS-9 and achievement, the ADHS and achievement, and the SIRS-9 and the ADHS. Third, the scores must be free of influential outliers. Having an outlier can skew the results of the correlation by pulling the line of best fit too far in one direction. I plotted the Cook's Distances for each point to assess whether influential outliers were present (Kim, 2015; Warner, 2013).

Next, to determine how well the regression line model fit the observed data, residual diagnostics were run to ensure that the unexplained variability, or error, did not have any particular trend (Warner, 2013). In this study, I created residual plots to test three additional assumptions. First, the residuals must have a normal distribution and a mean of zero (Warner, 2013). I used a residual Q-Q plot and a histogram to detect violation of the normality assumption (Warner, 2013). Second, the assumption of linearity of residuals must be met; thus, I ran a scatter plot of residuals to detect nonlinearity (Warner, 2013). Third, the residuals must show homogeneity of variances (Warner, 2013). I ran a scatter plot of residuals to detect unequal error variances and outliers (Warner, 2013). If there were more than one predictor, determining the multicollinearity between predictor variables would be necessary; however, this study had only one predictor, professor–student rapport, so this assumption does not apply (Warner, 2013).

In the first step of the analysis, I used bivariate linear regression to determine if a relationship existed between the predictor variable of professor–student rapport and the outcome variable of student achievement (Kim, 2016; Warner, 2013). Even if a significant relationship did not exist between professor–student rapport and student achievement in the current study, prior literature provides a good theoretical base and background of research to support that a

relationship exists, which allowed for the next step of the analysis (Shrout & Bolger, 2002; Warner, 2013).

In Step 2 of the analysis, I ran a bivariate linear regression with professor–student rapport as the predictor variable and student hope as the outcome variable (Kim, 2016; Warner, 2013). This analysis yielded a statistically significant model, and so the final step was carried out (Kim, 2016; Warner, 2013). In Step 3 of the analysis, I ran a bivariate linear regression between the combined results of two predictor variables, student hope and student professor–student rapport, on the outcome variable: student achievement (Kim, 2016; Warner, 2013). If mediation existed, the relationship of the predictor variable (professor–student rapport) on the outcome variable (student achievement) would weaken when the mediating variable student hope was included in the regression because the effect of professor–student rapport on student achievement would have gone through student hope (Kim, 2016; Warner, 2013). If the effect of professor–student rapport on student achievement disappeared, then student hope would have fully mediated between professor–student rapport and student achievement (Kim, 2016; Warner, 2013). If the effect of professor–student rapport on student achievement still existed but was diminished, then student hope partially mediated between professor–student rapport and student achievement (Kim, 2016; Warner, 2013).

Once these relationships were established, I explored whether the mediation effect was statistically significant using bootstrapping in R. The bootstrapping statistical technique uses random resampling with replacement from the raw data to estimate the population parameter. As such, the raw data of the current study were treated as the population. With bootstrapping, each random sample with replacement from the raw data was used to reproduce a possible score in the true population. R also generated the results of the Sobel test; however, because I had access to

the raw data, bootstrapping was the appropriate course of action (Preacher & Leonardelli, 2004). The R script used for the analysis is provided in Appendix J. The effect size of the current study was reported as the  $a$  and  $b$  coefficients themselves which represents an informal measure of the indirect effect (Preacher & Kelly, 2011).



## CHAPTER FOUR: FINDINGS

### Overview

The purpose of this quantitative correlational study was to determine if hope mediated the relationship between professor–student rapport and student achievement. I used a mediation model to examine the research question. This chapter describes the data analysis used to examine whether the data supported the hypothesis.

### Research Question

The research question for this study was as follows:

**RQ 1:** Does hope mediate the relationship between professor–student rapport and student achievement in an undergraduate population of a mid-sized southeastern university in the United States?

### Null Hypothesis

The null hypothesis for this study was as follows:

**H<sub>0</sub>1:** Student hope does not have a significant mediating effect on the relationship between professor–student rapport and student achievement in an undergraduate population of a mid-sized southeastern university in the United States.

### Descriptive Statistics

Descriptive statistics for the, minimum, maximum, mean, and standard deviation are reported for student hope (ADHS), professor–student rapport (SIRS-9), and student achievement (ACH) in Table 1. For the ADHS, total hope scores can range from 8 to 64 with higher scores representing higher levels of hope (Snyder, 2002). The mean hope score for the current sample is 51.31; this score is consistent with previously reported mean scores for an undergraduate sample ( $M = 48$ ; Lopez et al., 2000). The SIRS-9 scores can range from 9 to 45, with higher scores

representing better perceived rapport between the student and the instructor. Mean SIRS-9 have not yet been reported in the literature. Student achievement was measured by the ratio of points earned in a course out of total possible points; therefore, ACH scores may range from 0 to 1 with higher values indicating higher achievement.

**Table 1**

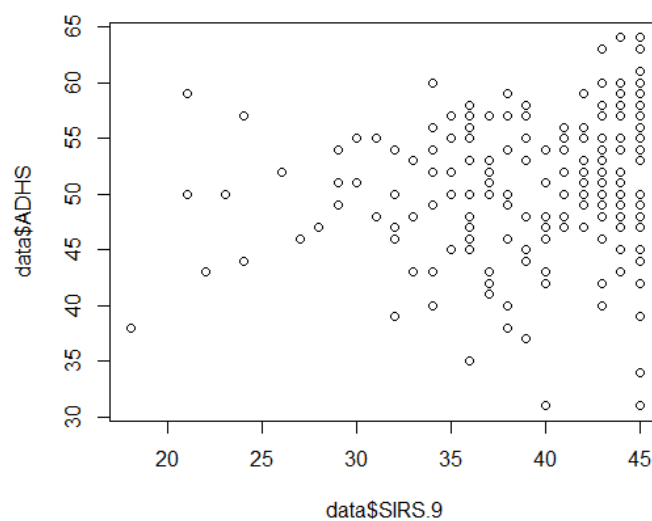
*Minimum, Maximum, Mean, and Standard Deviation of Student Hope (ADHS), Professor-Student Rapport (SIRS-9), and Student Achievement (ACH) (N=218)*

Variable	Min	Max	M	SD
ADHS	31	64	51.31	6.22
SIRS-9	18	45	40.17	5.63
ACH	.49	.99	.84	.11

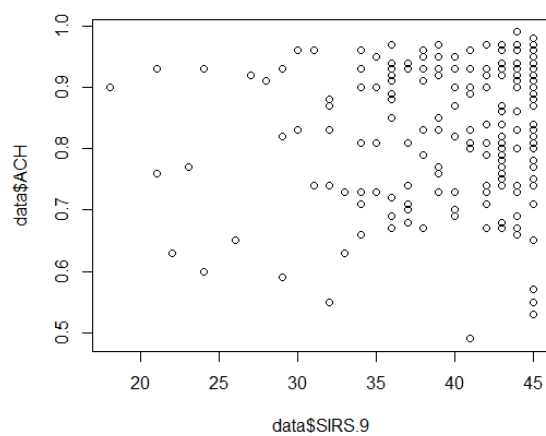
I created three scatterplots to visualize the relationships among the predictor variables, mediator, and outcome variable. Figures 1 through 3 depict the relationship between professor–student rapport (SIRS-9) and student hope (ADHS), professor–student rapport and student achievement, and student hope and student achievement.

**Figure 1**

*Scatterplot SIRS-9 (Rapport) vs. ADHS (Hope)*

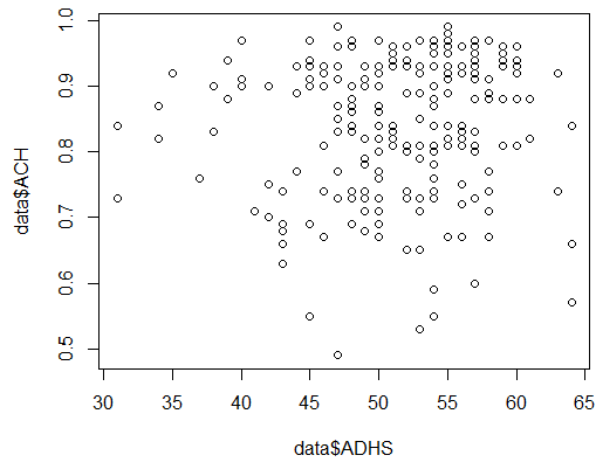
**Figure 2**

*Scatterplot SIRS-9 (Rapport) vs. ACH (Achievement)*



**Figure 3**

*Scatterplot ADHS (Hope) vs. ACH (Achievement)*



### Results

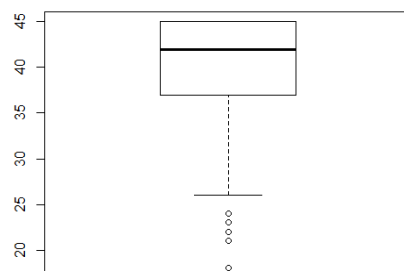
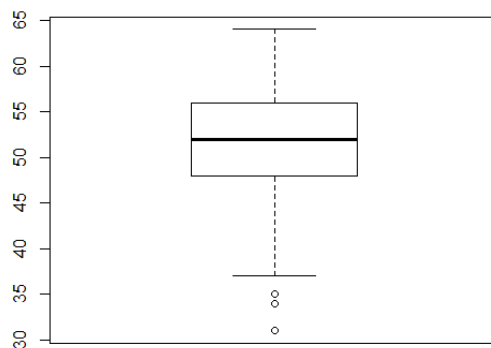
I conducted a mediation analysis to test the null hypothesis that student hope does not have a significant mediating effect on the relationship between professor–student rapport and student achievement in an undergraduate population of a mid-sized southeastern university in the United States. Two assumptions were met prior to performing the mediation analysis: continuous levels of measurement and paired values (Warner, 2013). The third assumption, absence of outliers, was not met. However, outliers were subsequently removed in a secondary analysis to determine whether the outliers influenced the results significantly (Warner, 2013). Additionally, I ran residual diagnostics to determine how well the regression line model fit the observed data. To do so, I checked statistical assumptions of normal distribution, linearity of residuals, and homoscedasticity of residuals (Warner, 2013).

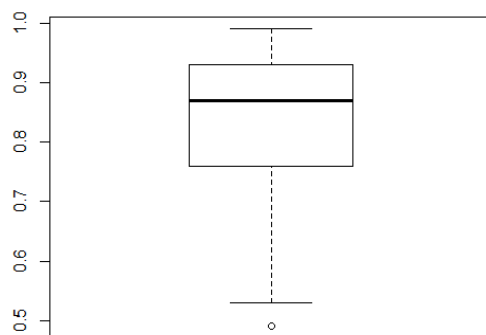
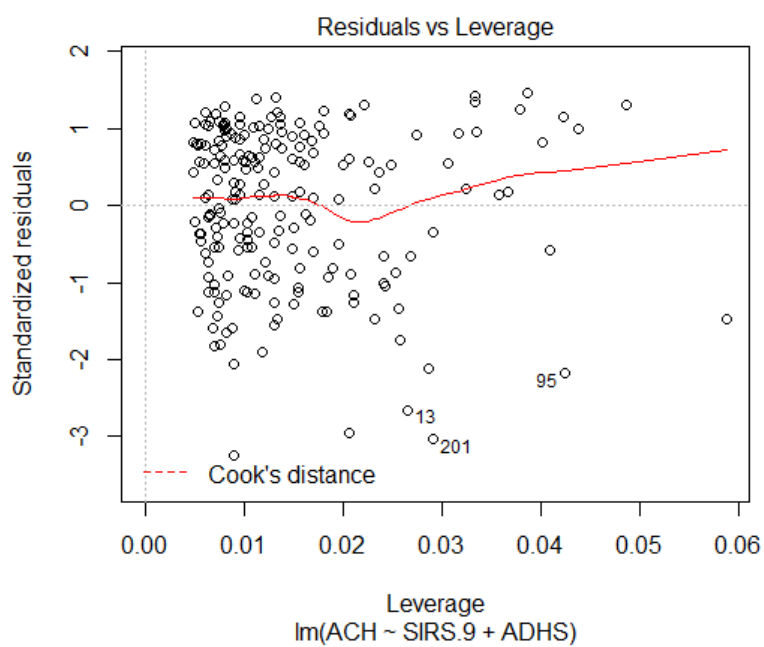
### **Data Screening**

At the time of data collection, 307 participants had responded to the study. After review of the data, two participants were removed due to withdrawal from a course or incomplete grade status, seven participants were removed for neglecting to type their name into the survey to give consent, 24 participants were removed for incomplete survey responses, and 56 were removed for not meeting eligibility criteria for the study. This resulted in a total of 218 participants. All but 18 of the 218 participants completed the study within 12 minutes.

### **Assumptions**

First, the levels of measurement were identified as continuous. Values of the ADHS, SIRS-9, and student achievement are quantitative measures that can take any value between their minimum and maximum and on which meaningful arithmetic can be performed. Therefore, this assumption was met. Next, each participant had pairs of values. In the current study, each participant had paired values of the SIRS-9 and achievement, the ADHS and achievement, and the SIRS-9 and the ADHS; therefore, this assumption was met. Third, the scores must be free of influential outliers. Box and whisker plots showed the presence of outliers. Having an outlier can skew the results of the correlation by pulling the line of best fit too far in one direction; thus, I plotted the Cook's Distances for each point to assess whether influential outliers were present in the data (Kim, 2015; Warner, 2013). Plotting Cook's Distances provided a measure of the change in the predicted values if the observation was removed. A graph of Cook's Distance showed outliers, or observations with values of larger than three times the mean of Cook's distance; therefore, this assumption was not met. Figures 4 through 7 depict these findings. The subsequent mediation analysis was run both in the presence and absence of outliers to determine whether they were influential in the analysis.

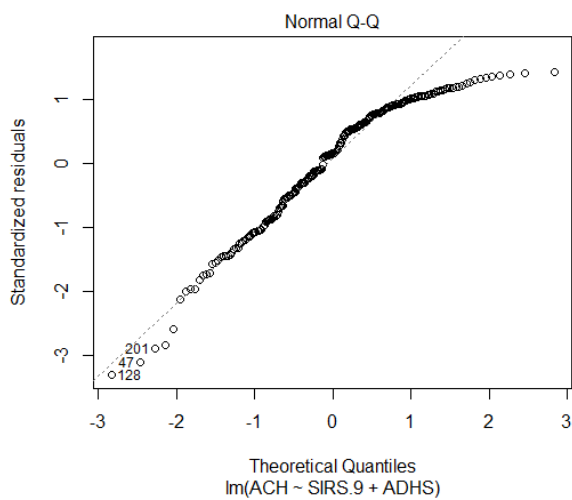
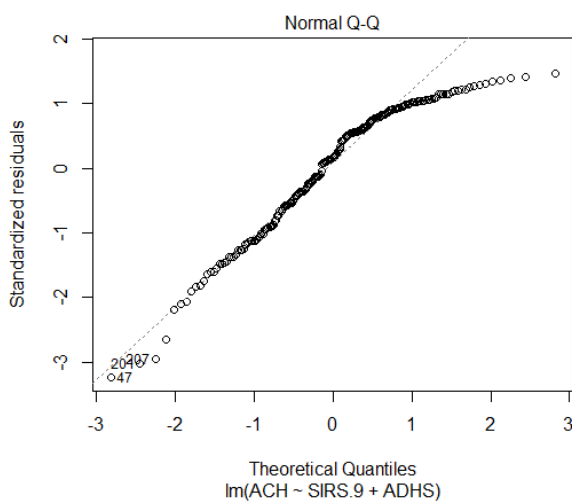
**Figure 4***SIRS 9 Box and Whiskers with Outliers***Figure 5***ADHS Box and Whiskers with Outliers*

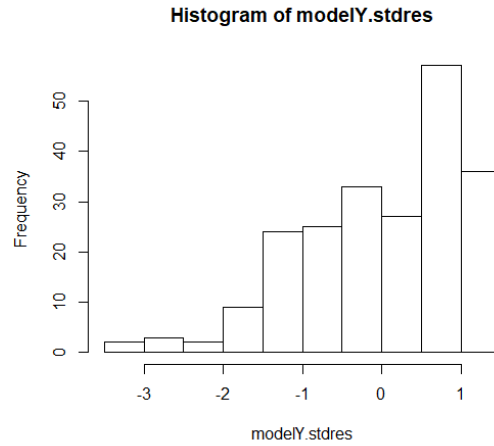
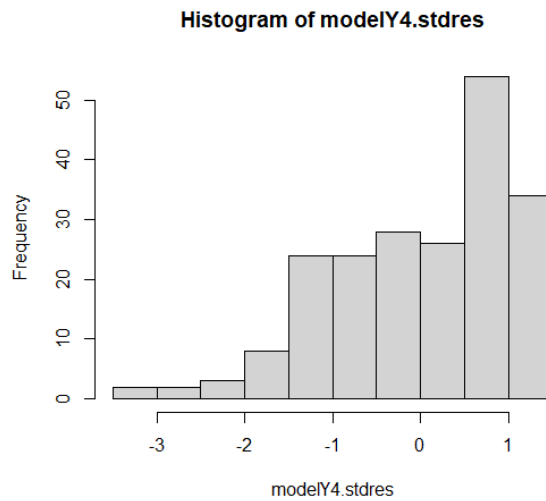
**Figure 6***Student Achievement Box and Whiskers with Outliers***Figure 7***Cook's Distance*

### **Residual Diagnostics**

Next, I ran residual diagnostics to determine how well the regression line model fit the observed data (Kim, 2015). The residuals, or error terms, are the distances of each data point from the regression line. The residuals reveal the values left over after the model has been run. I created residual plots to test three assumptions: normal distribution and mean of zero, linearity of residuals, and homogeneity of variances of the residuals (Kim, 2015; Warner, 2013). A quantile-quantile, or Q-Q plot and histogram, were used to detect violation of the normality assumption for residuals. For the Q-Q plot, I plotted ordered values of the residuals against the expected values from the normal distribution. If normally distributed, the residuals should lie approximately on the diagonal (Kim, 2015). In the current study, the Q-Q plot showed values deviating from the diagonal; therefore, the assumption of normal distribution of residuals was not met. I repeated the analysis without outliers and the results were the same. For the histogram, the figure should follow a bell curve pattern. In the current study, the histogram of residuals showed left skew; therefore, the assumption of normality was not met. I also replotted the histogram without outliers and the results were the same. Figures 8 through 11 show the residual Q-Q plots and histograms.



**Figure 8***Residual Q-Q Plot with Outliers***Figure 9***Residual QQ Plot Without Outliers*

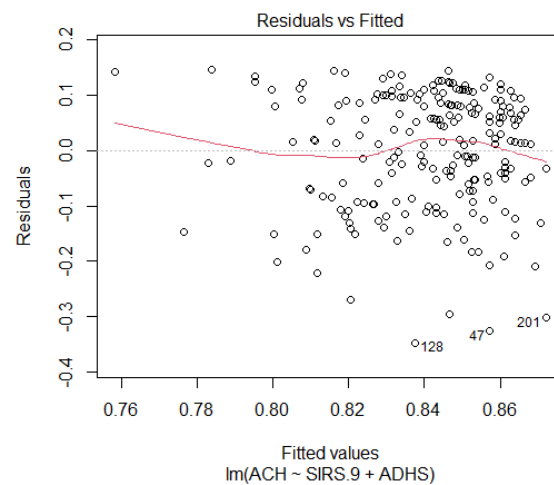
**Figure 10***Residual Histogram with Outliers***Figure 11***Residual Histogram Without Outliers*

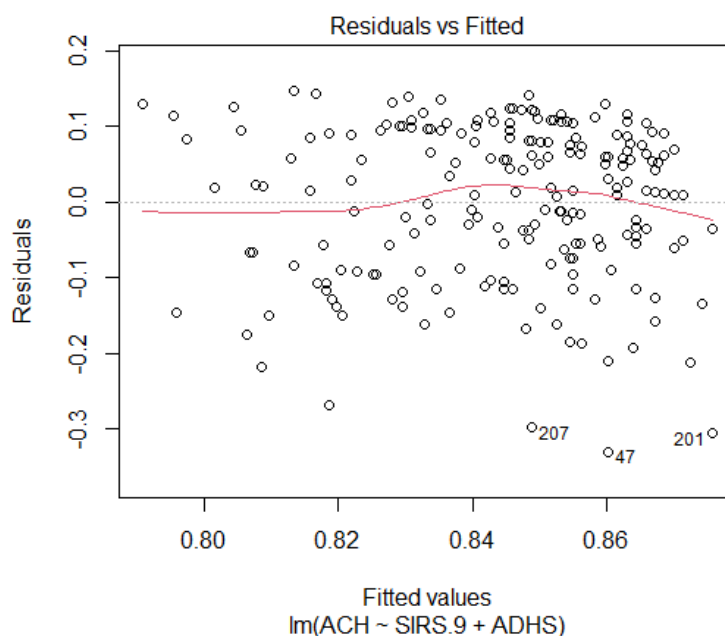
Second, the assumption of linearity of residuals must be met (Warner, 2013). I ran a scatter plot of residuals to detect nonlinearity. If the assumption is met, the points should be

scattered about the line without any significant trend or pattern (Warner, 2013). However, in the current study, the graph indicated a pattern in the data and the assumption of linearity was not met. However, I replotted the data without outliers and the data were more linear (see Figure 12 and 13). Third, the residuals must show homogeneity of variances (Warner, 2013). Therefore, I assessed the residual plots for the assumption of homoscedasticity. If the points form a cone shape, the data are heteroscedastic and the assumption is violated. The assumption in the current study was met because the amount of variability about the residuals does not change for different values of the fitted values.

**Figure 12**

*Residuals vs Fitted with Outliers*



**Figure 13***Residuals vs. Fitted No Outliers*

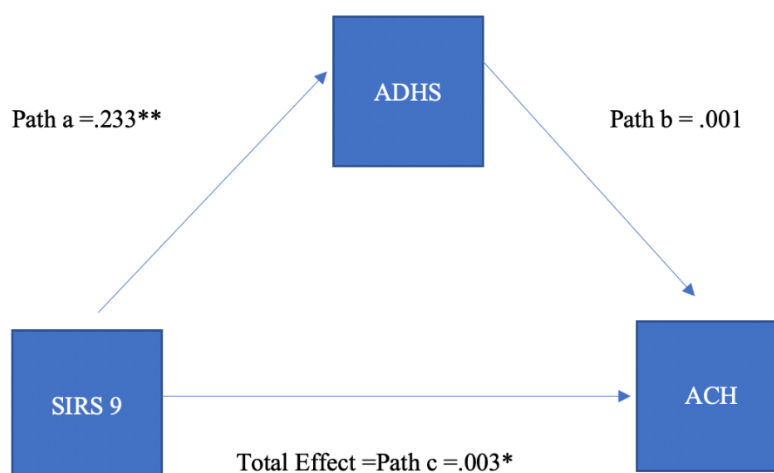
### Mediation Analysis

I conducted mediation analysis to test the inferential statistics. A mediation analysis provides a quantitative assessment of how a predictor variable is exerting its effect on an outcome variable of interest (Creswell & Creswell, 2018). Mediation analysis in the current study was comprised of three sets of regression analyses where (a) professor–student rapport was the predictor variable and student achievement was the outcome variable, (b) professor–student rapport was the predictor variable and student hope was the outcome variable, and (c) the combination of professor–student rapport and hope was the predictor variable and student achievement was the outcome variable (Warner, 2013). In the current study, the effect of professor–student rapport on student achievement was not mediated by student hope. As Figure

14 illustrates, the regression coefficient between professor–student rapport and student achievement was significant; however, the regression coefficient between student hope and student achievement was not significant. See Table 2 for inferential statistics for all regression models.

**Figure 14**

*Mediation Model*



**Table 2**

*Coefficients for the Mediating Effect*

Testing paths	<i>B</i>	SE( <i>B</i> )	<i>p</i>
<b>Path c:</b> Outcome=ACH (Achievement)			
$R^2 = .029$ , $F(1,216) = 6.501$			
Predictor=SIRS-9	.003	.001	.012
<b>Path a:</b> Outcome=ADHS (Hope)			
$R^2 = .04$ , $F(1,216) = 10.1$ , $p = .002$			
Predictor=SIRS-9 (Rapport)	.233	.073	.002

Testing paths	<i>B</i>	SE(B)	<i>p</i>
<b>Path b and c': Outcome=ACH</b>			
Adj. $R^2=.026$ , $F(2, 215)=3.903$ , $p=.022$			
Predictor: SIRS-9 (c')	.003	.001	.025
Predictor: ADHS (b)	.001	.001	.256
Total (a)*(b)	.0002		

The data indicated that student hope was not a mediating effect; however, hope and rapport were significantly related:  $r(216) = .233$ ,  $p = .002$ . I conducted the mediation analysis with bootstrapping; however, because the effect of hope on achievement was not significant, the mediation was not applicable. The initial analysis was completed with the presence of outliers. To ensure that the results were valid, the researcher replicated the analysis without outliers and the results were the same. That is, the effect of rapport on achievement was significant, whereas the effect of hope on achievement was not. Hope and rapport were still significantly related.

### Hypothesis

In the current study, the null hypothesis stated that student hope does not have a significant mediating effect on the relationship between professor–student rapport and student achievement in an undergraduate population of a mid-sized southeastern university in the United States. I failed to reject the null hypothesis. Analysis of the data did not support the presence of a significant relationship between the mediator hope and the outcome variable achievement; therefore, the conditions for mediation were not present, rendering the mediation analysis inapplicable.

## **CHAPTER FIVE: CONCLUSIONS**

### **Overview**

This final chapter will provide a summary of the current study and analysis of the findings. First, the chapter will present a discussion of the results. Next, implications of the findings will be shared. The chapter will conclude with an examination of the limitations of the study and recommendations for future research.

### **Discussion**

At the time of this study, the world was in the midst of a global pandemic: coronavirus disease (COVID-19). It is hard to overstate the impact of COVID-19 on the social fabric of families, communities, institutions, cities, states, countries, and the world. Prolonged restrictions such as social distancing, wearing of personal protective equipment such as facial masks, limited physical contact, and limited social gatherings had been in place for nearly a year at the time of data collection. Across age groups, a lack of social connectedness in tandem with widespread collateral economic consequences of the pandemic evinced significant increases in mental health disorders such as anxiety and depression (American Psychological Association, 2020; Brooks et al., 2020; Wan, 2020). College campuses were not immune to these effects. Administrators of American colleges and universities engaged in practices to maintain a sense of normalcy for undergraduates within the required pandemic mitigation measures; however, young adults still experienced inexorable effects of living and learning in socially atypical or unpreferred ways (Dhar et al., 2020; Son et al., 2020). Specific to educational environments, and most relevant to the results of the current study, participants may have engaged in any combination of synchronous, asynchronous, face-to-face, or virtual interactions with professors while enrolled in a course due to COVID-19, which may have affected rapport building. Overall, due to the

pervasive impact of these necessary safety practices, populations experienced deeply disorientating shifts to the ways in which people typically connect with one another. These shifts may have affected the study in anticipated and unanticipated ways. Regardless, the current study still provided interesting findings in light of the ongoing extraordinary context.

The current study was grounded in research that indicated that students who perceive positive relationships with their professors perform better academically (Lammers & Bird, 2019; Lammers et al., 2017; Sybing, 2019). The purpose of the current study was to elucidate more about the process through which professor–student rapport confers academic benefit to undergraduate students. I hypothesized that student hope may serve as the mechanism, or the mediator, between professor–student rapport and student achievement. That is, I proposed that professor–student rapport may be exerting influence on undergraduate achievement by shaping students’ hope or students’ capacity to engage in pathways and agency thinking. This hypothesis has not yet been adequately researched in the literature.

I used a quantitative, nonexperimental, correlational study design and a mediation analysis to describe the extent that hope accounts for the relationship between the predictor variable, professor–student rapport, and the outcome variable, undergraduate achievement. Professor–student rapport, defined as “an emotional connection between individuals based on understanding, caring, and mutual respect” (Lammers & Byrd, 2019, p. 127), was measured using the SIRS-9. Undergraduate achievement, defined as a student’s grade or GPA, was measured by the ratio between each participants’ points earned and total possible points in a course. The mediator in the current study, hope, was defined as “a positive cognitive motivational state based on an interactively derived sense of successful: 1) agency (goal-directed



energy) and 2) pathways (planning to meet goals)” (Snyder et al., 1991, p. 297). Participants’ hope was measured using the ADHS (Snyder et al., 1991).

I collected demographic, ADHS, and SIRS-9 data via electronic survey for each undergraduate participant in Fall 2020 from the midterm (October 2020) through the end of term (December 2020). At the end of the term, participants’ course grades were paired with survey results. All participants were enrolled in a psychology course and received activity credits for their participation. From a total of 307 participants, 218 participants yielded valid and/or eligible responses for analysis.

As predicted, the current study showed a significant relationship between professor–student rapport and undergraduate achievement; however, the data did not support the presence of a significant relationship between the mediator (hope) and the outcome variable (undergraduate achievement), rendering the mediation analysis inapplicable. This finding was unexpected. The extant research has led researchers to characterize the link between the hope construct and academic achievement as well-established (Pedrotti, 2018) For example, Snyder et al. (1997) conducted a longitudinal study that followed undergraduate students for 6 years and found that those with high hope scores on the ADHS had significantly higher mean GPAs. In subsequent research, studies have overwhelmingly found a relationship between hope and academic outcomes (Akos & Kurz, 2016; Ciarrochi et al., 2007; Day et al., 2010; Dixon et al., 2017; Feldman & Kubota, 2015; Gallagher et al., 2017; Marques et al., 2015; Rand et al., 2011; Shek & Li, 2016; Snyder et al., 2002; Yarcheski & Mahon, 2016) with infrequent findings to the contrary (Jackson et al., 2003; Lackaye & Margalit, 2008; Lackaye et al., 2006). Further, Marques et al. (2017) conducted a systematic evaluation on the strength of the association between hope and academic outcomes across educational levels using findings from 45 primary

studies ( $N=9250$ ). Through their meta-analysis, Marques et al. found academic performance outcomes to have a moderate positive relationship with hope. Although Marques et al.'s analysis revealed this link to be stronger for primary and secondary students than for tertiary students, their findings in tandem with previous studies strongly support a link between the hope construct and academic achievement that would certainly be expected here.

Yet, the relationship between hope and academic achievement was not established in the current study. Hope did not significantly predict achievement. However, extenuating circumstances may have influenced the results of the current study, such that it is important to replicate the findings. Considering the current educational climate created by the pandemic, achievement may have had a greater relationship to learner characteristics such as academic engagement, academic self-efficacy, or optimism that were not measured here and that are separate from but related to hope. As such, these related constructs may have served as confounding factors in the study, creating choppy conditions for the pathway and agency thinking of hope while leaving academic engagement, academic self-efficacy, and optimism intact.

Yet another explanation is that the current global pandemic may have had a confounding effect on the way in which hope operated within individuals. Research has established that the pathways and agency thinking of hope has a relationship with intentional and motivational factors and a future-oriented perspective (Adelabu, 2008; Onwuegbuzie & Snyder, 2000). That is, a hopeful student would be expected to formulate a reasonable goal, plan the sequence of steps to take toward the goal, and possesses the motivation to move along the route; however, these expectations assume conditions in which the student can prioritize achievement as a goal. In the current climate of the pandemic, students may have possessed adequate pathways and

agency resources but chose to prioritize differently. Put simply, undergraduates with high hope and low achievement may be directing their limited hope resources toward goals other than achievement, such as financial threats, mental well-being, or maintaining social connectedness.

Conversely, the pandemic conditions may have prompted professors to interact with students differently than they may have in typical learning conditions. That is, students with low hope and high achievement may have benefited from professors who provided an atypical degree of external pathways and agency supports that the student could not summon on their own to reach the goal. For example, a professor may have given a low-hope student extra time to complete assignments, increased their communication or individualized encouragement, provided extra credit opportunities, provided opportunities for multiple submissions of work, broken work into small manageable chunks for a learner who was overwhelmed, or perhaps a combination of some or all of these interventions. Intensified pathways and agency supports from professors would not be unexpected in the pandemic learning climate but may have disrupted the typical hope–achievement connection.

The study data did reveal a significant relationship between professor–student rapport and student hope. This link has been minimally researched in the literature; thus, the current study adds to this body of work. In other words, the current study supports preliminary research that the social relationships between professors and undergraduate students may impact students’ pathways and agency thinking.

### **Implications**

Learning is the sine qua non of tertiary institutions, and professors are at the front lines in support of that mission (Condon et al., 2016). Within limits of time and resources, professors serve as conduits of learning as they deliver content, organize experiences, and order the

academic progress of their students. To enhance achievement, professors must recognize a shared responsibility for student success—especially for underserved and marginalized populations—while operating within their personal spheres of influence to use actionable levers (McNair et al., 2016). The current study supports extant literature that the social relationship—specifically, the rapport between professors and undergraduate students—is one of those levers. Professors should understand that their efforts to demonstrate respect for students’ ideas, recognize students’ needs and feelings, convey compassion and empathy, and encourage student progress makes a significant difference in their students’ academic lives (Moriña, 2019). Importantly, the continued presence of a relationship between professor–student rapport and achievement during pandemic conditions suggests that professors’ efforts to establish rapport are resistant to even highly disruptive circumstances. This persistent connection does not purport an unrealistic or saccharine picture in which professors lower academic expectations or adopt the role of counselor, nor does it encourage uniformity in response that would render professor–student interactions contrived and insincere. Rather, this connection encourages professors’ reflections of how their unique interactions and communications with undergraduates support a strong and positive social connection between themselves and their students in the context of academic achievement (Condon et al., 2016; Moriña, 2019). These reflections must address personal biases and systemic tendencies toward deficit-minded thinking. Optimal learning conditions and techniques are not universal across learners; thus, professors must take care that disparities among their students are not interpreted as deficiencies. Ongoing professional development in tertiary instructors can help prevent practices where blaming the student trumps the recognition of long-standing social inequities in education (McNair et al., 2016). Systematic and research-based faculty explorations of the impact of professor–student relationships and

academic outcomes, such as those conducted via SoTL, are ideal platforms for sharing and benefiting from iterative opportunities of practice and reflection (Condon et al., 2016).

In the current study, the significant relationship between professor–student rapport and student hope provides another important piece of information. This relationship suggests that a connection may be present between students’ perceptions of professor–student interactions, such as the student’s perception that the professor is approachable or fair, and a student’s future orientation and intentional and motivational factors. In other words, the social connection between the professor and the student may foster students’ adaptive motivational beliefs and engagement and increase students’ ability to find ways to overcome barriers (pathways) or be willing to try (agency). In a specific strong professor–student relationship, the student may be more likely to conceive of reasonable goals for the course, be intentional about the concrete steps needed to succeed in the course, move along those steps in a systematic way, and overcome challenges that may present themselves in a course, such as a difficult assignment or trouble meeting a deadline. In short, the student’s simple perception that a supportive connection exists between the professor and the student may have the potential to promote self-confidence and goal-setting. In contrast, students who perceive a lack of caring and support from a professor may be less able to elicit the pathways and agency thinking that would boost their ability to cope with academic challenges.

Hope was not found to be a mediator in this study because the expected conditions for the mediation analysis were not present. That is, the current study revealed a significant relationship between professor–student rapport and achievement and between professor–student rapport and hope, but it did not reveal a significant relationship between hope and achievement. However, overwhelming empirical data support a connection between hope and academic achievement;

thus, it is possible that singular factors related to the current pandemic climate may have disrupted the hope–achievement connection. As discussed earlier, other related motivational constructs like academic self-efficacy may have trumped hopefulness. Further, students’ pathways or agency thinking may have been intact but directed toward goals other than achievement due the pandemic. Alternately, the effects of deficient pathways and agency components of hope in students may have been attenuated externally by the context-specific actions of professors. Due to the strong body of empirical evidence connecting hope and achievement, I anticipate that hope may still be found to significantly mediate the relationship between professor–student rapport and student achievement in future studies. This hypothesis is supported by the fact that the current study revealed that professor–student rapport had a significant relationship to student hope. This finding merits further investigation to determine whether professor–student rapport may be exerting influence on undergraduate achievement by shaping students’ hope.

### **Limitations**

The current study presents with various limitations. The current study is correlational and nonexperimental; therefore, no causal connections can be assumed (Warner, 2013). The results may not be generalizable to a broader undergraduate population due to the limits of the sample demographics, such as the fact that the sample was drawn from a Christian institution, was comprised of mostly White students, and that only those students enrolled in psychology course participated (Warner, 2013). Additionally, participants did not complete the ADHS and SIRS-9 at the same point in time. Data collection began at around midterm and continued until end of term. Differing amounts of exposure to the professor may have affected the participants’ perceptions of their interactions with the professor and, in turn, affected their SIRS-9 score.

Similarly, the SIRS-9 score may have been affected by the participants' level of expected achievement. Put simply, participants who completed the survey at the end of the term and were confident that they were receiving a high mark or low mark for the course may have been more or less likely to give a professor a favorable rating on the SIRS-9. Additionally, students who started but did not complete the course were not included in the analysis. These students may have withdrawn due to poor achievement, low hope, low professor–student rapport, or some combination thereof; these relationships remain unexplored. Finally, the aforementioned conditions of the global pandemic must be noted as a limitation to the current study. It is difficult to determine how such a chronic, life-threatening climate may have impacted individual or overall social responses in this study.

### **Recommendations for Future Research**

The current study provides promising clues as to how the social connection between professors and undergraduate students may affect student achievement; however, the results are incomplete and further investigation is needed. Future researchers may look beyond correlational studies to more experimental approaches where professor–student rapport measures are observed, quantified, and controlled for. A more experimental approach would allow the direction and strength of the professor–student relationship and its impact on students hope and subsequent achievement to be measured within a cause-and-effect framework. In addition, this study should be replicated at a time when a life-threatening global disease is not a consideration. This replication will allow future researchers to recreate this study in entirely synchronous, asynchronous, face-to-face, or virtual environments that can be more systematically controlled. To make results more generalizable, future research should explore the use of an undergraduate sample that is more representative of the general population. The current sample was taken from

psychology students in a Christian university. Future studies should be recreated with a sample of undergraduates from a variety of disciplines and from a public or nondenominational tertiary institution. Further, the sample from the current study consisted of mostly White students; thus, future research should be organized around a more diverse sample of undergraduates, or perhaps explored systematically to determine how professor–student relationships, hope, and achievement may correlate differently between different racial or ethnic groups.



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## APPENDIX A: ADULT DISPOSITIONAL HOPE SCALE (ADHS)

### The Goals Scale

Directions: Read each item carefully. Using the scale shown below, please select the number that best describes YOU and put that number in the blank provided.

1 = Definitely False, 2 = Mostly False, 3 = Somewhat False, 4 = Slightly False, 5 = Slightly True,

6 = Somewhat True, 7 = Mostly True, 8 = Definitely True.

- \_\_\_ 1. I can think of many ways to get out of a jam.
- \_\_\_ 2. I energetically pursue my goals.
- \_\_\_ 3. I feel tired most of the time.
- \_\_\_ 4. There are lots of ways around any problem.
- \_\_\_ 5. I am easily downed in an argument.
- \_\_\_ 6. I can think of many ways to get the things in life that are most important to me.
- \_\_\_ 7. I worry about my health.
- \_\_\_ 8. Even when others get discouraged, I know I can find a way to solve the problem.
- \_\_\_ 9. My past experiences have prepared me well for my future.
- \_\_\_ 10. I've been pretty successful in life.
- \_\_\_ 11. I usually find myself worrying about something.
- \_\_\_ 12. I meet the goals that I set for myself.

Notes: When administered, the scale is called this the Goals Scale rather than the Hope Scale. Items 3, 5, 7, and 11 are distracters and are not used for scoring. The pathways subscale score is the sum of items 1, 4, 6, and 8, and the agency subscale is the sum of items 2, 9, 10, and 12. Hope is the sum of the four pathways and four agency items. Scores can range from a low of 8 to a high of 64. The scale can be used for research or clinical purposes without contacting the author.



**APPENDIX B: PERMISSION TO USE AND PUBLISH ADULT DISPOSITIONAL HOPE  
SCALE**

**B1. Proposed E-mail to ADHS publisher**

Dear Publisher,

I am a doctoral candidate in the educational administration program at Liberty University. I am interested in the role that student hope plays in educational outcomes. I fully believe that student success is achieved and represented by much more than an IQ score, previous GPA, or a grade in a class. I also believe that professor-student rapport plays a critical role in nurturing hope in their students. Through my research, I hope to contribute in some small way to our understandings in this area. For my dissertation research I would like to utilize the Adult Dispositional Hope Scale (ADHS) (Snyder et al., 1991), to see if student hope mediates the relationship between professor-student rapport and student achievement. I would be interested in obtaining your permission to use the ADHS in my research and also request permission to reproduce it in the appendix of my dissertation. I would be happy to send you the current draft of my proposal for your review.

I appreciate your assistance.

Many thanks,

Analisa M. Wellington

B2. LICENSE TO USE ADHS



The will and the ways: Development and validation of an individual-differences measure of hope.  
Author: Snyder, C. R.; Harris, Cheri; Anderson, John R.; Holleran, Sharon A.; Irving, Lori M.; Sigmon, Sandra T.; Yoshinobu, Lauren; Gibb, June; Langelie, Charyle; Harney, Pat  
Publication: Journal of Personality and Social Psychology  
Publisher: American Psychological Association  
Date: Apr 1, 1991  
Copyright © 1991, American Psychological Association

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Thank you for your order.  
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**APPENDIX C: STUDENT-INSTRUCTOR RAPPORT SCALE-9 (SIRS-9)**

Reflect upon your personal interaction and observations in this class thus far. Evaluate these questions on a scale from one to five, one being “not at all” and 5 being “very much so”:

1. Your instructor understands you.
2. Your instructor encourages you.
3. Your instructor cares about you.
4. Your instructor treats you fairly.
5. Your instructor communicates effectively with you.
6. Your instructor respects you.
7. Your instructor has earned your respect.
8. Your instructor is approachable when you have questions or comments.
9. In general, you are satisfied with your relationship with the instructor.

## APPENDIX D: PERMISSION TO USE AND PUBLISH STUDENT-INSTRUCTOR RAPPORT SCALE-9

WL

Tue 7/7/2020 3:22 PM  
To: Wellington, Analisa



Brief Measure of Student-Inst...  
507 KB

[ EXTERNAL EMAIL: Do not click any links or open attachments unless you know the sender and trust the content. ]

Analisa,

You are more than welcome to use the SIRS-9 for your research. It continues to be a valuable measure for us and I hope it serves you well.

I've attached the first article in which the scale was published.

Bill Lammers

...

WL

Fri 3/26/2021 7:21 AM  
To: Wellington, Analisa

Analisa,

**Congratulations** on successfully defending your dissertation!!

You have my permission to include a full copy of the Student-Instructor Rapport Scale-9 (SIRS-9) in your published dissertation.

Bill Lammers

...

Bill Lammers, Ph.D.  
Professor of Psychology  
University of Central Arkansas

**AVID:** UCA dedicates itself to **A**cademic **V**itality, **I**ntegrity, and **D**iversity.

**APPENDIX E: IRB APPROVAL****LIBERTY UNIVERSITY**  
INSTITUTIONAL REVIEW BOARD

September 24, 2020

Analisa Wellington  
Angela Ford

Re: IRB Exemption - IRB-FY20-21-62 HOPE AS A MEDIATOR BETWEEN PROFESSOR  
STUDENT RAPPORT AND STUDENT ACHIEVEMENT

Dear Analisa Wellington, Angela Ford:

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 to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46: 101(b):

Category 2.(iii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:

The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

Your stamped consent form can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. This form should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document should be made available without alteration.

Please note that this exemption 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 exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption 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**

**APPENDIX F: PERMISSION TO CONDUCT RESEARCH**

Subject        Re: IRB proof of permission for research with a single department  
Link to Outlook Item [Click here](#)  
From    Conner, Kevin Wayne (Psychology)  
To        Wellington, Analisa  
Sent    9/13/2020, 4:42:53 PM

Miss Wellington,

Thank you for your request to use undergraduate psychology students in your study on hope. I approve of the request to post an announcement on our research surveys page. I approve of the research to be used as psychology activity.

Thank you.

Kevin Conner, PhD  
Associate Professor & Residential Chair  
Department of Psychology



Liberty University | Training Champions for Christ since 1971

## **APPENDIX G: RECRUITMENT LETTER**

Dear Student:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to investigate how hope may mediate the relationship between professor-student rapport and student achievement. I am writing to invite eligible participants to join my study.

Participants must be undergraduate students who are 18 years of age or older taking a psychology course. Participants, if willing, will be asked to complete a survey toward the end of their course. The researcher also plans to link your course grade to your survey results. It should take approximately 10 minutes to complete the survey. Participation will be completely confidential and no identifiable responses will be presented in the final form of this study..

A consent document is provided as the first page of the survey. The consent document contains additional information about my research. After you have read the consent form, type your full name into the consent box and proceed to the survey. Doing so will indicate that you have read the consent information and would like to take part in the survey. Participants will be able to claim 1 psychology activity credit (5 points) for any psychology courses they are taking in the Department of Psychology at Liberty University.

In order to participate, please click [here](#) (hyperlink to online survey).

Sincerely,

Analisa M. Wellington  
Doctoral Candidate, Liberty University





**APPENDIX H: INVITATION TO PARTICIPATE AND INFORMED CONSENT**

**Title of the Project:** HOPE AS A MEDIATOR BETWEEN PROFESSOR STUDENT  
RAPPORT AND STUDENT ACHIEVEMENT

**Principal Investigator:** Analisa M. Wellington, Liberty University

**Invitation to be Part of a Research Study**

You are invited to participate in a research study. In order to participate, you must be an undergraduate student and 18 years or older and enrolled in a psychology course. Please take time to read this entire form and ask questions before deciding whether to take part in this research project. This study has been approved by the IRB.

**What is the study about and why is it being done?**

The purpose of this study is to explore the possible mediating effect of student hope between professor-student rapport and student achievement. This study will contribute to the researcher's completion of her dissertation.

**What will happen if you take part in this study?**

If you agree to be in this study, I would ask you to do the following things:

You will complete a 10-minute online survey that will be administered to you through a link posted to the School of Behavioral Sciences Research & Surveys page. In the survey, you will be asked to provide answers to a series of questions related to your academic goals and your perceptions of professor-student rapport. You will be asked to provide your access to your course grade at the end of course. Your student ID will be requested to link each participant to their course grade.

**How could you or others benefit from this study?**

Participants should not expect to receive a direct benefit from taking part in this study; however, potential benefits from participation in this study as a whole include providing additional information on how professor-student rapport confers benefit to students.

**What risks might you experience from being in this study?**

The investigator does not perceive more than minimal risks from your involvement in this study (that is, no risks beyond the risks associated with everyday life).

**How will personal information be protected?**

The records of this study will be kept private. Individual responses will be confidentially obtained and recorded online through the Qualtrics software. No identifiable responses will be presented in the final form of this study. The results may be published in a professional journal specific to addressing higher education issues. All data will be stored in a password protected secure location only accessible to the researcher. The researcher retains the right to use and publish non-identifiable data. All records will be destroyed three years after the completion of the study. Final aggregate results will be made available to participants upon request.

**How will you be compensated for being part of the study?**

If you complete the survey, you will be able to claim 1 psychology activity credit (5 points) for any psychology courses you are taking in the Department of Psychology at Liberty University. .

**Is study participation voluntary?**

Your participation is entirely voluntary. You are free to choose not to participate. Your decision whether to participate will not affect your current or future relations with Liberty University. Should you choose to participate, you can withdraw at any time without consequences of any kind.

**What should you do if you decide to withdraw from the study?**

If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study. However, if your responses have been submitted and confidentially recorded you can withdraw prior to the survey data being linked to your course grade by contacting this researcher and providing your student ID so that the survey results associated with your student ID can be deleted from the study records.

**Whom do you contact if you have questions or concerns about the study?**

The researcher conducting this study is Analisa Wellington. You may ask any questions you have now. If you have questions later, you are encouraged to contact her at [awellington2@liberty.edu](mailto:awellington2@liberty.edu). You may also contact the researcher's faculty sponsor, Angela Ford, EdD, at [aford5@liberty.edu](mailto:aford5@liberty.edu).

**Whom do you contact if you have questions about your rights as a research participant?**

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at [irb@liberty.edu](mailto:irb@liberty.edu)

**Your Consent**

By typing your name and date into the survey fields, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You can print a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

---

Type Name

## APPENDIX I: QUALTRICS SURVEY TEXT

### Consent

**Title of the Project:** HOPE AS A MEDIATOR BETWEEN PROFESSOR STUDENT RAPPORT AND STUDENT ACHIEVEMENT

**Principal Investigator:** Analisa M. Wellington, Liberty University

### Invitation to be Part of a Research Study

You are invited to participate in a research study. In order to participate, you must be an undergraduate student and 18 years or older and enrolled in a psychology course. Please take time to read this entire form and ask questions before deciding whether to take part in this research project. This study has been approved by the IRB.

**What is the study about and why is it being done?** The purpose of this study is to explore the possible mediating effect of student hope between professor-student rapport and student achievement. This study will contribute to the researcher's completion of her dissertation.

**What will happen if you take part in this study?** If you agree to be in this study, I would ask you to do the following things: You will complete a 10-minute online survey that will be administered to you through a link posted to the School of Behavioral Sciences Research & Surveys page. In the survey, you will be asked to provide answers to a series of questions related to your academic goals and your perceptions of professor-student rapport. You will be asked to provide your access to your course grade at the end of course. Your student ID will be requested to link each participant to their course grade.

### How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study; however, potential benefits from participation in this study as a whole include providing additional information on how professor-student rapport confers benefit to students.

**What risks might you experience from being in this study?** The investigator does not perceive more than minimal risks from your involvement in this study (that is, no risks beyond the risks associated with everyday life).

### How will personal information be protected?

The records of this study will be kept private. Individual responses will be confidentially obtained and recorded online through the Qualtrics software. No identifiable responses will be presented in the final form of this study. The results may be published in a professional journal specific to addressing higher education issues. All data will be stored in a password protected secure location only accessible to the researcher. The researcher retains the right to use and publish non-identifiable data. All records will be destroyed three years after the completion of the study. Final aggregate results will be made available to participants upon request.

**How will you be compensated for being part of the study?** If you complete the survey, you will be able to claim 1 psychology activity credit (5 points) for any psychology courses you are taking in the Department of Psychology at Liberty University.

**Is study participation voluntary?** Your participation is entirely voluntary. You are free to choose not to participate. Your decision whether to participate will not affect your current or future relations with Liberty University. Should you choose to participate, you can withdraw at any time without consequences of any kind.

**What should you do if you decide to withdraw from the study?** If you choose to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be

recorded or included in the study. However, if your responses have been submitted and confidentially recorded you can withdraw prior to the survey data being linked to your course grade by contacting this researcher and providing your student ID so that the survey results associated with your student ID can be deleted from the study records.

**Whom do you contact if you have questions or concerns about the study?** The researcher conducting this study is Analisa Wellington. You may ask any questions you have now. If you have questions later, you are encouraged to contact her at [awellington2@liberty.edu](mailto:awellington2@liberty.edu). You may also contact the researcher's faculty sponsor, Angela Ford, EdD, at [aford5@liberty.edu](mailto:aford5@liberty.edu).

**Whom do you contact if you have questions about your rights as a research participant?** If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at [irb@liberty.edu](mailto:irb@liberty.edu)

### **Your Consent**

By typing your name and date into the following survey fields, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You can print a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

*I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.*

Type Your Full Name

---

I am at least 18 years of age.

☐ Yes (1)

☐ No (2)

*Skip To: End of Survey If I am at least 18 years of age. = No*

I have completed this survey before.

☐ Yes (1)

☐ No (2)

*Skip To: End of Survey If I have completed this survey before. = Yes*

**End of Block: Informed Consent**

---

**Start of Block: Demographics**



Q5 What is your student identification number?

---

Q6 What is your age?

- ☐ 18 (1)
- ☐ 19 (2)
- ☐ 20 (3)
- ☐ 21 and over (4)

Q7 What is your race?

- ☐ White (1)
- ☐ Black or African American (2)
- ☐ American Indian or Alaska Native (3)
- ☐ Asian (4)
- ☐ Native Hawaiian or Pacific Islander (5)
- ☐ Other (6)

Q8 What year of undergraduate study are you currently completing?

- ☐ Freshman (1)
- ☐ Sophomore (2)
- ☐ Junior (3)
- ☐ Senior (4)
- 

Q9 What is your gender?

- ☐ Male (1)
- ☐ Female (2)
- 

Q13 Name one psychology professor you took a class with this semester (Fall 2020).

---

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Page Break

Q14 What class did you take with \${Q13/ChoiceTextEntryValue}

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**End of Block: Demographics**

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**Start of Block: SIRS 9**





Q10 Reflect upon your personal interaction and observations in [\\${Q14/ChoiceTextEntryValue}](#) thus far. Evaluate these questions on a scale from 1 to 5, 1 being “not at all” and 5 being “very much so”:

	1 Not at all (1)	2 (2)	3 Somewhat (3)	4 (4)	5 Very much so (5)
Your instructor understands you. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your instructor encourages you. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your instructor cares about you. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your instructor treats you fairly. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your instructor communicates effectively with you. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your instructor respects you. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your instructor has earned your respect. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your instructor is approachable when you have questions or comments. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, you are satisfied with your relationship with the instructor. (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Start of Block: ADHS



Q11 Read each item carefully. Select the choice that best describes you on a scale of 1 to 8 where 1 is "Definitely false" and 8 is "Definitely true".

[illegible]

Even when  
others get  
discouraged  
, I know I  
can find a  
way to  
solve the  
problem. (8)



My past  
experiences  
have  
prepared me  
well for my  
future. (9)



I've been  
pretty  
successful  
in life. (10)



I usually  
find myself  
worrying  
about  
something.  
(11)



I meet the  
goals that I  
set for  
myself. (12)



**End of Block: ADHS**

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## APPENDIX J: R SCRIPT FOR MEDIATION ANALYSIS

```

data<-read.csv(file.choose())
View(data)
#rapport predicts achievement
modelX<-lm(ACH ~ SIRS.9, data)
summary(modelX)

#rapport predicts hope
modelM <- lm(ADHS ~ SIRS.9, data)
summary(modelM)
#hope and rapport predict achievement
modelY <- lm(ACH ~ SIRS.9 + ADHS, data)

summary(modelY)
#save standardized residuals
modelY.stdres = rstandard(modelY)
require(graphics)
#histogram of residuals
histogram_residuals<-hist(modelY.stdres)

#diagnostic plots for model y including residuals fit, qq, scale-location, leverage
plot(modelY)

#mediation analysis
library(mediation)
results <- mediate(modelM, modelY, treat='SIRS.9', mediator='ADHS',
  boot=TRUE, sims=5000)
#descriptive statistics
library(summarytools)
summary(results)

descr(data)
#boxplots for each variable
boxplot(data$SIRS.9)
boxplot(data$ADHS)
boxplot(data$ACH)

no_outliersACH <- subset(data, data$ACH> (.76 - 1.5*.17) & data$ACH< (.93 + 1.5*.17))
no_outliersADHS<-subset(no_outliersACH, no_outliersACH$ADHS> (48 - 1.5*7.75) &
no_outliersACH$ADHS< (56 + 1.5*7.75))
no_outliers<- subset(no_outliersADHS, no_outliersADHS$SIRS.9> (37 - 1.5*8) &
no_outliersADHS$SIRS.9< (45 + 1.5*8))#scatterplots
descr(no_outliers)

```

```

boxplot(no_outliers$SIRS.9)
boxplot(no_outliers$ADHS)
boxplot(no_outliers$ACH)

plot(no_outliers$SIRS.9, no_outliers$ADHS)
plot(no_outliers$SIRS.9, no_outliers$ACH)
plot(no_outliers$ADHS, no_outliers$ACH)

-----
data<-read.csv(file.choose())
View(data)
#rapport predicts achievement
modelX2<-lm(ACH ~ SIRS.9, no_outliers)
summary(modelX)

#rapport predicts hope
modelM2 <- lm(ADHS ~ SIRS.9, no_outliers)
summary(modelM)
#hope and rapport predict achievement
modelY2 <- lm(ACH ~ SIRS.9 + ADHS, no_outliers)

summary(modelY2)
#save standardized residuals
modelY2.stdres = rstandard(modelY2)
require(graphics)
#histogram of residuals
histogram_residuals<-hist(modelY2.stdres)

#diagnostic plots for model y including residuals fit, qq, scale-location, leverage
plot(modelY2)

#mediation analysis
library(mediation)
results2 <- mediate(modelM2, modelY2, treat='SIRS.9', mediator='ADHS',
                    boot=TRUE, sims=5000)

#descriptive statistics
library(summarytools)
summary(results2)

descr(data)
#boxplots for each variable
boxplot(data$SIRS.9)
boxplot(data$ADHS)
boxplot(data$ACH)

```

```

no_outliersACH <- subset(data, data$ACH> (.76 - 1.5*.17) & data$ACH< (.93 + 1.5*.17))
no_outliersADHS<-subset(no_outliersACH, no_outliersACH$ADHS> (48 - 1.5*7.75) &
no_outliersACH$ADHS< (56 + 1.5*7.75))
no_outliers<- subset(no_outliersADHS, no_outliersADHS$SIRS.9> (37 - 1.5*8) &
no_outliersADHS$SIRS.9< (45 + 1.5*8))#scatterplots
descr(no_outliers)

boxplot(no_outliers$SIRS.9)
boxplot(no_outliers$ADHS)
boxplot(no_outliers$ACH)

modelX4<-lm(ACH ~ SIRS.9, no_outliers)
summary(modelX4)

#rapport predicts hope
modelM4 <- lm(ADHS ~ SIRS.9, no_outliers)
summary(modelM4)
#hope and rapport predict achievement
modelY4 <- lm(ACH ~ SIRS.9 + ADHS, no_outliers)

summary(modelY4)
#save standardized residuals
modelY4.stdres = rstandard(modelY4)
require(graphics)
#histogram of residuals
histogram_residuals_no_outliers<-hist(modelY4.stdres)

#diagnostic plots for model y including residuals fit, qq, scale-location, leverage
plot(modelY4)

#mediation analysis
library(mediation)
results <- mediate(modelM, modelY, treat='SIRS.9', mediator='ADHS',
boot=TRUE, sims=5000)
#descriptive statistics
library(summarytools)
summary(results)

```