Social-emotional learning in higher education: Examining the relationship between social-emotional skills and students' academic success

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Abstract

Social-emotional learning (SEL) has shown positive effects on well-being and academic achievement for students in K-12 settings, but the SEL framework has yet to be applied to higher education to any substantial degree. SEL are programs designed to teach children and adults skills to recognize and manage emotions, solve problems effectively and establish positive relations with others. They are particularly relevant in college where students are confronted with a unique set of challenges and intrapersonal competencies that have been identified as crucial for college students' success. SEL requires institutional buy-in, time and resources, highlighting the need of proper justification for higher institutions that involves an accumulation of evidence that supports the impact of social-emotional skills on college student success. However, there are still several issues regarding the development of this evidence, such as: 1) the lack of conceptual coherence behind social-emotional skills; 2) contradictory evidence examining these skills and difficulty to identify which skills are the most important; 3) questions related to the validity of social-emotional skill measures; and 4) possible limitations in the outcomes analyzed by these skills.

This thesis presents two analyses that explore the impact of social-emotional skills in college student success. The first analysis uses quantitative survey and achievement data to model students GPA growth trajectory and year-to-year enrollment using social-emotional and background variables. The second analysis presents a qualitative assessment of students' written reflections to describe how students defined growth mindset, intelligence and then applied these constructs to their lives. Each analysis is detailed with their respective methods, limitations, and discussion section. In general, these two analyses found that: 1) the relationship between social-emotional skills is complex and not necessarily reflected in traditional measures of student achievement; and 2) the conceptual distinction between different social-emotional skills is not clear in practice, and the overlap between different skills suggests a broader framework is required to understand how these skills impact behavior. Implications for research and practice are provided.

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Chapter 1: Introduction

Earning a college degree is vital to job-market success and overall well-being of young adults. Globally, individuals who earn a degree in higher education have a greater probability of being employed and earn, on average, a higher salary than those with no degree (OECD, 2018). While in 2017, U.S. bachelor's degree attainment rates remained above average (48%) for OECD member countries (OECD, 2018), this attainment is still far below what is expected by country officials (Lederman & Fain, 2017). College attainment remains highly disparate among many minority groups. For example, less than 40% of Black students entering college in 2010 graduated within six years at a four-year institution, compared to 63% of White students (NCES, 2018). Furthermore, students from ethnic minority backgrounds are over-represented in college remedial courses (Chen, 2016). Ultimately these two factors lead to an increased investment in time and money for many sub-populations of students.

Given the high cost and low return of many educational intervention programs, such as remediation (Bahr, 2009), researchers have looked to other ways of promoting student retention and achievement in higher education. These include participation in educationally purposeful activities, such as freshman seminar courses (Davis, 1992) and service-learning (Song, Furco, Lopez, & Maruyama, 2018). Another possible avenue of support for college students is that of social-emotional skill promotion.

Social-emotional skills, also called non-cognitive or affective skills, have become increasingly relevant in K-12 educational policy. For instance, the Every Student Succeeds Act (ESSA) developed under President Obama describes the importance of nonacademic indicators of school quality and student success (U.S. Department of Education, n.d.).

Some states and districts have eagerly jumped on the bandwagon of interventions which develop social-emotional skills in elementary, middle, and high school students, and these programs have been incorporated into many public-school systems. For instance, CORE districts in California collect yearly measures of social-emotional skills on over 20% of all Californian students for purposes of school improvement and accountability (Hough, Byun, & Mulfinger, 2018).

Excitement over social-emotional skills seems warranted given the extensive amount of correlational studies relating these skills to positive outcomes in children (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011) and youth (Taylor, Oberle, Durlak, & Weissberg, 2017). Consequently, many programs and frameworks for social-emotional learning have been developed, highlighting different skills that impact student learning and well-being (e.g. Second Step Social-Emotional Learning and the Clover Leaf Model). One of the most well-known social-emotional learning programs is the Collaborative for Academic Social and Emotional Learning or CASEL which promotes five different competencies: self-awareness; self-management; social awareness; responsible decision- making; and relational skills (CASEL, 2013).

While social-emotional learning seems to have a well-established role in K-12 policy, this framework has yet to be applied to higher education to any substantial degree. Moreover, there are many issues which hinder the development of programs targeting these skills for older students. For instance, some authors argue that it is more cost-worthy to invest in non-cognitive skill promotion in early childhood than later in life, given the malleability of children's neural pathways (Heckman, 2006); hence, research in social-emotional skill promotion at higher levels is 'not worth it'. Nonetheless, as argued by

Conley (2015), social-emotional skills remain highly relevant throughout the entire lifespan and may affect individuals across different developmental periods. This is supported by growing evidence of interventions impacting social-emotional skills in adults (e.g. emotional competence; Kotsou, Nelis, Gregoire, & Mikolajczak, 2011). Therefore, it seems possible- and perhaps necessary- to continue to endorse these skills beyond K-12 education.

Social-emotional skills are highly relevant to higher education policy. In general, they align with the broader mission of institutions of higher education of advancing liberal education (Conley, 2015), which goes beyond promoting academic content knowledge. As defined by the American Association of Colleges and Universities (1998), liberal education "prepares [individuals] to live responsible, productive, and creative lives in a dramatically changing world. It is an education that fosters a well-grounded intellectual resilience, a disposition toward lifelong learning, and an acceptance of responsibility for the ethical consequences of our ideas and actions" (paras. 1)

Furthermore, college students experience new and unique challenges that require the use of social-emotional skills. For example, there is a growing literature about the need for mental health promotion and prevention in college, given the high incidence of mental health disorders in college students (Auderbach et al., 2016). Promoting social-emotional skills, such as emotional intelligence (Chow, Chiu, & Wong, 2011) has the potential of mitigating psychological distress in students. Social-emotional skills have also been tied to success in the job market (Heckman, Stixrud, & Urzua, 2006).

Despite the lack of comprehensive social-emotional learning programs in higher education, there is growing support for development of these skills and interventions to

impact college students academic success. The National Academies of Science Engineering and Medicine (NAS; 2017) published a report about intrapersonal and interpersonal competencies and interventions that promote college students' academic achievement (i.e. GPA), particularly for underrepresented students. In this report, they identified eight critical intrapersonal competencies for student success (i.e. behaviors related to conscientiousness; sense of belonging; academic self-efficacy; growth mindset; utility goals and values; intrinsic goals and interest; prosocial goals and values; and positive future self) which they define as malleable attitudes, behaviors, beliefs and dispositions.

Another relevant field of study is that of social-psychological interventions. These interventions are focused on impacting students' beliefs about themselves and their abilities with the hope of halting negative recursive processes which affect students' academic achievement (Yeager & Walton, 2011). They have been extensively studied in higher education (see Harackiewicz & Priniski, 2018 for review) and relate to many of the skills seen in SEL frameworks. In fact, self-awareness, as defined by CASEL (2013), encompasses growth mindset and self-efficacy, which are both common outcomes of social-psychological interventions and in the purview of social-psychological research.

Socio-psychological interventions have been distinguished as being crucial for promoting students' academic achievement, particularly those at high-risk of dropping out, and have been gaining momentum in higher education. The NAS (2017) report mentioned above encourages extending research on these interventions to promote underrepresented students' academic success in college. Likewise, PERTS lab in Stanford has developed an online growth mindset intervention for college students' all over the country

(https://www.perts.net/orientation/cg) to enhance continuous enrollment and graduation rates.

There is an ongoing debate about the magnitude of the impact of these skills and interventions on students' academic outcomes. The overall accumulation of research examining relations of these skills and college outcomes (i.e. achievement and retention) demonstrates conflicting evidence for different subsets of skills, and small effect sizes supporting their association to academic performance. In a 2004 meta-analysis of 55 longitudinal studies, Valentine, Dubois and Cooper (2004) examined the relation between self-beliefs (i.e. self-esteem, self-efficacy, and self-concept) and academic achievement, and found a small positive association between these skills and academic achievement. Robbins, Lauver, Le, Davis, Langley and Carlstrom's (2004) meta-analysis of 109 studies to examine the relation between what they called noncognitive factors (i.e. achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-concept, academic-related skills, and contextual influences) with academic outcomes found that while most of these factors correlated positively with retention, the association between these skills and performance was not as strong. These studies focus on different subsets of skills, showing a promising impact of social-emotional skills (or noncognitive skills) on retention, but a very small effect of achievement. Both of these studies are over a decade old. One more recent meta-analysis focusing on growth mindset found null relations of growth mindset and mindset interventions with different measures of academic achievement (Sisk, Burgoyne, Sun, Butler, & McNamara, 2018). This latter study examined a larger sample of studies (i.e. 129 studies and 273 effect sizes) but was focused solely on growth mindset. In contrast, a

review article written by Harackiweski and Priniski (2018) summarizes research on social-psychosocial interventions in higher education which target 1) how students' value and perceive academic tasks; 2) the way they view academic challenges and 3) students personal values, describing many positive findings of the effect of these interventions on students' academic achievement. Therefore while studies support the impact of some skills over others in promoting college success (i.e. retention and achievement), this association is small and may have minimal practical implications. Nonetheless researchers continue to advocate for their implementation in college.

Hence, while it seems that social-emotional learning has a place in higher education, these skills and interventions need to be further explored in this context to be adequately framed. Ultimately the question remains, are these skills of value to college student success? This thesis will explore this question by first reviewing the theory behind social-emotional skills with a focus on higher education, and then describe two different analyses examining the relationship between a subset of social-emotional skills and academic achievement in undergraduate students.

Overview

In Chapter 2, I critically review the literature on social emotional skills in the context of higher education. I start by defining and contextualizing social-emotional skills in college, and then I examine the developmental literature behind emerging adulthood and situate social-emotional skills in the developmental period of college. Next, I describe one major framework of social-emotional skills and describe the research and theory around three different skills. Finally, I end this chapter by highlighting some limitations in the current literature and propose a new study.

In Chapter 3, I introduce my research questions, the methodology and philosophical framework through which I conceptualized my study. I then describe the context and procedure of the study which uses both qualitative and quantitative archival data.

In Chapter 4, I describe the method and results for the quantitative analysis. I start by explaining the results of a confirmatory and exploratory factor analysis to verify the structure of the factors from the measured items. Subsequently, I present the results for two different models predicting student achievement and enrollment. I then provide a discussion and conclusion for that analysis. In Chapter 5, I detail a qualitative analysis, describing the themes that resulted from the evaluation of student reflections along with quotes and examples from the text. I provide a conclusion and discussion section for this chapter as well.

In Chapter 6, I provide a general discussion and conclusion for the thesis integrating the findings of Chapter 4 and Chapter 5 into one cohesive analysis. I also discuss implications for higher education research and provide possible avenues for future research.

Chapter 2: Literature Review

Social-emotional skills are generally defined as "the capacity to recognize and manage emotions, solve problems effectively, and establish positive relations with others" (Zins & Elias, 2007, p. 234). This definition includes a broad range of skills, competencies, dispositions, beliefs, strategies, and behaviors which, ultimately, can be learned and practiced. The umbrella term of "social-emotional skills" is used widely across K-12 literature to capture these different factors. However, researchers have used various terms to refer to the same set of concepts, and there is a large dispute as to what exactly should be captured under each umbrella term. Despite these inconsistencies, social-emotional skills have been deemed to be crucial for children's growth and for the development of self-sufficient adults (Elias, 1997). Social-emotional learning has the goal of teaching these skills to support children and adolescents' lifelong success.

Social-emotional skills have garnered increasing support in K-12 policy because of the evidence behind their positive impact on college and career readiness (Dymnicki, Sambolt & Kidron, 2013); mental health (Payton, Wardlaw, Graczyk, Bloodworth, Tompsett & Weissberg, 2000); and encouraging academic success (Zins, Bloodworth, Weissberg & Walberg, 2004). These outcomes are highly relevant in higher education, where the prevalence of mental illness (Auderbach et al., 2016), and risky behaviors (e.g. drinking; Knight, Wechsler, Kuo, Seibring, Weitzman & Schukit, 2002) is well-documented. For example, Schwartz (2006) examined college suicide data from years 1991 until 2004 and reported that the death by suicide rate among college attending adults is 6.5/100,000, and national surveys estimate that 11.4% of college students seriously considered attempting suicide in the past year (Barrios, Everett, Simons & Brenner,2000). Additionally, college

represents a unique stage of development where individuals are expected to make vital life choices (Arnett, 2000), thus requiring important social-emotional skills to make well-thought out, informed decisions.

Social-emotional skills are also pertinent to college achievement and career success. Meta-analytical reviews, systematic reviews and large-scale studies examining different subsets of social-emotional skills in higher education have demonstrated a positive association between these skills and academic success in college (Richardson, Abraham & Bond, 2012; Robbins, Allen, Casillas, Peterson & Le, 2006; Schneider & Preckel, 2017). Likewise, these skills also been found to be important for career preparation and success (Rowan-Kenyon, Savitz-Romer, Ott, Swan & Liu, 2017). Survey studies report that employers highly value skills that develop largely independent of content learning, such as communication, teamwork, organization, problem-solving, and leadership (Hart Associates, 2015), and certain social-emotional skills have been positively related to career outcomes (i.e., promotion, salary and satisfaction; Ng, Eby, Sorensen, and Feldman, 2005). Consequently, teaching these skills in college may have a positive impact on students' subsequent marketability (Savitz-Romer, Rowan-Kenyon & Fancsali, 2015).

Although social-emotional skills are significant for college student well-being and success, there is little consensus about which skills are most impactful, and few studies consider the college student context and experiences. This chapter will delve deeper into relevant literature related to social-emotional skills in higher education, exploring theory and empirical evidence about these skills.

Before proceeding, it is important to clarify some issues of nomenclature pertaining to this field of study. This thesis will continue to use social-emotional skills to refer to

malleable beliefs and attitudes that are beyond the purview of content learning or traditional cognitive skills (i.e. critical thinking) and have an impact on student outcomes. I describe these social-emotional skills more clearly later in the chapter as self-beliefs and relate them back to motivational theories. Studies and literature examined in this section often refer to the same skills by different names such as noncognitive, intrapersonal, motivational, soft skills, etc. For instance, growth mindset, grit and self-efficacy are considered intrapersonal competencies by the National Academies of Science and Engineering (2017), while Farrington et al. (2012) refer to these same concepts as noncognitive factors, and grit and self-efficacy have also been called soft skills by Heckman and Kautz (2012). This issue around disparate umbrella terms is discussed in more detail later in the chapter.

Emerging Adulthood

Given the importance of developmental theory in the advancement of research in the field of social-emotional skills (Brackett, Elbertson & Rivers, 2015), its applications to higher education should also consider the unique life period which characterizes college student life. Thus, it is important to start this review by contextualizing this period of college within the developmental stage of emerging adulthood. For most students, entering college is a time of discovery, experimentation, and reflection. In 2000, Joseph Arnett developed a theory of emerging adulthood, describing this stage as a unique developmental period distinguishable from adolescence and adulthood, and embodied by college students. Emerging adulthood is defined by change and exploration, where individuals develop the foundations for their income and occupation. Arnett argues that between 18 and 25 years old an emerging adult explores different life paths and structures. Their marital status, school enrollment and parenthood become difficult to predict. For instance, young adults

frequently change residences, engage in different romantic relationships, and have less financial and work stability (Arnett, 2000). This stage is also a time of semi-independence where many of the decisions are still being made by other adults such as college faculty and staff (Arnett, 2000).

Arnett (2004) describes five pillars or dimensions of emerging adulthood: the age of instability; the age of possibilities; the age of self-focus; the age of identity exploration; and the age of feeling in-between. Within the age of instability, emerging adults face a rapid change in their plans within work, relationships, and residence. For example, the period between 18 and 25 is, on average, characterized by high mobility where individuals move constantly from dorm rooms to apartments to cohabitation with a romantic partner (see Arnett, 2000).

Emerging adults are confronted with a large number of possibilities in both their career and personal life (Arnett, 2004, p. 16). As they are faced with making decisions and preparing for their future careers, work, education, and finances become primordial goals and concerns for emerging adults, particularly for individuals in their twenties (Ranta, Dietrich, & Salmela-Aro, 2014). This time is also characterized by self-focus. Coming from the care of their family and household, emerging adults are now faced with new responsibilities where they are expected to take care of themselves. Their well-being becomes a matter of the decisions they make for themselves (Arnett, 2004, p. 12-13).

The concept of identity exploration relates to Erikson's (1968) theory of development and the central crisis of adolescent life as identity versus role confusion. As Erikson (1968) explains, adolescence in industrialized society becomes more marked, where adolescents are pushed to decide which role they will take in society. A role which

aligns with their identity and allows them to feel efficacious. While Erikson describes this stage as adolescence, this ego development continues through emerging adulthood, although afterward it slows down or stabilizes (Syed, Seiffge-Krenke & King, 2012).

Finally, the age of feeling-in-between relates to a feeling of not being an adolescent, but still not quite an adult. To illustrate, when asked "Have you reached adulthood?", more than half of emerging adults were unable to respond with a definitive yes (Arnett, 2001).

Critics mention that, while there is a breadth of research on emerging adulthood, most of this research is based on college samples and is not easily generalizable to non-college attendees (Mitchell & Syed, 2012). Additionally, the term of emerging adulthood has been coined to support Arnett's theory, and does not remain a neutral term to describe a transitional phase (Côté, 2014).

Emerging adulthood, initially, was rarely studied outside of White majority populations, as noted by Syed and Mitchell (2013). Different researchers have attempted to describe the application of this theory to both minority and low-income students. Following the five pillars described by Arnett (2000, 2004), Syed and Mitchell (2013) describe differences experienced by individuals from minority backgrounds. While for most the era of emerging adulthood may be a time of possibilities, young adults from minority background experience the reality of implicit racism and discrimination, which often affects their employment possibilities (Quilian, Pager, Hexel & Midtbøen, 2017). This prospect of added challenge and adversity when entering the job market may imply a different college experience for minority students and provide a detriment to their motivation and the construction of their beliefs. It should be noted that while this added challenge may be a barrier for most students, there is also evidence that some students are

able to take this specific challenge as a motivation (Sanders, 1997) and demonstrate exceptional strategies to overcome these systemic biases (see McGee, 2015 for an example observed in high-achieving Black students in math).

Coping with these different demands requires the development of personal assets that supports emerging adults during this transition into adulthood. Developmental theorists have identified specific assets that are believed to be critical for a healthy development: having confidence in one's abilities to achieve one's goals; be socially connected; control their emotions; and make a meaningful change (Zarrett & Eccles, 2006). Hence, promotion of social-emotional skills during this stage becomes imperative to assist students when navigating emerging adulthood and support their success in college.

Review of Social-Emotional Skills Research

Many different frameworks of social-emotional skills have been created for K-12 settings (e.g. Clover Leaf Model, CASEL, 21st Century Skills). One of the largest frameworks for social-emotional learning in K-12 is the CASEL (2013) 5 skill model which encompasses: self-awareness, self-management, responsible decision-making, relational skills, and social awareness. While there is no dominant framework for social-emotional skills in higher education (Savitz-Romer et al., 2015), different reports highlight important skills for both college and career success.

One of these reports is from the National Academies of Sciences, Engineering, and Medicine (2017), which identifies eight different intra and interpersonal competencies related to college student success. Authors of this report describe developmental challenges that progress fairly equally for students and involve effectively managing their dispositions, beliefs, goals, interest, values, and identity to succeed. The recommended

eight competencies (i.e. behaviors related to conscientiousness, sense of belonging, academic self-efficacy, growth mindset, utility goals and values, intrinsic goals and interests, prosocial goals and values and positive future self) play a crucial role within each developmental challenge. For example, individuals transitioning into college often are confronted with the question: *do I belong here?* This question may arise in a multitude of contexts such as while making new friends or engaging in a new field of study. Positive beliefs about belonging, or sense of connectedness to their new environment, can support students when adapting. Thus, it is no surprise that sense of belonging is one of the competencies mentioned in this report and important for college student success. In this report they mention self-efficacy, growth mindset and grit (under behaviors related to conscientiousness) as intrapersonal competencies. As mentioned above, these same constructs have been identified as noncognitive factors, social-emotional skills, soft skills, affective skill, etc.

Achievement Motivation

Many of the constructs that fall under terms like intrapersonal competencies, social-emotional skills, or noncognitive factors (such as grit, growth mindset, self-efficacy, self-esteem, sense of belonging) are best characterized as self-beliefs relevant to success in school settings and that impact motivation. Messick (1979) supports this assertion by arguing that all non-cognitive variables qualify as motivational to some degree. Hence, to understand the mechanisms through which these skills impact positive student outcomes, it is pertinent to understand them in the context of motivational theory.

Achievement motivation can be best described as "a relatively stable disposition to strive for achievement and success" (Atkinson, 1957, p.359). Originally, authors

conceptualized achievement motivation as a stable, trait-like construct, however modern theorists describe it as situational, where students experience differing levels of achievement motivation in situations where they are expected to demonstrate their abilities (Nicholls, 1984). Within the study of achievement motivation, authors' have focused on studying self-related perceptions or the way individuals feel about themselves, the roles that they take on, what they believe they are capable of, and the attributes they think they possess. These self-beliefs contain different aspects of self-knowledge; they may be related to the idea of one's competence (e.g. self-efficacy), self-worth (e.g. self-esteem), identity (e.g. academic self-concept) or theories about the nature of their abilities (e.g. implicit theories).

Many authors describe the plausible theoretical relationship between self-beliefs and achievement-oriented behaviors. For example, self-determination theory examines individuals' growth tendencies and needs (i.e. the need for relatedness, competency, and autonomy) as the foundations of self-motivation (Ryan & Deci, 2000). In this theory, self-determined actions and motivation are purely volitional and affirm one's sense of self, they are sometimes described as intrinsically motivated behaviors and are distinguishable from other intentional behaviors (Deci, Vallerand, Pelletier, & Ryan, 1991). Applied to education, this theory states that when a student's needs for competency, relatedness and autonomy are met, they are then able to engage intrinsically with the academic content and overcome the negative effects of an extrinsically focused academic environment (Covington & Dray, 2002, p. 38).

Another perspective is the theory of possible selves described by Markus and Nurius (1986). Possible selves refer to a certain self-knowledge about how individuals see

themselves and their potential for the future. This can be understood as a cognitive representation of goals, motives, and fears. Possible selves are developed from past and present knowledge about the self; they represent roles and fantasies for the future. They are unique to the person but derive from salient ideals in the environment. These possible selves provide certain functions to the self, including: 1) providing patterns for new behavior; 2) assigning meaning to the individual's current behavior; and 3) because they are most vulnerable to changes in the environment, communicating inconsistent information about the self. In this way, a student may see themselves as both an honors student and a dropout. This representation will then guide their behaviors and emotions in school.

Examining the theoretical history behind self-beliefs and motivation helps build an explanation as to how they may be related to behaviors. This theoretical mechanism is one of the shortcomings of social-emotional literature, which often proposes ambiguous relationships between social-emotional skills and achievement behaviors (Delaney, Harmon & Ryan, 2013). However, the frameworks presented above define these self-beliefs as behavioral skills which is problematic when constructing interventions to target them. Rowan-Kenyon, et.al. (2017) provide a framework to bridge this gap between motivational beliefs and skills by differentiating between core and enacted skills. In their review, they describe core skills (e.g., self-efficacy) as necessary to be able to enact specific behaviors (e.g. self-regulatory behavior). For example, grit can be conceptualized as a core skill that is necessary for individuals to develop long term goals and enact behaviors to accomplish those goals. For this thesis, I focus on three skills highlighted both in the CASEL framework and the NAS report: growth mindset; self-efficacy; and grit. I describe

these skills individually; provide a summary of research examining these skills in relation to academic achievement and particularly with college students; address some of the criticisms or controversies related to them; and detail research supporting their malleability.

Self-Efficacy

A somewhat prolific area of study within education is the study of self-efficacy. Bandura (1977) recognized that personal beliefs about one's competencies were a crucial factor in performance settings; people engage in tasks that they feel competent and confident about and avoid those that they do not. These beliefs and expectations are derived from four principal sources of information: performance accomplishments; vicarious experience; verbal persuasion; and physiological states.

Furthermore, individuals with positive self-efficacy beliefs exert more effort, select adaptive goals, and behave in ways that are congruent with their goals and task persistence (Bandura, 1997). Correlational studies have shown an association between self-efficacy and each of use of cognitive strategies (Pintrich & de Groot, 1990), persistence, and performance in achievement settings (see Pajares, 1996).

More recent studies have called for academic self-efficacy as an important predictor of academic success, particularly in college. Academic self-efficacy can be understood as specific self-beliefs related to their capability about learning within a specific course, such that if students perceive that they are making progress in learning and becoming more skillful as they work on tasks, they develop a sense of self-efficacy (Schunk, 1991). Self-reports related to academic self-efficacy ask students to rate how confident they are that they can perform well on an academic task or in a specific class (e.g. I expect to do very

well in math class; Bong & Skaalvik, 2003). For instance, Bandura, Barbaranelli, Caprara and Pastorelli (2001) measured perceived self-efficacy for academic achievement, which they defined as participants' evaluations of their capabilities to master different areas of coursework.

International research has found support for a broader conception of self-efficacy called general self-efficacy, which is described as a universal construct that entails "a broad and stable sense of personal competence to deal effectively with a variety of stressful situations" (Scholz, Doña, Sud & Schwarzer, 2002, p. 243). This construct is useful when context is less specific. General self-efficacy has been associated with positive coping strategies, particularly in the face of stress (Luszczynska, Scholz & Schwarzer, 2005). General self-efficacy is theorized to be of particular importance when individuals have to adapt to new circumstances. In one study among East German refugees, people with higher general self-efficacy were healthier, better integrated socially, and more frequently employed (Schwarzer, Hahn & Jerusalem, 1993)

Differences in how broadly or specifically self-efficacy is measured impacts the quality of cumulative evidence surrounding self-efficacy. Nonetheless, scholars have substantiated that self-efficacy is positively associated with significant gains in college students academic achievement and persistence (Multon, Brown & Lent, 1991; Robbins et al., 2004). Chemers, Hu and Garcia (2001) used structural-equation modelling to test the direct and indirect effects of academic self-efficacy on a number of different achievement related beliefs and behaviors. They found that academic self-efficacy was directly related to performance and academic achievement; and also, to students perceptions of their capacities for responding to the demands of college life.

The directionality of the relationship between self-efficacy and academic achievement has also been debated by many researchers (Kirsch, 1995; Williams, 2010). While Bandura (1977, 1997) originally proposed that self-efficacy affects expected outcomes, he did not consider that the relationship may be reversed until sometime afterwards. The gains or losses that people consider when engaging in behavior are critical to understanding choice and behavioral regulation. Studies examining the influence of these outcome expectancies on self-efficacy ratings have shown that the presence of incentives and expected pain intensity influence self-efficacy ratings (see Williams, 2010, for a review). However, while past academic achievement can affect future outcome expectancies and influence self-efficacy ratings, self-efficacy remains a strong predictor of behavior even when accounting for outcome expectancies (Bandura, 1995).

Evidence of the malleability of self-efficacy has focused on evaluating the impact of self-efficacy interventions. Approaches to enhancing self-efficacy seek to intervene to alter either students' sources of self-efficacy (i.e. performance accomplishments, vicarious learning, verbal persuasion, and emotional arousal; Bandura, 1997) or environmental factors that provide information for one's sense of competence. In one example, Luzzo et al., (1999) compared two different interventions based on these sources of efficacy. The first intervention consisted of 15-minute video presentations to model how other students came to the choice of selecting careers, hence operationalizing a vicarious learning condition. In the second intervention, students were given a test with math problems of varying degree of difficulty, and then provided a performance score. In this second intervention, all students passed the test, reinforcing their belief that they had the skills required to do well in math courses, hence inducing performance accomplishment. Results

found that only the performance accomplishment condition significantly increased students' math and science self-efficacy. Nonetheless, both interventions had a positive effect on performance 4 weeks after the intervention compared to a control condition.

Growth Mindset

In Dweck and Leggett's (1988) article on motivation and personality, they describe a motivational framework where self-beliefs, particularly beliefs related to the malleability and controllability of personal attributes, affect the goals individuals choose to pursue. In achievement settings, these goals create a framework that influences patterns of adaptive or maladaptive: (1) affect (i.e. positive versus negative affect); (2) cognitions (i.e. effort versus ability attributions); and (3) behavior (i.e. helpless versus mastery-oriented responses; Dweck & Leggett, 1988). This model posits that individuals' can hold two different theories about the nature of abilities which affects these goals and adaptive patterns. These two theories are described as growth theories or beliefs that abilities are malleable and can change through learning; and fixed theories, beliefs that abilities are stable and unchanging.

Blackwell, Trzneiweski and Dweck (2007) tested this motivational model with seventh graders and found that learning goals and positive efforts mediated the relationship between growth theory and positive strategies. Positive strategies were directly related to higher GPA. This model was tested again by Robins and Pals (2002) in a longitudinal study with undergraduate students. They revealed a similar relationship between fixed theory, performance goals and helpless attributions, however they found no significant association between these variables and academic achievement (i.e. cumulative college GPA).

Recent meta-analytic findings have tested the strength of the relationship between incremental theories and academic achievement. Sisk et al., (2018) found that the average correlation between incremental theories and academic achievement across 273 different studies was small ,but positive, for college students (r = .02), even when accounting for course selection in college. In another meta-analysis examining the relationship between implicit theories and self-regulation, Burnette, O'Boyle, Vanepps, Pollack and Finke (2013) found a similar weak correlation between incremental theories and academic achievement. This second study, however, did find a significant positive relationship between incremental theories and learning goals (r = .18), mastery-oriented strategies (r = .22), and optimistic expectations (r = .15), which are consistent with Blackwell et al.'s (2007) original study.

These implicit theories have been shown to be malleable and can be impacted by well-designed interventions (Aronson, Fried & Good, 2002; Blackwell et al., 2007; Paunesku et al., 2015). For example, if students learn about neural pathways that communicate and are strengthened through repetitive practice, they begin to understand that intelligence is a malleable trait that requires effort and time. This belief then becomes a schema that can be used to interpret failure without losing confidence in their own abilities, attributing failure to factors outside their control, and allowing them to be motivated to continue developing strategies to improve their studies (Yeager & Walton, 2011).

While growth mindset interventions in middle (Dommett, Devonshire, Sewter & Greenfield, 2013) and high school (Yeager et al., 2016a; Yeager et al., 2019) have shown success in changing students beliefs, similar interventions with undergraduate students

have shown mixed results. Some studies show a promising relationship between these interventions and academic success (Aronson et al., 2002), while other larger studies have found no effect for these interventions on college students (Yeager et al., 2016b). Additionally, other meta-analytical findings have not found evidence that growth mindset interventions impact academic achievement (Sisk et al., 2018), a caution to higher-education policymakers interested in integrating these interventions into policy.

Grit

Grit is another intrapersonal construct that has received the attention of educators and policymakers in recent years. Grit is described as "perseverance and passion for long-term goals" (Duckworth, Peterson, Matthews & Kelly, 2007, p.1087). This definition encompasses behaviors of effort, interest and overcoming obstacles.

Researchers of grit claim: 1) that it is one of the most important qualities for student achievement; 2) it encompasses two distinct factors of passion and perseverance; and 3) that it can be trained. These claims make it an attractive construct for higher education professionals.

Correlational research has found a moderate association between grit and performance. In one seminal article, Duckworth et al. (2007) describe four different correlational studies relating grit to performance in different settings and samples. Their third study examined the relationship between grit, cumulative GPA, and expected year of graduation using SAT scores as a covariate with psychology majors at the University of Pennsylvania. In this sample, grit scores were positively related to GPA, even when SAT scores were held constant (r = .34).

One meta-analysis (Credé, Tynan, & Haarms, 2017) examined the relationship between grit and academic achievement in middle school and found a small correlation (r = .17) between grit and GPA. Results from this meta-analysis also found that perseverance of efforts was a better predictor of performance than either consistency of efforts or an overall grit score. They also found support for the idea that grit increases with age, finding a small but positive correlation between age group studied and grit score.

Research on grit has received many criticisms over the years related to the quality of studies built around it. One of the central critiques towards this field of research involves the overall factor structure and predictive validity of the grit scale and construct. Muenks, Wigfield, Yang and O'Neal (2017) used multidimensional item response theory to test the grit factor structure on college and high school students. Their results showed that, for the college students' sample, a bifactor model, which has a primary grit factor and two orthogonal secondary factors of consistency of interest and perseverance of effort, fit the best. That model follows Duckworth and Quinn's (2009) original conceptualization of grit. Another validation study, conducted by Fosnacht, Copridge and Sarraf (2017) used a large dataset of college students to test the validity of the short grit scale (Duckworth & Quinn, 2009). In this study, a two correlated factor model with both subscales provided the best fit. Furthermore, on the college sample, perseverance of effort was a significant predictor of a host of outcomes, such as engagement, but consistency of effort was not (Muenks et al., 2017; Fosnacht et al., 2017).

Consequently, while grit is still a widely used construct in educational research (Credé, 2018), questions remain about its usefulness in predicting academic performance across age groups, particularly for college students. Perseverance of effort seems to be a

better predictor of college academic achievement, compared to consistency of interest and overall grit scores (Credé et al., 2017; Muenks et al., 2017). This follows other criticism about the practicality of the consistency of interest scale, particularly when having to adapt and re-envision goals after major setbacks. Almeida (2016) takes a sociocultural lens to discuss grit in the context of higher education, proposing a reconceptualizing of grit as the convergence of three components: intrinsic interest and passion; preference for long-term goals; and a view of obstacles as temporary rather than permanent setbacks. Re-thinking grit as intrinsic interest and passion instead of consistency of interest may be a more authentic approach to reflect college students' experience during their years at university considering they are provided with opportunities to engage in a variety of interests, and choosing one interest and committing may take time. Nonetheless, measures of grit have not expanded the concept to include these components, hence studies with college students continue to examine grit as following the traditional grit measure.

Finally, while grit has been claimed to be malleable (Duckworth, 2007), it is not yet clear if interventions targeting grit are successful, particularly for college students (Credé, Tynan & Haarms, 2017). However, Paunesku et al. (2015) found that a growth mindset and sense-of-purpose intervention did enhance students' persistence, which is conceptually related to grit.

In conclusion, the study of implicit theories, general self-efficacy and grit have a long history of evidence to support their impact on K-12 and college student outcomes. However, along with a heavy focus of the research on K-12 students, these findings are not without controversies and questions, which make practitioners cautious about their overall implementation in higher education. Irrespective of these criticisms, researchers have

developed a myriad of different interventions (see Harackiewicz & Priniski, 2018 for review) to target these skills with the promise of positively impacting college student success.

Social-Emotional Learning in Higher Education

Regardless of the lack of cohesive guidelines for applying social-emotional learning to higher education, there have been isolated attempts to build social-emotional skills into college curriculum. One example comes from Wang, Wilhite, Young and Bleomker (2012), who designed and implemented a social-emotional learning curriculum within a freshman seminar. They evaluated the course using a quasi-experimental design, incorporating both quantitative and qualitative findings. Their results showed a significant growth in awareness of emotions, interpersonal relations, perspective taking and self-management from pretest to posttest. Students who participated in this curriculum also obtained higher GPAs than a control group.

The Wildcat Track program at the University of Arizona also incorporates a social and affective skill building curriculum into its program (Savitz-Romer et al., 2015). Students in the Wildcat Track program attend workshops that help foster their academic self-efficacy, metacognitive skills, and cognitive strategies. In this program, students have individual meetings with a professional learning specialist and attend workshops focused on fostering their academic self-efficacy, metacognition, and cognitive strategies. One third of students who participated in the Wildcat program were removed from academic probation in the following semester, and the average cumulative GPA of participating students increased between 60% and 70%. This study, however, does not consider the

effect of other confounding mechanisms that may explain students' increased achievement beyond participation in this program.

Interventions promoting social-emotional skills in higher education have also come in the way of social-psychological interventions which focus on promoting one skill at a time, and are often advertised as one shot, short, low-cost interventions (Yeager & Walton, 2011), similar to the interventions described above. For this reason, they are extremely easy to implement in college settings (Yeager et al, 2016b). Social-emotional learning programs in K-12 and social-psychological interventions often tackle overlapping constructs (e.g. self-efficacy and mindsets), with the larger competencies targeted by social-emotional learning (e.g. self-awareness and self-management) incorporating many of the beliefs addressed by social-psychological interventions.

Social-emotional interventions have expanded in their scope and content, now with a number of different interventions available targeting different processes in students (Harackiewicz & Priniski, 2018). While these interventions remain highly applicable in research, having students engage in countless interventions to promote each skill independently is impractical in higher education settings. Assimilating these different interventions and skills into cohesive curriculums for college students may be an important step to support college students' social-emotional development. Building organized SEL curriculums in college requires a careful and precise understanding of the overall mechanisms through with these skills impact retention and achievement and evidence needs to grapple with many inconsistencies that affect research in this area.

Issues Pertaining to the Study of Social-Emotional Skills in Higher Education

There are many issues that obstruct the study of these skills in higher education. The first corresponds to the amount of umbrella terms and overall conceptual disagreement which pervades the field. Second is the discrepancy among frameworks regarding which skills are most important. A third dispute relates to the validity of questionnaires created to measure these skills. Finally, there are challenges surrounding the use of cumulative GPA as an outcome measure, notably when examining the impact of these skills. I will discuss these points in more detail in this section.

Many authors have brought up the issue of lack of conceptual coherence behind social-emotional skills (Dinsmore et al., 2008; Duckworth & Yeager, 2015; Farrington et al., 2012). First of all, there is the conceptualization of these skills as non-cognitive (Farrington, et al., 2012); soft skills (Heckman & Kautz, 2012); social-emotional (CASEL, 2013); and intrapersonal (NAS, 2017), among others. This discrepancies between umbrella terms have caused a disconnect between different fields of study (Robbins, Lauver, Le, Davis & Langley, 2004) - particularly among motivation theorists - and makes it difficult to properly operationalize and describe them. For example, the term noncognitive skills are broadly used, but it implies that these skills are unrelated to or beyond cognition, which authors claim is simply untrue (Messick, 1979). The term social-emotional directly relates to social-emotional learning in K-12 settings and child development; however, this term is also problematic as it may isolate these skills completely from academic learning (Duckworth & Yeager, 2015).

Conceptualizing social-emotional factors as skills, dispositions, beliefs, values, or competencies is another area of disagreement among researchers. Using skills as the overall

terminology characterizes social-emotional factors as being malleable and, hence, learnable, and teachable (Duckworth & Yeager, 2015). However, many of the skills reviewed and described in the literature of college readiness and success are more appropriately beliefs, values, or attitudes, not specific skills such as oral communication (Messick, 1979). Kraiger, Ford and Salas (1993) categorize learning outcomes as cognitive, skills and affective (i.e., attitudes and motivation). They specify that skills include a goal orientation and clear linking of successive behaviors; whereas affective learning outcomes include psychological factors that influence behaviors but are not necessarily behaviors themselves. These conceptual distinctions between skills, beliefs, and attitudes are important when considering the mechanism through which they influence academic behaviors (Savitz-Romer et al., 2015).

Secondly, there is a lack of agreement about which skills are most pertinent in promoting positive student outcomes. This discrepancy is evidenced by the myriad of SEL programs that have propped up in K-12 education in the past decade (e.g., CASEL, Second Step Social-Emotional Learning, and the Clover Leaf Model). This is also true in higher education research. While most meta-analyses agree that self-efficacy is one of the most reliable predictors of academic performance (e.g. Richardson et al., 2012), few can agree whether to focus on specific performance self-efficacy or more generalized academic self-efficacy (Schneider & Preckel, 2017). Likewise, researchers argue about the importance of self-esteem in education and learning (Bachman & O'Malley, 1977; Maruyama, Rubin & Kingsbury, 1981).

These first two disputes cause confusion in research of social-emotional skills and college student outcomes, such as between experts in the fields of college and career

success. Rowan-Kenyon, et al. (2017) conducted a systematic review examining the literature on social-emotional (called non-cognitive skills) in career readiness and college success literatures. In their findings they mention a lack of overlap between both literatures in terms of the skills they highlight and the way they define these skills. They describe both fields as differing in the types of definitions they use, with articles on college success providing more conceptual definitions for these skills while the career readiness field tends to use more operational definitions, citing items that measure those skills. These differences lead to very little overlap and a great deal of idiosyncrasy.

A third issue that arises in the field concerns the validity of measures of social-emotional skills (Duckworth & Yeager, 2015; Messick, 1979). Most measures of social-emotional skills in college students rely on self-report questionnaires (Kautz, Heckman, Diris, Weel & Borghans, 2014), which usually ask students to rate to what extent they relate or agree with a number of different statements. Duckworth and Yeager (2015) illustrate the arduous process students have to go through to accurately respond to a single self-report item. This process includes: understanding the question; recalling the information that is pertinent to the question; integrating and summarizing that information into a judgement; translating that judgement into an adequate response given the option; and, finally; editing the response given a variety of motives. Duckworth and Yeager also enumerate many threats of validity that can occur at any point during that process. For instance, social desirability, or the motivation to be seen as favorably by others, may influence how students edit their responses, choosing positive responses that do not necessarily reflect their true attitude. Hence, many authors call for triangulation of different assessments or measures (including qualitative reports) to better understand students'

noncognitive skills (Almeida, 2016; Duckworth & Yeager, 2015; Harackiewicz & Priniski, 2018).

One final topic to consider when examining the importance of social-emotional skills in promoting college student success are measures of academic achievement. Measures of academic achievement, particularly in higher education, include course grades, scores on standardized tests, cumulative GPA, among others (e.g. Richardson et al., 2012; Valentine et al., 2004; Sisk et al., 2018). These measures are limited insofar as they represent only a snapshot of students' performance in a given context and have not fully examined student growth and change. Social-emotional skills, and particularly the skills mentioned above, may not affect students' overall achievement at any given point or on a specific measure, but their general growth and adaptation during a crucial life transition. Growth mindset, for example, becomes important for students when they are facing challenging times in school, such as transitioning from higher school to college. When students endorse an incremental view of their abilities, these transitional challenges become opportunities to learn and grow, where students with growth mindset use feedback to adapt and adopt positive strategies (Yeager & Dweck, 2012).

Conclusion

In summary, social-emotional skills have garnered increasing support in higher education, based on arguments about their impact on college success and career readiness. However, research contextualizing these skills within the context of higher education is still lacking. To examine these skills in higher education, it is first important to understand their role in college student success by reviewing the theory and empirical evidence supporting their effectiveness in promoting college student success. Consequently, I began

by first describing the developmental theory of emerging adulthood. I then continued by reviewing closely the evidence behind some of the key constructs, self-efficacy, growth mindset, and grit, and describing current attempts to build interventions and curriculum around social-emotional skills in college. Finally, I describe some of the issues that hinder research in this field, such as: lack of conceptual coherence; disagreement between researchers about which skills impact student achievement; issues with measuring these skills; and limitations in definitions of academic success in higher education. The following study attempts to overcome these limitations by proposing a quantitative and qualitative study examining the association between a subset of social-emotional skills (i.e., grit, growth mindset and self-efficacy) and academic success (i.e. GPA and retention), focusing on the role these skills play in college student academic behaviors.

Chapter 3: Methodology

Context

The current project uses archival data collected as part of a collaborative partnership between researchers, and a college-student support program (CSSP) from a large Midwestern University. This program supports high-achieving, historically underserved students in pursuing their degree, providing freshman students with academic advising, a financial reward during their first and last year, peer mentoring and a freshman first-year seminar course to provide context for their college careers.

At the outset of this research collaboration, in Fall 2014, program leaders contacted researchers based on their interest in integrating an intervention to promote social-emotional skills into their freshman seminar course. Program leaders sought advice on which skills were the most important to support college students success, and ways to promote these skills within a course. Research team members selected growth mindset as a key skill to promote after reviewing the literature available at the time of successful social-emotional interventions, and provided course instructors with reading materials about intelligence and neuroplasticity that were relevant to promoting growth mindset (e.g., Blackwell et al., 2007). The research team also developed measures to evaluate if engaging with these topics through a structured class discussion, readings and video clips impacted students grit, growth mindset and general self-efficacy. For this purpose, researchers administered a pre-survey one week before class and a post survey at the end of the week after this class. This was all provided to the program leaders and instructors to implement; they also decided to integrate a reflection task as part of the intervention activities. This partnership continued to evolve with researchers providing advice and

data analysis support to continue to support their exploration into the development of social-emotional skills.

During the fifth week of the course, students participated in a 75-minute class where they listened to a lecture about intelligence, neuroplasticity and mindsets (fixed vs. growth) and viewed a set of videos related to those topics. In the second session of the week, they participated in a group discussion about the common negative habits students can fall into throughout their college experiences. Outside of class time, students were expected to engage with a set of resources related to the content covered that week (i.e., lectures on neuroplasticity and growth mindset, group discussion about negative college habits). These materials were: (1) a podcast interview which discussed how intelligence can be expressed in everyday jobs such as waitressing; (2) a video which reflected on how we are responsible for the connections that our brains make or "shaping our brains" and how technology might be affecting these connections; (3) a video on neuroplasticity and child brain malleability; (4) a TED Talk about brain scans and how individual brains differ even within medical and psychiatric disorders; (5) a TED Talk about brain plasticity and habits that might enhance neuroplasticity; (6) an article about seven bad habits that college students fall into when navigating college life; (7) two chapters from a course book about an anthropologist's experience living as a college student; and 8) an article titled "Carol Dweck Revisits the growth mindset" written by Carol Dweck (2015).

Additionally, as a result of this partnership, academic data were collected for four freshman cohorts of students in this class as part of a large grant examining the impact of community engagement on students' academic success. The university's Office of

Institutional Research (OIR) followed two freshman cohorts of this seminar class, collecting academic data from these students up until 2018.

One of the purposes of the study is to provide feedback for this program to support their efforts in improving student success by incorporating social-emotional skills into their curriculum. This requires an in-depth understanding of how participating students are interpreting these concepts, and the extent to which these skills are supporting students' academic achievement. Therefore, generalizability will be limited to the context of this program and these students.

Study Goals

The study aims to gain a deeper understanding of the relationship between students' social-emotional skills and students' behavior in college using a mixed methods approach. The following study uses both qualitative and quantitative methods to: 1) explore the predictive validity of general self-efficacy, grit and growth mindset on students' trajectory of academic achievement through college; and 2) describe how students conceptualize and reflect on intelligence and growth mindset. This study follows a retrospective cohort design in which archival data were obtained for freshman college students who were part of a first-year experience course. Motivational data were collected for two cohorts of freshman students enrolled in a large midwestern university during fall 2015 and 2016. Academic data (i.e. semester GPA, credits earned and retention) was collected for each cohort until end of fall 2018.

Research Questions

The first analysis uses a longitudinal multi-level model to explore within person change (or intra-individual change; Ployhart, Holtz & Bliese, 2002), and the between-person change or interindividual change. The questions addressed are:

1. To what extent, if at all, are growth mindset, general self-efficacy and grit associated with CSSP students' trajectory or change in academic achievement (GPA) from semester to semester?

2. To what extent, if at all, are growth mindset, general self-efficacy and grit associated with CSSP students' end of year enrollment?

The second group of analyses uses constant comparison (Glaser, 1965) to qualitatively analyze students' written class reflections, with the purpose of describing:

3. What theories of intelligence are CSSP students ascribing to in their definitions?

4. How do CSSP students define growth mindset, after being introduced to the concept through class lecture and readings?

5. How do CSSP students reflect on the concepts of intelligence and growth mindset and apply these concepts to their lives?

a. What larger themes are CSSP students' expressing in their reflections?

b. What, if any, relationships do they construct among growth mindset, concepts of intelligence and navigating college?

Data Collection

In both fall 2015 and fall 2016, students enrolled in CSSP freshman seminar attended one large group session and one discussion session each week (each were roughly an hour). The course objectives included: encouraging greater self-awareness; developing a coherent educational plan; enhancing critical thinking; and gaining a better understanding of the campus' resources and cultures. During week four of the course, students were asked to complete a survey at home related to the following week's topic. This survey included measures of grit, growth mindset, and general self-efficacy described in Chapter 4. In the lecture portion of the class, in week five, students were given a lecture on neuroplasticity, growth mindset, and non-traditional forms of intelligence. For homework, after lecture, students were asked to read a set of materials related to the topics from lecture, complete another survey which contained the same measures as the pretest, and write a short reflection task. Both cohorts of student academic data were collected from the Office of Institutional (OIR), updating academic performance data until end of fall 2018, representing students' third and second year respectively.

Participants

Participants in this study include all students who participated in the CSSP fall freshman seminar course in 2015 and 2016. In total there were 176 students enrolled in the course in fall 2015 and 182 students enrolled in fall 2016. All students were in their first semester of college, starting at a large Midwestern public university. Participants were also participants in the CSSP program. They were identified as having faced challenges that may have impacted their high school ranks and test scores and that put them at some risk of not graduating. At the same time, they displayed personal experiences, additional

attributes and skills, and high school records indicative of strong potential of success. Many are from historically underserved populations. The university defined underserved students as being non-white, low-income (i.e. Pell eligible), and/or first generation. More information about the sample is included in Table 1.

IRB

Student academic, survey and reflection data were provided to the researcher deidentified by program instructors and OIR. Survey and reflection activities were part of normal classroom activities and did not represent an additional demand on their time. Hence, IRB determined this study was not human research (IRB ID: STUDY00007828).

Mixed Methods Framework

While this study was designed as a separate qualitative and quantitative study, interpreting, and integrating these two sets of data required a mixed-methods framework to better understand the relationship among these motivational constructs, achievement, and reflections. Mixed methods research involves an "intellectual and practical synthesis based on qualitative and quantitative research" (Johnson, Onwuegbuzie & Turner, 2007, p. 129). Based on a philosophical framework of pragmatism, mixed methods offer a solution for building off the strengths of both qualitative and quantitative methods to address complex educational issues (Johnson & Onwuegbuzie, 2004).

An empirical review conducted by Greene, Caracelli and Graham (1989) describes five different purposes for mixed methods studies: triangulation; complementarity; development; initiation; and expansion. Following their classification, this study will use mixed methods for exploration, using inductive methods to explore in depth the

motivational constructs examined, and generate a hypothesis or generalization about their relationship to academic achievement in higher education.

Mixed-methods research is rooted in the philosophy of pragmatism proposed by prominent educational and psychological theorists such as Charles Sanders Pierce, William James, and John Dewey (Tashakkori & Teddlie, 1998). James described pragmatism as "the attitude of looking away from first things, principles, 'categories,' supposed necessities; and of looking towards last things, fruits, consequences, facts" (cited in White 2010, p.32). Similarly, Dewey described pragmatism as focusing on function of theories' concepts, objects, and ideas to solve social problems (Biesta, 2010). Hence, pragmatism is focused on examining practical consequences, and the development of theory grounded in empirical findings. Pragmatic philosophers view knowledge as both constructed and based on reality and experiences, emphasizing processes of participation, collective meaning making, and communication (Biesta, 2010). Pragmatists also indicate the fallibility of research and current beliefs, instead propose justification in the form of "warranted assertibility" (Dewey, 1941).

Pragmatism offers a philosophical middle ground that is practical and outcome oriented. Applied to mixed-methods research, this philosophical approach provides a medium for using qualitative and quantitative insights to build workable solutions to social problems (Johnson & Onwuegbuzie, 2001). It expands the notion of objectivity and subjectivity in scientific inquiry , by providing a flexible conceptualization of the nature of knowledge, hence offering a bridge for quantitative and qualitative inquiry (Leech & Onwuegbuzie &, 2009).

To summarize, this study is guided by the fundaments of pragmatism using a flexible approach to study social-emotional skills trying to find their practical applications to higher education. The following chapters in this dissertation will describe each analysis (i.e. quantitative and qualitative) as separate phases each with their corresponding methods, results, discussion, and conclusion section. The last chapter will provide one general discussion of both phases building upon the inferences from each analysis.

Chapter 4: Quantitative Phase

The purpose of the following phase is to describe CSSP students' academic trajectory through college and examine the association between that trajectory and social-emotional skills. Academic trajectory was measured by GPA in each semester as reported by the Office of Institutional Research (OIR). This chapter also examines the association between social-emotional skills and end of year enrollment. Social-emotional skills were assessed using the posttest scores administered the week after receiving a lecture and readings about intelligence and growth mindset in class. Using the posttest scores ensures that all students had- theoretically- equal exposure to class content that may have affected their social-emotional skills across time, which was necessary to use these variables and a time invariant design. There is evidence that, unless exposed to an intervention, these skills remain generally stable through college (Robin & Pals, 2002). A growth curve model was fit to examine the association among these measures. Additionally, analyses used logistic regression to examine the association among social-emotional skills, background variables and year to year enrollment.

Research Questions

1. To what extent, if at all, are growth mindset, general self-efficacy and grit associated with CSSP students' trajectory or change in academic achievement (GPA) from semester to semester?
2. To what extent, if at all, are growth mindset, general self-efficacy and grit associated with CSSP students' end of year enrollment?

Method

Data

A set of scales designed to measure key social-emotional skill variables, including growth mindset, grit, and general self-efficacy, was administered to CSSP students during the fourth week of classes of their first semester (fall) in college. This questionnaire included 26 items and asked participants to rate which phrase best represented their perspective on a 7-point slider scale ranging from 1= "Strongly Disagree" to 7 = "Strongly Agree." Providing a slider allowed students to adjust their scores to best represent their attitudes, allowing for more response alternatives and increasing score variance (Cook, Heath & Thompson, 2001). The use of sliders over traditional Likert point scales has been highly debated (Roster, Lucianetti & Albaum, 2015). Although empirical research examining the reliability of sliders is scarce, Cook, Heath and Thompson (2001) found support for the reliability of slider scores when evaluating attitudes in web-based surveys, concluding that sliders may be just as reliable as Likert type scales.

Items within the scale were from three well-established instruments measuring grit, growth mindset and general self-efficacy. An additional four items of items developed by the initial research team were also included in this survey.

Grit

For this analysis the research team used the short Grit Scale (Grit-S) which consists of 8 items separated into two correlated subscales, consistency of interest (i.e. "I have been obsessed with a certain idea or project for a short time but later lost interest) and perseverance of effort (i.e. "Setbacks don't discourage me"). Internal consistency for this scale, or alphas, range from .73 to .83 (Duckworth & Quinn, 2009). In this first study, grit

was defined as a hierarchical construct with consistency of interests and perseverance of effort as two subsumed correlated factors .Duckworth and Quinn (2009) originally tested the validity of this test with adolescents, cadets, and spelling bee finalists, finding evidence of Grit-S predictive validity when measuring achievement (e.g. success in spelling bee and career interest). Validation studies using this scale with college students have found evidence for a different structure of grit, namely, a correlated two factor model with consistency of interest and perseverance of effort (Fosnacht, Copridge & Sarraf, 2017).

General Self-Efficacy

While self-efficacy has usually been applied to specific areas (i.e. mathematical self-efficacy), general self-efficacy refers to a person's belief in their competence to deal with a broad variety of stressful or challenging situations. The general self-efficacy (GSE) scale developed by Jerusalem and Schwarzer in 1979 has been tested in 23 different nations with Cronbach's alpha ranging from 0.76 – 0.90 (Schwarzer & Jerusalem, 1995). The GSE consists of 10 items related to how confident or efficacious subjects feel in broad situations (i.e. "I can always manage to solve difficult problems if I try hard enough"). This instrument was developed and has been mostly used in studies of health-promoting behaviors (Luszczynska, Scholz & Schwarzer, 2005, Schwarzer & Jerusalem, 1995).

Growth Mindset

To measure student's growth mindset, students responded to three items from Henderson, Dweck and Chiu's (1992) scale. These three questions were related to endorsing a fixed mindset (i.e. "Intelligence is something about you that you can't change very much"). Past reliability studies reported coefficient alphas of between .92 - .96 for these three items (Dweck, Chiu & Hong, 1995). A fourth item, designed by Dweck (2000)

was included to measure growth mindset (i.e. "No matter who you are, you can significantly change your intelligence level"). Many studies have used this scale, or slight variations, to examine the association between growth mindset and achievement (e.g. Blackwell, et al., 2007), additionally a few studies focus exclusively on the fixed mindset subscale to provide a measure of fixed theory (e.g. Yeager, et al., 2019)

Extra Items

Four additional items were incorporated in the survey which theoretically resemble the motivational constructs (e.g., "How I've done in the past doesn't determine how well I will do in the future"). These items were designed by the original research team.

Items from this survey were rescaled, and respondents used sliders instead of radio-button scales used in the original survey versions, which may have affected the established psychometric properties of the published scales. I report results from a confirmatory (CFA) and exploratory (EFA) factor analysis to establish the adequate use of the social-emotional skills variables in the results section of this chapter.

Background and Academic Variables

OIR provided deidentified academic and background data for both cohorts of students. Background data included: first generation status (i.e. a student whose parents have not earned a post-secondary degree); Pell eligibility which is used as a proxy of low-income; ethnicity (i.e. White, Black, Asian, Hispanic, American Indian, Hawaiian, and not-specified)[1]; biological sex and age.

Academic variables consist of cumulative and semester grades (i.e. GPA); end of academic year enrollment status; and credits earned each semester. GPA was used as a continuous

[1] Ethnicity was recoded as White and non-White.

variable ranging from 0 to 4.0. Student enrollment status was determined at the end of the year and consisted of three possible categories: 1) enrolled throughout that academic year (fall and spring term) either in the same or different campus; 2) not enrolled (i.e. dropped out in either fall or spring of that academic year); and 3) graduated.

Sample Characteristics

Quantitative data were available for 167 students for the 2015 cohort[2]. Of those students, 160 (95.8 %) responded to the survey while 7 (4.2%) did not. As for the 2016 cohort, there were 182 subjects available analysis, of which 135 (74.2%) of students responded to the survey, while 47 (25.8%) did not respond. This difference between respondents and non-respondents across cohorts (i.e. 7 in 2015, and 47 in 2016) was statistically significant (X^2 (1) = 29.52, p < .001), which could signify a difference in course programming or in survey administration, hence, to account for this unknown difference, cohort will be retained as a covariate in the subsequent analysis. No other significant differences were found between respondents and nondependent in biological sex, ethnicity, Pell eligibility, first generation status or age.

[2] This represents 94.8% of all enrolled students in 2015. Background and survey data were not available for 9 subjects in this cohort.

Table 1.
Characteristics of Student with complete versus missing survey data

	2015 (n = 167)			2016 (n = 182)		
	Complete (%)	Missing (%)	X^2(df)	Complete (%)	Missing (%)	X^2(df)
Female[a]	112 (97.3%)	3 (2.6%)		90 (74.3%)	31 (25.7 %)	
Male[a]	48 (92.3 %)	4 (7.6%)		45 (73.8%)	16 (26.2%)	
Ethnicity[a]						
Black	28 (90.3%)	3 (9.7%)		27 (72.9%)	10 (27.1%)	
American Indian	4 (100%)	0		4 (66.6%)	2 (33.3%)	
Asian	44 (97.7%)	1(2.3%)		39 (69.6%)	17 (30.4%)	
Hispanic	15 (93.7%)	1 (6.3%)		17 (74 %)	6 (26%)	
White	68 (97.1%)	2 (2.9%)		47 (81%)	11 (19%)	
Hawaiian	0	0		1 (100%)		
Pell Eligibility	86 (95.5%)	4 (4.5%)		70 (70%)	30 (30%)	1.56(1)
First generation	94 (95%)	5 (5%)		72 (71.3%)	29 (28.7%)	0.67(1)
	M(SD)	M(SD)	t (df)	M(SD)	M(SD)	t (df)
Age[t]	18.1 (.46)	18 (.00)	.64(165)	18.1 (.42)	18.1 (.41)	.62(180)

Note. *p<.0.05, **p < .01, *** p < .001. [t]Age is described as age upon entry. [a] indicates dropped from the chi-square analysis due to small sample size.

To increase sample size and provide a more cohesive analysis, available data from both cohorts were collapsed into one overall dataset of 349 students. Fifty-four students who did not respond to the survey in the 2015 cohort and 2016 cohort were eliminated. An additional four students with missing GPA data were also eliminated. These students started college, completed the survey, but later dropped out before reaching the end of their first semester. The final sample size for the analysis was 291.

Data analysis: GPA

This analysis employs growth curve modelling using a multilevel framework to analyze repeated measures data. These models estimate smoothed academic trajectories (i.e. the linear association between GPA and time) that are unique to each individual to respond to research question 1. Using random coefficient modeling (Polyhart, Holtz, &

Bliese, 2002), a two-level model was developed to describe the changes in students' GPA as a function of entity theory (growth mindset), grit perseverance of effort, grit consistency of interests, and GSE. Because there were multiple observations of semester GPA data for each individual, waves of time data were nested within individuals. Growth curve modelling -- also called multilevel models for repeated measures -- can estimate between persons differences in within-person change (Curran, Obeidat & Losardo, 2010). One advantage of using multilevel models to study growth over more traditional ANOVA models is the flexibility of the approach in handling missing data. Students who have at least one measure of semester GPA are able to be retained in the model. All quantitative analysis was conducted using the lme4 package (Bates, Maechler, Bolker & Walker, 2015) created for R (R Core Team, 2017). The level one and level two models are further described in the following section.

Level One Model

$$\mathrm{GPA}_{ti} = \pi_{0i} + \pi_{1i}\mathrm{Time} + e_{ti}$$

Where GPA_{ti} represents the semester GPA of the *i*th student in the *t* semester, π_{0i} is students' GPA of the *i*th student at time 0. π_{1i} represents the slope for the *i*th student reflecting the linear trajectory of grades over semesters, and e_{ti} is the within student error. If π_{0i} and π_{1i},vary significantly across students, a slope and intercept model is necessary.

The level two model is specified with random effects for each individual (i.e. subject slopes and intercepts) as well as a set of fixed effects (i.e. social-emotional skills and background variables). Model two will allow for a determination of whether or not GSE, entity theory, perseverance of effort and consistency of interests explain a proportion of the variance of students' individual trajectories in achievement. To

facilitate interpretation, the time variable was rescaled to (time minus 1), thus time 0 represents the students' first semester. Additionally, all continuous variables at level 2 will be standardized, including the social-emotional skills variables.

Level Two Models

Random intercept model.

$$\pi_{0i} = \beta_{00} + \sum_{p=6} \beta_{0p} X_{pi} + \beta_{02} Time^2 + \beta_{03} Entity + \beta_{04} PE + \beta_{05} CI + \beta_{06} GSE + \beta_{07} Credits + r_{0i}$$

In this model, the motivational variables (i.e. entity theory, perseverance of effort, consistency of interests and GSE) are predicting GPA at time 0 (i.e. first semester) controlling for the background covariates. Where β_{00} is the mean intercept for students, X_{pi} contains all the background covariates which may relate to students' intercept or GPA at time zero (i.e. ACT score, ethnicity, female, Pell eligibility, first generation status, and age), and β_{0p} captures the effect of the covariates X_{pi}on intercepts. $\beta_{02}\text{Time}^2$ reflects the non-linear, or quadratic, effect of time on intercepts. $\beta_{03}, \beta_{04}, \beta_{05}$ and $\beta_{06}$are slopes capturing the effects of entity theory, perseverance of effort, consistency of interests and GSE on students' GPA at semester 1. $\beta_{07}\text{Credits}$[3] controls for the effects of credits on students' GPA at time 1. r_{0i} is the error term for the intercept model.

Random slopes model.

$$\pi_{1i} = \beta_{10} + \beta_{11}\text{Entity} + \beta_{12}\text{PE} + \beta_{13}\text{CI} + \beta_{14}\text{GSE} + \beta_{15}\text{Credits} + r_{1i}$$

[3] In a preliminary unconditional model with semester and credits, the fixed effect of credits was not significant ($\beta = 0.01$, SE = 0.007, $p > 0.05$), hence the random effect of credit was not necessary.

In this model, the motivational variables (i.e. entity theory, perseverance of effort, consistency of interests and GSE) are predicting the variance in slope estimates for students' semester to semester GPA. β_{10} represents the mean slope for time for all students. $\beta_{11}, \beta_{12}, \beta_{13}$and β_{14} are slopes capturing the effect of entity theory, perseverance of effort, consistency of interests and GSE on students' growth trajectories, and $\beta_{15}\text{Credits}$ controls for the effects of credits on students' slopes. Since I am interested in examining average increase or decrease of students GPA across time the linear time variable was included in this model, but the quadratic term was not.

Overall Model

$$\beta_{00} + \sum_{p=6} \beta_{0p} X_{pi} + \beta_{02}\text{Time}^2 + \beta_{03}\text{Entity} + \beta_{04}\text{PE} + \beta_{05}\text{CI} + \beta_{06}\text{GSE} + \beta_{07}\text{Credits} + r_{0i} + (\beta_{10} + \beta_{11}\text{Entity} + \beta_{12}\text{PE} + \beta_{13}\text{CI} + \beta_{14}\text{GSE} + \beta_{15}\text{Credits} + r_{1i}) * \text{Time} + e_{ti}$$

Data Analysis: Enrollment

Table 2 contains the distribution of students enrolled, not enrolled, and graduated by academic year and cohort.

Table 2.
Enrollment status by academic year and cohort

	First Year		Second Year		Third Year
	2015 (%)	2016 (%)	2015 (%)	2016 (%)	2015 (%)
Enrolled	150 (90%)	162 (89%)	143 (85.6%)	138 (76%)	136 (81.5%)
Enrolled in different campus	1 (0.6%)	1 (0.5%)	1 (0.6%)	2 (1%)	1 (0.6%)
Not Enrolled	16 (9.5%)	19 (10.5%)	22 (13.2%)	37 (20.3%)	21 (12.5%)
Graduated			1 (0.6%)	5 (2.7%)	9 (5.4%)

Note: One student in the 2015 cohort graduated during their second year and was labelled as graduated in their third year. In total 14 students in the dataset graduated.

As seen above, only between 9 – 20% of students in each cohort dropped out at some point of their academic year. Around 22 students in the complete dataset (n = 349)

dropped out and did not return within either two or three academic years (i.e. two academic years collected for the 2016 cohort and three for the 2015 cohort), 28 students dropped out in at least one academic year.

I used multivariate logistic regression to examine the association among social-emotional skills, background variables and enrollment. For this analysis, students who had missing survey data were dropped from the analysis. One student in the 2015 cohort graduated during their second year and was labelled as graduated in their third year. In total, 14 in the dataset graduated and they were recoded as enrolled. Enrollment was dummy-coded (i.e. 0 not enrolled, 1 enrolled/graduated), and students who enrolled in a different campus were still coded as enrolled. Three separate models where fit: predicting first year retention, second year retention and third year retention. Third year retention was only analyzed using the 2015 cohort (n = 160).

Results

Before addressing the primary research questions for this section, several preliminary analyses were conducted, including a factor analysis of the survey administered to students, and basic descriptive statistics and correlational analyses to examine relations among the subscales, student background characteristics and outcomes.

Factor Analysis

Preliminary analyses examined the internal structure of the survey scales administered with both cohorts. Given the changes to the established surveys mentioned above (e.g. changing the scale), it was imperative to examine the internal structure of the overall survey administered before analyzing scores from the survey. To ease interpretability, I avoided reverse coding the items for this first run.

Missing Item-Level Data

Eight subjects had missing data on different items in the final dataset. The level of proportion of missing data was .001 indicating the percentage of missing cells in the data matrix (i.e 0.1%). Missing data analysis followed to examine whether values were missing completely at random (MCAR). Little's MCAR test (Little, 1988) was not significant (χ^2 (174) = 191.41, p = .17) suggesting that values were missing entirely at chance. I used predictive mean matching (PMM) to impute the scores for those 8 cells. PMM is similar to the regression methods except that it uses multiple imputation methods to fill in a value randomly selected from among another observation whose regression predicted values are closest to the regression-predicted value for the missing value of the simulated model. This ensures that the imputed values are plausible (van Buuren & Groothuis-Oudshoorn, 2011).

CFA

I began by conducting a CFA exploring a four-factor solution, composed of grit consistency of interests, grit perseverance of effort, growth mindset and GSE items. Separating the grit scale into two separate subscales is consistent with findings about the factor structure of this scale with college students (Fosnacht, et al., 2017). All of the factors were allowed to correlate. Overall, this model did not provide a good fit to the data. One plausible reason for this is the fact that these scales have been developed in isolation and previous studies have not explored them in relation to one another (i.e., the scales lacked complete construct validation). Hence, past studies do not account for possible intercorrelations amongst these particular items and scales, which is explored with this analysis. Maximum likelihood was used to estimate model parameters and goodness-of-fit of the CFA model was examined with RMSEA > 0.05 (90% CI .08 - .09), SRMR = .11,

CFI = .82 and TLI = .76. These cutoff scores indicate a poor fit for the model tested according to the cutoff scores detailed in Hu and Bentler (1999), hence this particular theoretical model may not be an appropriate interpretation of the interrelations among the items for this sample.

EFA

I then conducted an exploratory factor analysis, re-entering the extra items left out of the CFA analysis, to uncover the general structure of the latent variables underlying the items that constitute the survey. An initial examination of the scree plot generated by correlation matrix of the item responses showed evidence for a 3 and possibly 4 factor solution (see Figure 1). I examined the 3 and 4 factor solution using principal axis factoring and promax rotation (Hendrickson & White, 1964). The promax factor rotation is a type of oblique rotation that allows the overall factors to be correlated to one another. Since these variables all fall into the category of social-emotional skills, there is no reason to believe that any underlying dimensions are independent. Ultimately, I decided to move forward with the four-factor solution, as the three-factor solution combined the perseverance of effort scale with the GSE items. Self-efficacy is generally related to intentions of behavior or future behaviors (Pajares, 1996) while the perseverance of effort scale is related to behavioral tendencies (Duckworth & Quinn, 2009). While the difference may seem trivial, it is significant when predicting future behavior. The four-factor solution ultimately provided a better fit to the data [TLI = 0.91, RMSEA = .057 (90% CI .04 - .06)] .

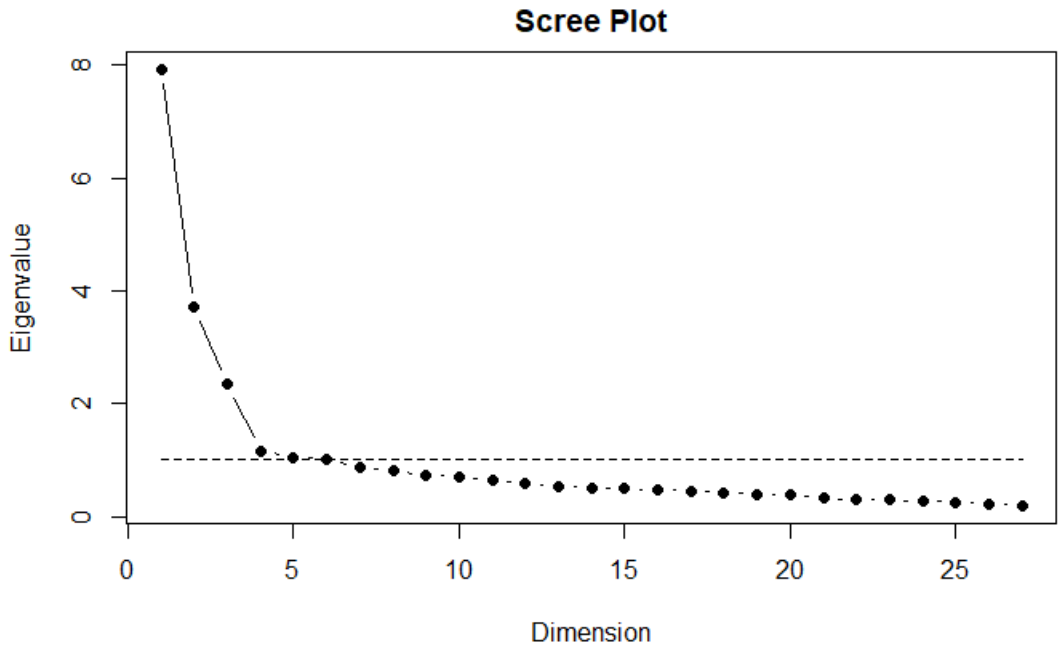

Figure 1. Scree plot showing eigenvalues for each dimension, in principal axis factor extraction.

Table 3 presents the results of the exploratory factor analysis, with the items separated by Factors and each item's factor loadings. Factor 1 (α = .89) was composed of 11 items reported on a 7-point slider scale that explained 43% of the variance with factor loadings from .36 to .93.This factor contained most of the items from the GSE scale with the exception of "It is easy for me to stick to my aims and accomplish my goals" which loaded on another factor. One of the extra items ("I enjoy a challenge") also loaded highly on this factor (.58). This scale was maintained as the GSE scale which measures students' global confidence in their coping ability across a range of stressful or new situations (Luszczynska et al., 2005).

Factor 2 consisted of the growth mindset items, which explained 21% of the variance with factor loadings from -.45 to .86 (α = .82). The extra item "Even if I'm not

naturally good at something, I know I can improve with practice" also loaded highly on this factor. Because most of the items in the growth mindset scale related to fixed mindset, both the growth mindset item (-.43) and the fourth extra item (-.32) loaded negatively on to this factor. Factor 2 was renamed to fixed theory, because three of the growth mindset items were specifically related to endorsing a fixed versus growth theory. Additionally, past studies have indicated that subjects tend to agree with growth items even though they retain a fixed mindset (Hong, Chiu, Dweck, Lin & Wan, 1999), hence, large efficacy studies examining growth mindset use fixed theory items as a measure of growth mindset (e.g., Yeager, et al., 2019).

Factor 3 (α = .74) contained mostly items from the grit consistency of items subscale, along with one item from the extra scale "If I have a choice between an easier and a more challenging task, I tend to choose the easier." This factor explained 19% of the total variance explained by the factors, with factor loadings ranging from .55 - .72. I maintained the factor as inconsistency of interests since the original grit items were worded negatively. These items reflect a tendency to frequently change goals and interests (Credé, Tynan & Harms, 2017).

Finally factor 4 (α = .79) explained 17 % of the total variance and contained three of the grit perseverance of effort subscale items, along with one item from the GSE scale "It is easy for me to stick to my aims and accomplish my goals" Factor loadings on this factor ranged from .46 - .67. As described by Duckworth et al. (2007) as the "ability to sustain effort in the face of adversity" (p. 1090).

There were two items that were either complex or did not load on any factor. The extra item number three "How I've done in the past doesn't determine how well I will do

in the future" loaded low on most items with factor loadings of under .30. Similarly, the extra item "Even if I'm not naturally good at something, I know I can improve with practice" loaded above |.30| on both factor 3 (-.32) and factor 4 (.30). These two items were excluded.

Additionally, The grit item 7, which corresponds to the perseverance of effort subscale, "Setbacks don't discourage me" did not load to the same factor as the rest of the items in that subscale. This is consistent with Fosnacht et al. (2017), who found that excluding this item from the perseverance of effort scale improved model fit and ultimately eliminated it from their model. In this study, the item had a positive factor loading of .36 on the GSE scale and .25 on the perseverance of effort scale, hence, and given Fosnacht et al.'s results, this item was retained in Factor 1 along with the GSE items. Each student received a single score on each factor, representing the sum of their scores on each item divided by the number of items in that factor (their individual mean across items). These scores were used as the social-emotional variables described in the following analyses.

Table 3.
Results of the exploratory factor analysis

Scale	Item	Loadings
Factor 1: GSE (11 Items) α = .89		
GSE	Thanks to my resourcefulness, I know how to handle unforeseen situations.	.70
GSE	I can usually handle whatever comes my way.	.70
GSE	If someone opposes me, I can find the means and ways to get what I want.	.54
GSE	I can solve most problems if I invest the necessary effort.	.66
GSE	If I am in trouble, I can usually think of a solution.	.93
GSE	When I am confronted with a problem, I can usually find several solutions.	.70
GSE	I can always manage to solve difficult problems if I try hard enough.	.69
GSE	I can remain calm when facing difficulties because I can rely on my coping abilities.	.50
GSE	I am confident that I could deal efficiently with unexpected events.	.72
Grit PE	Setbacks don't discourage me.	.36
Extra	I enjoy a challenge.	.58
Factor 2: Entity Theory (4 Items) α = .82		
GM	No matter who you are, you can significantly change your intelligence level.	-.45
GM	You have a certain amount of intelligence, and there's really not much you can do to change it.	.76
GM	Intelligence is something about you that you can't change very much.	.78
GM	To be honest, you can't really change how intelligent you are.	.86
Factor 3: Inconsistency of Interest (6 Items) α = .74		
Grit CI	I often set a goal but later choose to pursue a different one.	.61
Grit CI	I have been obsessed with a project or idea for a short time but later lost interest.	.72
Grit CI	I have difficulty maintaining my focus on projects that take more than a few months to complete.	.64
Grit CI	New ideas and projects sometimes distract me from previous ones.	.65
Extra	If I have a choice between an easier and a more challenging task, I tend to choose the easier.	.55
Extra	Even if I'm not naturally good at something, I know I can improve with practice.	-.32
Factor 4: Perseverance of Effort (5 Items) α = .79		
GSE	It is easy for me to stick to my aims and accomplish my goals.	.55
Grit PE	I am diligent.	.46
Grit PE	I am a hard worker.	.67
Grit PE	I finish whatever I begin.	.52
Extra	Even if I'm not naturally good at something, I know I can improve with practice.	.30
Eliminated		
Extra	How I've done in the past doesn't determine how well I will do in the future.	

Note: *p < .05, **p < .01, ***p < .001. Reporting factor loadings of above |.30|. GSE = GSE, GM = Growth Mindset, Grit CI = Grit Consistency of Interests, Grit PE = Grit Perseverance of Effort.

Correlations Among Variables

Table 4 presets the correlations, means and standard deviations for the continuous social-emotional skills variables, the background variables, and the academic outcomes. The continuous factors were significantly correlated with one another. Perseverance of effort and GSE had the highest correlation (r = .75), although this is not surprising given the structure of the EFA above. Significance among correlations of social-emotional skills and background variables varied. ACT scores was positively correlated with inconsistency of interests (r = .11, p < .05). Pell eligibility was negatively related to GSE; students who were eligible for Pell grants tended to have lower GSE scores (-.12, p < 0.05). Cumulative GPA at year one was negatively correlated to entity theory (r = - .12, p < .05) and inconsistency of interests (r = -.15, p < .01) and positively related to perseverance of effort (r = .17, p < .001). These correlations are in the expected direction given their theoretical relation to academic achievement; however, they are small, which is supported by past meta-analyses (i.e. Burnette, Boyle & Vaneep, 2013; Credé, Tynan & Harms, 2016; Robbins et al, 2004).

Similarly, overall White[4] students had a higher cumulative GPA at year 1 than non-white students (r = 0.20, p < .001). A second outcome variable, number of semesters enrolled, was also included in this correlational analysis. Inconsistency of interest (r = -.025, p < .001) and entity theory (r = -0.25, p < .001) were both negatively correlated with the number of semesters enrolled. Not surprisingly, Cumulative GPA at year one and number of semesters enrolled were significantly and positively correlated (r = 0.35, p < .001).

[4] Ethnicity was recoded to White and non-White when analyzed in the model.

Table 4.

Correlation, means and standard deviations of covariates and outcome

Variable	1	2	3	4	5	6	7	8	9	10	11	*M*	*SD*
1. Entity Theory	1											2.1	1.1
2. Inconsistency of interests	.37***	1										3.8	.99
3. Perseverance of Effort	-.23**	-.34***	1									6.4	1.0
4. General Self-Efficacy	-.17**	-.19**	.75***	1								5.3	.83
5. ACT	-.01	.11*	-.1	.06	1							22.2	1.9
6. Pell	-.01	-.04	-.09	-.12*	-.08	1						.54	.50
7. First Generation	.02	.06	.01	0	.02	.25***	1					.57	.49
8. White	-.03	-.01	-.03	-.03	.28***	-.35***	-.14*	1				.37	.48
9. Female	-.03	.06	-.04	-.13*	-.09	-.12*	.07	.19**	1			.68	.47
10. Cum GPA YR1	-.12*	-.15**	.17***	.01	.06	-.11	-.06	.2***	.04	1		3.2	.57
11. Semesters enrolled	-.25***	-.25***	.11	.02	-.02	.02	0	.05	.07	.35*	1	4.6	1.3

Note: *p < .05, **p < .01, ***p < .001. Semesters enrolled indicates the total number of semesters enrolled by a student.

Growth Curve Analysis for GPA

A fully unconditional model with a fixed-effect of intercept, a random-effect of intercept, and no other terms were initially fit to the data to determine the within and between student variation in grades. The average linear GPA slope[5] of students over semester was -.03 ($p < .001$) meaning that, on average, students' GPA decreased over time. To learn if the slopes vary significantly across individual students, the same model was fit after constraining the variance of the GPA slopes to 0, and then comparing the deviance between the constrained and unconstrained slope model. The deviance statistics is used to test the null hypothesis that the additional model predictors do not improve the fit of the model. Results from the deviance test ($\Delta D = 17$, $\chi^2 (2) = 35.32$, $p < .001$) suggests that we can reject the null, and that constructing an explanatory model to account for the variation in slopes would be productive. I computed the intraclass correlation (ICC) which, in this study, is the measure of the proportion of total variation in the dependent variable that is between students. The ICC was 0.43, this indicates that 43% of the variation in student GPA was due to individual differences.

Visual inspection of the average semester trajectory (see Figure 2) suggests that students' grades tends to drop after their first semester and then increase again towards their 5th and 6th semester. This suggests that the relationship between time and GPA may be parabolic, which requires a quadratic function. Two unconditional models, one with a quadratic fixed effect and another with a quadratic random effect, were built and compared to the original linear model. The model with fixed quadratic semester was found to be significant when compared to the original linear slope model ($\Delta D = 27.5$, $\chi^2 (1) = 27.7$, p

[5] All random effect models were fit using a Nelder-Mead optimizer instead of the default BOBYQA (see Bates et al., 2015)

< .001), however the model with the random effect for quadratic time was not significant. Hence the quadratic time variable was retained for the overall model as a fixed effect.

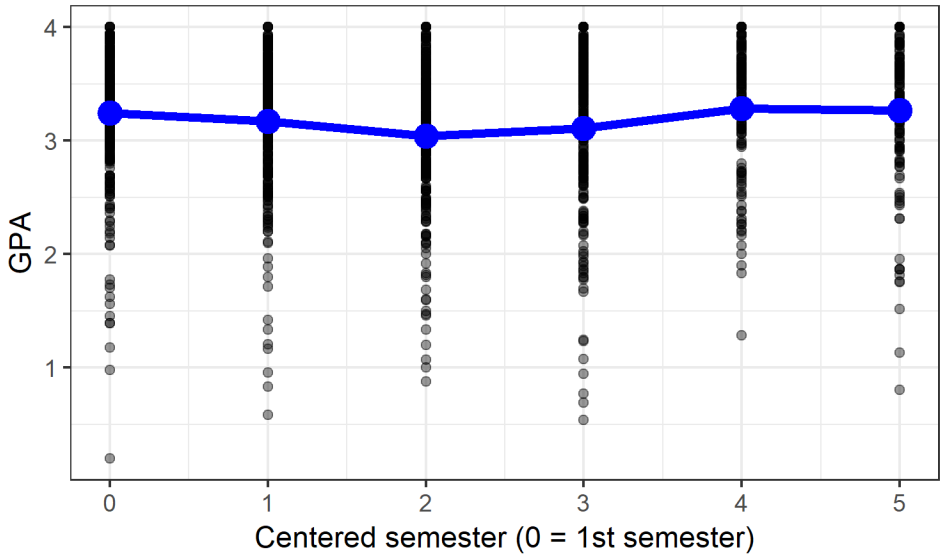

Figure 2. Average linear trajectory of student GPA across semesters

In the present study, all of the continuous explanatory variables were mean centered and standardized (i.e., the mean across individuals was subtracted from each individual score and then divided by the standard deviation). This facilitated interpretation of the resulting model coefficients and intercept. GPA was found to be heavily negatively skewed, with 50 % of the data falling between 3.17 and 4.0. A Tukey transformation procedure was used with these data and described further in Appendix A. This analysis, however, uses the untransformed data to facilitate interpretation of the results.

I checked model assumptions for the final model including normality and homogeneity of variance. A visual assessment of the QQ plots for level 1 and level 2 residuals did not show significant deviations from normality. All data points were centered on the line with deviations at the tail ends. A Bartlett test of homogeneity of variance

showed evidence of heterogeneity of residual variance (K^2 (5) = 39.31, p < 0.001). This is problematic and could be caused by a number underlying issues, specifically: 1) omission of important variables at level 1; 2) the effects of a level 1 predictor treated as fixed when actually random; 3) coding errors in the data; and 4) non-normal data with heavy tails (Raudenbush & Bryk, 2002, p. 263). Potential causes for this heterogeneity are further explored in limitations and in Appendix A.

Table 5.
Results of the growth curve model for GPA

Parameter		Coefficient	SE	*T* value
Intercept:				
	Intercept	3.22***	0.07	41.68
	Semester	-0.14***	0.02	-6.06
	Credits	0.08**	0.02	3.12
	Entity	-0.02	0.03	-0.74
	Grit II	-0.002	0.03	0.06
	PE	0.15***	0.04	3.68
	GSE	-0.11**	0.04	-2.80
	Cohort (2016)	-0.07	0.06	-1.28
	ACT	0.06*	0.02	2.24
	Age	-0.01	0.02	-0.40
	Female	0.05	0.06	0.87
	Pell	-0.04	0.06	-0.74
	First Gen	-0.02	0.05	-0.47
	White	0.13*	0.06	2.18
	$(\text{Semester})^2$	0.02***	0.00	5.07
Slope:				
	Credits	-0.02***	0.00	-2.64
	Entity	-0.01	0.01	-0.97
	Grit II	-0.01	0.01	-1.13
	PE	-0.008	0.01	-0.59
	GSE	-0.001	0.01	-0.13

Note: *p < .05, **p < .01, ***p < .001. Grit II = Grit Inconsistency of interests, Grit PE = Grit Perseverance of Effort, GSE = GSE.

Final Model Results

For the intercept, the regression coefficients indicate that a student who had average scores on entity theory, perseverance of effort, consistency of interests and GSE, and on all background characteristics, had a GPA of 3.22 during their first semester (see Table 5). The main effect of credits, ACT, and White were statistically significant. The effect of perseverance of effort and GSE were also statistically significant. With each 1-SD increase in perseverance of effort, students' GPA at their first semester increased by an additional 0.15 on average. With each 1-SD increase in GSE, the student's GPA at their first semester decreased by .11 on average. The significant and positive quadratic slope indicates that most students experienced an open upward trend in GPA across semesters (see Figure 2).

For the slope model for GPA, the effect size of credits indicated that with each increase of 1-SD in credits, the slope decreases by an additional .02 per semester. Entity theory, inconsistency of interests, perseverance of effort and GSE were not significantly related to student's slope trajectory.

Logistic Regression for Enrollment

Table 6.
Logistic regression analysis of the association between enrollment and social-emotional factors

	Year 1		Year 2		Year 3	
	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE
Entity	.31	.22	1.44	.21	1.80	.47
Grit II	1.06	.25	1.08	.21	1.12	.33
PE	.99	.30	1.46	.25	.82	.45
GSE	1.19	.29	1.05	.24	1.64	.35
ACT	.77	.20	.86	.17	-.72	.28
Age	1.08	.21	.96.	.18	.73	.27
Female	.53	.51	.50	.42	.21	.83
Pell	1.07	.44	1.04	.38	1.72	.59
First Gen	.85	.43	.92	.36	.76	.58
White	1.48	.47	1.03	.40	2.24	.63
Cohort	.83	.47	.43*	.37		

Note: *p < .05, **p < .01, ***p < .001. Enrollment was considered as enrolled for the totality of that year. Students who dropout may have reenrolled again in the following year, hence the number of students who dropped out in their third year was smaller than students who dropped out in their second year.

The analysis of enrollment indicated that the coefficients for the social-emotional skills variables, and the majority of the background variables were not statistically significant. The only significant finding was for cohort at year 2 where the 2016 cohort had a lower percentage of students retained during their second year than students in the 2015 cohort (OR = .43, $p < 0.05$). Females also had a lower probability of remaining enrolled in their third year than males (OR = .21, p = .06) but this finding was just outside the threshold for significance.

Discussion

The quantitative phase of the current study examined the association between social-emotional skills (i.e. growth mindset, grit, and GSE) and students' academic achievement trajectory using growth curve modelling, for two cohorts of students from a college support program at a large Midwestern University. This chapter also studied the association of social-emotional and enrollment using logistic regression with the same group of students. There are many findings from this study that warrant comment.

First, in response to research question 1, results from the growth curve analysis indicated that students' scores on perseverance of effort and GSE were significantly related to their GPA at their first semester ($p<.01$). However, this association was not significant for inconsistency of interests or entity theory. This is consistent with past research that has found perseverance of effort to be a better predictor of academic achievement than consistency of interests in the grit scale (Fosnacht, at al., 2017, Muenks et al., 2016).

The relationship between GSE and student GPA at Time 1 was significant but negative, which means that, on average, students with higher scores on the GSE scales had lower first semester GPA after controlling for background characteristics, grit, and growth mindset. It could be that students in their first semester are overestimating their confidence in their coping abilities, given that they probably have not faced any serious assessments up to that point (i.e., week 5 of courses). Other studies have found a similar negative correlation between performance and self-efficacy (e.g. Lawson, Banks & Logvin, 2006). Vancover et al. (2002) found that by inducing high self-efficacy in individuals in a game related task, performance decreased in a following task, finding a negative effect of self-efficacy. In this experiment, participants later sprung back in performance to compensate for the previous failure. Their explanation is that individuals' with higher self-efficacy may more readily feel that they have processed feedback instead of pondering feedback more thoroughly. This study could provide insight to our findings, where students' with higher self-efficacy may believe they are processing feedback more effectively than they are, particularly in the first weeks of schools when feedback is ambiguous. Yet this finding is difficult to accurately interpret without reservations given the high positive correlation between general self-efficacy and perseverance of effort. It may be that this positive

correlation is confounding the association between each variable and the outcome. This issue is explored further in Appendix A.

Second, students' linear slope trajectories were not found to be significantly associated with any of the social-emotional skills; fixed theory, GSE, inconsistency of interests and perseverance of effort were not found to be related to individual students' linear relationship between time and GPA. This result was surprising, given that it would be expected for students high on these social-emotional skills to improve steadily across time. However, results from this analysis should be interpreted with caution given the limitations described below. Additionally, the qualitative section of this dissertation will provide some context and discussion for these results.

Students' average credits per semester was significantly related to GPA. Students who on average take more credits per semester tend to decrease in GPA towards later semesters. It warrants mention that this linear trajectory does not fully explain the relationship between GPA and time given the significant effect of a quadratic slope. Nonetheless, this finding is contrary to many other studies that have found a positive association between number of credits and GPA (Duby & Schartman, 1997; Szafran, 2001). These studies, however, examine students' academic load cross-sectionally, not across time. Hence one possible interpretation for this finding is that students who tend to take larger course loads each semester suffer a burn-out effect in later semesters which is reflected in lower GPA's in later semesters.

In relation to enrollment and research question 2, the social-emotional skills of interest (viz., general self-efficacy, grit and growth mindset) were not found to be significantly related to enrollment at the end of their first year, second year or third year.

This finding could again be related to students' lack of experience or adaptation to college at the moment of survey administration. In one study, for instance, authors found that assessing non-cognitive skills before college did not add to the prediction of persistence beyond past performance. However, for participants in this study, at second semester these skills were associated with increase in odds of persisting into sophomore year (Kahn & Nauta, 2001). In contrast other studies suggest that social-emotional skills remain stable from high school to college (i.e. Robin & Pals, 2002).

Limitations

There were many limitations to these analyses that need to be considered. First, the outcome variable had many unfavorable characteristics: 1) it is a bounded variable; 2) it was heavily skewed in the present sample; and 3) college GPA as an outcome variable is limited because of course selection bias and grade inflation (Johnson, 1997). GPA is a theoretically bounded variable with grades limited between 0 and 4.0. Using a bounded outcome can result in violations of the homoskedasticity assumption (Hayes & Cai, 2007), which was not met in this study. While transformations are often recommended as a measure to address non-normality, they also make results more complex to interpret (Osborne, 2002). I have explored this issue further using a transformation in Appendix A, using this transformation on the dependent variable did not change the overall results of this analysis.

Second, student's survey responses may have been affected by desires to respond with correct answers or in socially desirable ways (e.g., Maruyama & Ryan, 2014, p. 120). Students had already discussed topics of growth mindset and intelligence in class before being administered the posttest, and may have been influenced by this discussion to provide

"correct" responses to the survey, which would reflect the overall message from class without an authentic change in attitude. This sample was also distinct for the campus, so results from these analyses likely are not generalizable to other college students on the same campus.

Third, there is a possibility that the factors used to construct the social-emotional skills variables do not represent the true underlying factor structure of the data. The initial confirmatory factor analysis meant to follow the theory underlying the scales was found to have a poor fit to the data. A subsequent exploratory analysis required certain decisions and assumptions to be made about the number of factors and meaningful factor loadings which could have biased the construction of the variables. Although this may be true, some changes made to the existing instruments did align with current validity data, particularly for the grit scale. As mentioned above, Fosnacht, et al. (2017) detail extensive evidence supporting a two correlated factor model, instead of two factors subsumed by a higher order grit factor. Additionally, they also found that the item "setbacks don't discourage me" worsened model fit for the perseverance of effort subscale which in this study fit under the GSE scale.

Finally, there were students who had GPA of 0 for certain time points. Using a multilevel framework to model growth curves allows for these students to remain in the data set even when they had missing GPA at one or more timepoints. However, this pattern of missingness in GPA is most likely because of students' dropping out, dropping out and reenrolling or graduating. This would make the pattern of missing nonignorable. Raudenbush and Bryk (2002) mention that results from nonignorable missingness are still robust if all the data are efficiently used and the fraction of missing information is small,

however, around 20% of the data in this study was missing due to one of the factors stated above. This affects the interpretation and generalizability of the results stated above.

Conclusion

In conclusion, the quantitative analyses found no significant association between students' social-emotional skills and achievement trajectory or enrollment. However, this study did find a significant and positive association between perseverance of effort and first semester GPA. This examination also found evidence of a negative association between students GSE and first semester GPA. Growth curve analyses are a promising method for examining academic achievement outcomes in a way that aligns with theories of motivation. They allow researchers to explore average growth trajectory across time and model predictors within student and between students. The current analysis did not find a significant association between social-emotional skills and student growth trajectory, however, limitations to the analysis could have hindered these results. The following chapters in this dissertation will explore the qualitative and integration phases of this mixed-methods study to provide a more complete picture of these skills and their impact on college students.

Chapter 5: Qualitative Phase

The qualitative phase of this study examines students written class assignments to describe how students define intelligence and growth mindset and illustrate how they apply these concepts to their lives.

Research Questions

3. What theories of intelligence are CSSP students ascribing to in their definitions?

4. How do CSSP students define growth mindset, after being introduced to the concept through class lecture and readings?

5. How do CSSP students reflect on the concepts of intelligence and growth mindset and apply these concepts to their lives?

a. What larger themes are CSSP students' expressing in their reflections?

b. What, if any, relationships do they construct among growth mindset, concepts of intelligence and navigating college?

Methods

Procedure

Student reflections were written as part of a homework assignment after engaging in lecture and discussion about intelligence and growth mindset. In these tasks (Appendix B) students were asked to examine the week's reading assignments, videos, and lecture PowerPoint; and write a reflection essay based on four prompts.

Instructions for each cohort varied, and students in each cohort had different instructors, which may have affected how they perceived the content in the class (see Chapter 3 for more about the lecture and homework). In 2015, students were asked to write a reflection essay of between 150-250 words responding to the following task instructions:

1) Write a definition of intelligence that includes exactly 32 words. Secondly, re-create a definition with only 16 words. Lastly, make a definition in 8 words. What essence has been distilled in this process?

2) Write a definition of "the growth mindset" that includes exactly 32 words. Secondly, re-create a definition with only 16 words. Lastly, make a definition in 8 words. What essence has been distilled in this process?

3) What in this week's unit did you find thought-provoking, interesting, compelling, and/or perplexing? Or, what questions did the learning resources raise for you?

4)How might this week's content be useful to you?

In 2016, students had to write a reflection of between 250-500 words addressing the following prompts:

1) Write a definition of intelligence that includes exactly 32 words;

2) Write a definition of "the growth mindset" that includes exactly 32 words;

3) What in this week's unit did you find thought-provoking and why?;

4) Based upon this week's resources, are there any changes you would make this semester/year?

Students in both cohorts typed their responses directly within the assignment box provided by the course's online management system. The assignment also included assessment and grading criteria (for a full description of the assignments please see Appendix B). I separated the assignment into different tasks: definitions of intelligence, definitions of growth mindset, and reflection (i.e. task 3 and 4). There were many

differences between the task assigned in 2015 and 2016 which are further discussed in the limitation section of this chapter.

Overall, 170 (96.5%) written reflections are available for the 2015 cohort and 169 in the 2016 cohort (92.8%). Each reflection was provided in a separate html files and supplied to the researcher deidentified with an id number created by program administrators. The total sample size consisted of 339 individual student written reflection.

Data Analysis

This study used a grounded theory analytical approach to categorize and summarize students' written assignments. Grounded theory uses an inductive reasoning to "discover hypotheses and concepts that are systematically worked out in relation to the data during the course of the research" (Glaser & Strauss, 2017, p. 6). Taking this approach allowed me to examine the data with a blank slate, and to use inductive reasoning to situate the analysis within the students' own frameworks not pre-existing ones. I relied on Johnny Saldaña's (2013) first and second cycle coding methods to build and refine the codes and themes created through this analysis. These themes provide evidence or support for the assertions detailed in the discussion. All of the students' qualitative data were analyzed using NVivo qualitative data analysis software (QSR International Pty Ltd. Version 12, 2018). The objective of this analysis was to develop a conceptual framework of students' definitions of intelligence and growth mindset and provide a descriptive analysis of their reflections about these topics.

Coding Procedure

Preparation for First Coding Cycle

To prepare for the first coding cycle (Saldaña, 2013), I extracted a random selection of around 10% of the total sample of reflection papers (around 32 reflections). This first process allowed me to decide on a coding approach and set up a process before coding the set of over three-hundred reflections. During this categorization, I carefully read through each assignment, writing analytic memos throughout the process. These analytic memos were short paragraphs which addressed emergent codes, notes about possible networks, and personal connections I had to the content to inform the appropriate coding method for the first coding cycle (Saldaña, 2013).

This first reading of students' written work was very enlightening.It helped me develop an initial understanding of students' thoughts and ideas and provided guidance to decide the best analytical procedure for every task. For instance, I realized that, when examining students' definitions of intelligence, instead of applying clear theories of intelligence, they mentioned words and concepts such as "knowledge", "processing", and "information". Because this first look through the data created difficulty classifying these definitions, I relied on NVivo's query function to discover the words and phrases most used in students' definitions of intelligence. Query specifications included identifying the 100 most frequent words used and their synonyms. NVivo provided a list of words, with their counts and a list of synonyms for these words.

For students' definitions of growth mindset, I discovered recurrent themes of effort, growth of abilities or intelligence, seeking challenges and focusing on learning. I decided

to start with some preliminary codes of these concepts (i.e., improvement/growth, effort, seeking challenges) to code the definitions of growth mindset.

Additionally, from this review, I discovered that students were expressing different levels of depth in how they planned to apply these concepts to their lives. Some students limited their reflection to re-framing the topic seen in class, whether it was about growth mindset or more general about intelligence. Others, however, expressed a deeper level of reflection, identifying past thoughts or behaviors that were related to the topics, and describing strategies or actions to change their beliefs or behaviors. For this part of the analysis I decided to focus on the content of students' reflections instead of the depth or quality of these thoughts.

First Coding Cycle

I proceeded with a combination of two exploratory coding methods (Saldaña, 2013): *descriptive*, which provides a word or short phrase to describe a datum, and *provisional*, which relies on a pre-determined list of preliminary codes which were determined from the previous exploration of the data. I also separated students' definitions of intelligence to be examined later using NVivo's query function. For the purpose of coding, datum or units of data were defined as complete thoughts; as examples: "because one's abilities and talents are entirely due to our actions and determination," and "… who believe their basic abilities and skills are made of hard work and dedication."

I divided the overall sample into 11 different groups which contained around 20-30 individual assignments. This process helped me organize my coding sessions following the groups created and separate the data into manageable chunks, which was necessary to mitigate the effects of coder fatigue (i.e. exhaustion resulting from reading and coding long

texts of data). Each of the 11 coding sessions began by first transferring the files to NVivo 12 to prepare for analysis. As mentioned previously, each assignment was separated into different parts (i.e., definition of intelligence, definition of growth mindset and reflection), which included coding each section as different categories.

Second Coding Cycle

For the growth mindset definitions and reflection sections. I employed Axial coding as a second cycle coding scheme (Saldaña, 2013). This method combines codes into larger chunks, identifies the most descriptive codes, describes the properties of each code, and explores relations between sub codes (Simmons, 2017). I then combined these larger axial codes into a conceptual map (Butler-Kisber & Poldma, 2010) documenting the relation aspects of my initial interpretation of the data. I began this process starting from the most prominent codes of growth and effort. From there, I incorporated each axial code into the conceptual map, drawing arrows and lines that represented associations between the codes that I had gathered from both my knowledge of the theoretical underpinnings of growth mindset and my exploration of the data. Finally, I reviewed the map with a peer reviewer and edited the map based on his analysis and our conversation (e.g. he suggested that secondary processes should all be at the same level, instead of placing one above the other as it was initially structured).

In preparation for the second coding cycle, I first went through the process of peer reviewing or debriefing for codes produced in the first coding cycle (please see the validation subheading below). This process helped me challenge my assumptions about the data, consolidate codes which were repetitive, and examine my preliminary assertions.

Validation

To provide validation for my study, I relied on two of the nine validation strategies described by Creswell and Miller (2000). They suggest that validation in qualitative studies has the purpose of demonstrating that a study is credible and accurately represents the participants' realities. But to establish validation, Creswell (2013, p.253) recommends employing at least two of these validation strategies. For this study I relied on two validation strategies clarifying researcher bias and peer debriefing.

- *Clarifying researcher bias:* While coding, I maintained a working document clarifying potential biases I may have developed with respect to the codes I produced. This helped me account for potential assumptions or beliefs that may have affected my interpretation of the results. In general, I saw that my lens as a social psychology researcher led me to over-interpret some of students' statements and fit them into existing theories of motivation. For example, during the first review of the data, I wanted to use constructs such as learned helplessness, or performance versus learning goals to describe students' definitions, which are specific motivational phenomena. Instead, I decided to move forward with more descriptive codes avoiding social psychological constructs and terminology.
- *Peer review or debriefing:* I engaged in peer debriefing to strengthen the credibility of my codes for the growth mindset definitions and the reflection sections. Debriefing is meant to be done with someone familiar with the research of phenomena being explored (Creswell & Miller, 2000). Hence, I relied on two colleagues both familiar with motivational theory and educational research. Each peer reviewer engaged with a different task (i.e. growth mindset definition and

reflection) by reading 10% of the available data, around 33 written tasks and providing feedback for the original codebook. This feedback was incorporated into the final codebooks presented in Appendix A and Appendix B. We also discussed possibilities for larger themes and connections which helped inform the second coding process for each task.

Results

Definitions of Intelligence

Query specifications for students' definitions of intelligence included identifying the 100 most frequent words used. NVivo provided a list of words, with their counts and a list of variants for these words (e.g. knowledge, and knowledgeable). These words were then categorized into their corresponding part of speech (i.e., noun, verbs, adjectives, pronouns, and adverbs). I eliminated pronouns (e.g., one and everyone); adverbs (e.g., also, many, and well); nouns that referred to the person (e.g., self and individual); words that were redundant because they were mentioned as part of the prompt (i.e., intelligence and defined); and non-descriptive nouns (e.g. things). By establishing these criteria and eliminating what I considered superfluous words, I was able to capture a list of concepts that, to a certain degree, reflected students cognitive representation of intelligence. This resulted in a list of 73 words. In Table 7 I provide the top 25% most highly mentioned words (please refer to Appendix C for the complete list).

Table 7.
Word Query Definitions of Intelligence

Word	Part of Speech	Variants of Words
knowledge	noun	knowledge, knowledgeable
ability	noun	abilities, ability
learns	verb	learn, learned, learning, learns
applying	verb	applied, apply, applying
skills	noun	skill, skilled, skillfully, skills
information	noun	information
understand	verb	understand, understandable, understanding, understandings, understands
use	verb	use, used, useful, usefully, uses, using
differently	adjective	differ, different, differently
able	adjective	able
think	verb	think, thinking, thinks
life	noun	life
situations	noun	situation, situations
new	adjective	new
acquire	verb	acquire, acquired, acquires, acquiring
brains	noun	brain, brains
knows	verb	know, knowing, knows
problem	noun	problem, problems
measures	verb	measurable, measure, measured, measurement, measurements, measures, measuring

Note: This only represents around 25% of the word query results. The rest of the results are included in Appendix C.

Definitions of Growth Mindset

In total, 13 codes were generated from students' definitions of growth mindset. The code that was most prevalent in the reflections was about growth or improvement. Over 180 students connected the concept of growth mindset with expansion of knowledge, abilities, or intelligence. They described this code with phrases such as "believing intelligence can grow" or "improving intelligence levels."

The second largest code was effort, where they identified practice or hard work as important to increasing their intelligence or expanding their skills. Phrases that characterized this theme were "developing skills through practice"; "abilities can change with effort" and "effort is needed for growth." Interestingly, although students did mention hard work as important, some also reflected on how hard work may not be enough if you do not engage in the correct strategies. This idea was presented in the article provided to them "Carol Dweck revisits the growth mindset" (Dweck, 2015).

Learning from setbacks or engaging in challenges was also a popular idea that students related to growth mindset. They mentioned that growth mindset "…motivates people to tackle challenge" and "look to mistakes and see that one can improve." Neuroplasticity, perseverance, accomplishing goals, trying new strategies, keeping a positive outlook, confidence in their abilities and going beyond their limits were also concepts that they used to describe growth mindset. For complete codebook please see Appendix D.

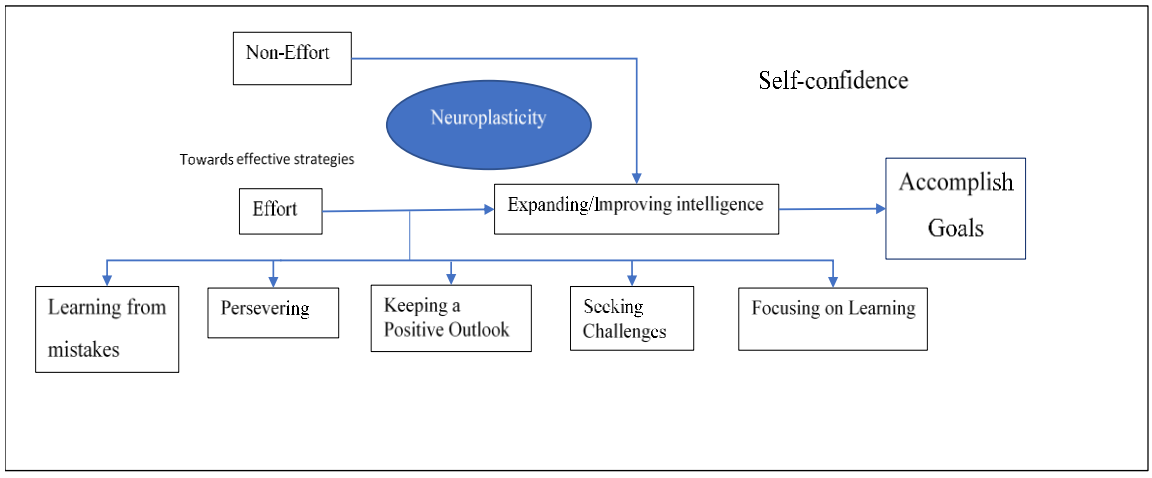

Figure 3. Exploratory model for students' definitions of growth mindset

Figure 2 shows the exploratory model connecting the concepts students generated from their definitions produced from the analysis described above. In general, students described growth mindset as the belief or frame of mind that you are able to expand or improve your intelligence through the mechanism of neuroplasticity. This expansion primarily requires effort (i.e., practice, dedication, and/or hard work); however, this effort needs to be employed in the right strategies. In contrast, some students identified other mechanisms through which this improvement happens, for example, as a natural product of human development or through time (i.e., non-effortful experiences).

There are other collateral processes that were identified as critical for this occurrence such as perseverance (i.e., overcoming obstacles, resilience and not giving up) and adapting. Other secondary processes include learning from mistakes, accepting challenges, maintaining a positive outlook, and developing a passion for learning (i.e., learning goals). Self-confidence was an important facilitator for the whole process.

Reflection: Appling these concepts to their lives

Students reflected about a myriad of different topics and to different degrees of depth. Overall, 12 different codes were generated for how students applied these concepts to their lives. These codes included: beliefs, gratitude, behavioral changes, interpersonal relationships, seeking future challenges, overvalue of intelligence, importance of change, growth mindset as necessary for success, positive outlook, the impact of culture on mindsets and questioning the purpose of grades. For the complete codebook please see Appendix E.

During the second coding cycle I consolidated and reduced my codes into four larger themes to summarize students' reflections. I also separated some codes into smaller

categories to better express themes and context. First students described changing beliefs in their reflection responses. For example, students explicitly mentioned changing their fixed mindset to a growth mindset. However, this change was not always moving from one end of a spectrum to another; some students identified that they had a combination of both fixed and growth beliefs, and each had a different application to certain aspects of their lives. Second, having to define intelligence and understand growth mindset prompted students to think about how the larger culture portrays intelligence and achievement in general with a particular focus on standardized testing. This also had them questioning their ideas about their own grades, and their role in their academic success. Third, students talked about specific behavioral changes modifying their approach to college by challenging themselves more, reflecting on their strategies or changing their approach to learning Fourth, some students discussed these weeks' content in relation to other social-emotional skills. For example, students discussed the importance of the weeks' content on interpersonal skills, self-confidence, and optimism. Finally, the last theme, value of growth mindset, integrates the codes of importance of change and growth mindset as important for career or success. This theme relates to internal and external benefits that students identified linked to adopting a growth mindset, which would help them change their perspectives or reach career success.

Table 8.
Reflection codes and themes

Themes	Codes	Examples
Mindset beliefs	Changing their fixed mindset to a growth mindset	"I struggle with math and I have a fixed mindset that I'm just bad at it and I could never get better but if I applied more of a growth mindset to math, I could get better at it."
	Combination of both fixed and growth mindset	"I have a fixed mindset when it comes assignments, tests, and quizzes. I think negatively when I don't get the correct answer or when I get a bad grade, I feel as if my life is over and that grades only matter in class. When it comes to sports for me, I have a growth mindset."
	Fixed mindset	"I have always believed that your brain is fixed on only being able to retain or is successful with certain subjects."
Culture and Intelligence	Societal value of intelligence	"I think intelligence is extremely hard to define because the idea of intelligence in the US might not be the same as elsewhere in the world."
	Value of grades	"For this semester, I will try not to let my grades affect me in a negative way. I believe that grades shouldn't define a person."
	Pressure of standardized testing	"It also really hard to have a growth mindset since the society measures intelligence with tests such as ACT, SAT, MCAT, and LSAT where is no place for mistakes and failings"
Changing their approach to learning	Challenging themselves more	"This weeks content will make me a much more ambitious learner, and will challenge myself to broaden my areas of study."
	Reflecting on their strategies	"A few changes I would like to make this semester/year are to work harder to stay on top of things. Sometimes I fall behind and do things at the last minute. I need to quit procrastinating."
	Reflecting on changing their learning	"I want to change how I learn new things and how I keep them with me throughout my whole life. Instead of just learning something just because I'm going to be tested on it and forgetting it the next week, I want to try learning things to help expand my mindset and intelligence and actually putting them to use in my life and keeping them within my memory so it can help expand my mind."

Other social-emotional skills.	Interpersonal skills	"This week's content is useful to me because I can become more careful of my actions and how it affects others."
	Self-confidence	"During this week I have learned that I need to believe in myself more in order to gain more intelligence. Confidence is a huge thing while taking on new information. I have never given myself enough credit and therefore I am less confident than I should be during my academics."
	Optimism/positive outlook	"It made me think about the attitude I have and how I view happiness. You don't benefit from being sad/depressed, it brings you down. Be happy and think positive because then you will learn more and be more productive."
Value of growth mindset	Internal value of growth mindset	"Lastly, I believe that this week's concept of neuroplasticity is useful because it lets us know that we can change the way we think. With that, it teaches us to look for new ways to go about things."
	External value of growth mindset	"What I found thought provoking in this unit is that your mindset, whatever it may be, has an enormous significances a person's success in certain actions that person does."

Discussion

The following qualitative stage of this dissertation provided an overview of how students' conceptualized intelligence, growth mindset and how they reflected about these concepts in their written reflections. Discussion will highlight patterns of findings across task activities to provide general assertions about this particular activity and this sample of students.

The definitions of intelligence written by students differ from previous studies examining how individuals conceptualize intelligence. For example, Sternberg et al. (1989) conducted three studies to examine the conceptions of intelligence of both experts and laymen. They found that people in general have clear prototypes of intelligence and that

these relate to existing psychological theories of intelligence (e.g. general intelligence theory). Conversely, the students in this study did not refer to specific theories but used words to emphasize different aspects of intelligence, hence, to respond to research question 3, I used a word query to describe students definitions. For example, the verb *apply* was used extensively across students' definitions, which could signify that how intellect is used or employed is practically as important as what it contains (i.e. skills, knowledge, and abilities). The use of nouns such as *life, situations* and *problems* also highlight the importance of utilizing intelligence in common life practice.

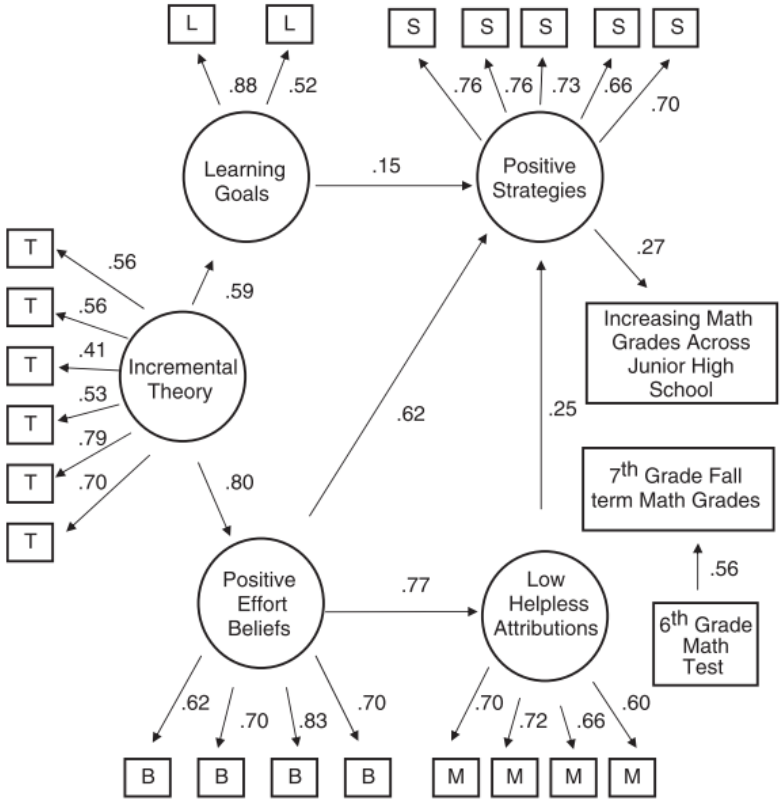

Figure 4. Path model of processes linking seventh-grade theory of intelligence and other motivational variables to growth curves. Reprinted from "Implicit Theories of Intelligence Predict Achievement Across an Adolescent Transition: A Longitudinal Study and an Intervention" by Blackwell, L.S., Trzesniewski, K. H., & Dweck, C, S, 2007, *Child Development*, 78(1), p. 253. Copyright 2007 by the Society for Research in Child Development, Inc.

In response to research question 4, students' definitions of growth mindset were very similar to the original model of growth mindset described in Blackwell et al. (2007) with seventh graders (see Figure 3). Correspondingly, students in this study identified the relationship between positive effort beliefs and positive strategies; incremental theory (i.e. expanding/improving intelligence), and learning goals (i.e. focusing on learning); and even the importance of low helpless attributions (i.e. keeping a positive outlook and persevering).

Unlike the seventh graders in Blackwell et al.'s study who responded to a survey, the college students in this study were asked to formulate their own definition of growth mindset, and, consequently, the relationships between these variables are not as demarcated as they are depicted in the path model in Figure 3. This bring up questions as to exactly how do these variables work and intertwine within students' cognitive representations to affect behavior? Furthermore, college students created links between growth mindset and other distinguishable skills, for instance they often described confidence (self-efficacy) and perseverance (grit) as fundamental characteristics of growth mindset. Again, it seemed like they viewed these skills as part of a larger motivational framework with complex and intricate connections rather than independent constructs.

Students also wrote that the expected outcome of this process was goal accomplishment, and many announced in their reflections that their goals were to seek challenges and learn even if it meant disregarding their grades. This focus on seeking challenges may be detrimental to students' academic achievement (i.e. GPA) because it involves them choosing more rigorous coursework and possibly classes with stricter grading standards. The paradoxical relationship between challenge and risk taking and

academic achievement is an important finding, particularly when defining success in college.

To respond to question 5, I emphasize some themes that were salient across the three task and mentioned particularly in students reflections. It was clear from students' definitions of intelligence and subsequent reflection that the idea of measuring intelligence and their abilities is something that was constantly on their minds, whether it was reflected in their GPA or in the cultural of standardized testing. While some identified it as a common characteristic of intelligence, others rejected this claim altogether, stating that intelligence was not in grades or numbers.

Many students rebuked having measures of intelligence dominate their lives. One student wrote about this subject very passionately:

> Something that I deeply resent is the idea that the ACT test is supposedly testing our intelligence by a series of multiple-choice questions and comparing everyone as an equal. That is not fair. The ACT test tests one's ability to answer questions in a limited amount of time; not how well they apply the knowledge they gained from school or life to be successful in the future. But sadly, success starts at the ACT test, which needs to change. We live in a time of much talk about intelligence. Yet we operate with a fairly restricted notion of what that term means, on identified with the verbal and quantitative measures of the schoolhouse and IQ [citation]. I couldn't agree more. I'm tired of the ACT deciding where I can and can't attend college, how many scholarships I get, and if I'm "worthy" enough to be a college level student.

Peter Sacks (1997) discusses the cognitive and emotional toll testing can take on students. He mentions that standardized testing is a meritocratic gatekeep which brands those who score poorly as deficient, resulting in a stigma that lives on with students throughout college. It could be that students from the CSSP program are feeling this stigma, given that a number of students in this program may have not reached the appropriate test score to receive unqualified admission to the university. This echoes current debate about the fairness of standardized testing for students of minority and low-income backgrounds (e.g. Camara & Schmidt, 1999; D'Orio, 2019), with many universities now forgoing SAT and ACT for their admission requirements.

In regard to growth mindset, students mentioned changing their beliefs and behaviors based on what they learned during that week's content. They provided examples of fixed mindset that they had identified within their own experiences, and ways in which they could counteract these beliefs in the future through strategies such as positive self-talk ("I'll remind myself that I can do better") or changing their habits ("I can change the way I study"). It was evident that students made connections from these skills to their academic lives and behaviors, even if that mechanism was not fully detailed. Interestingly, some students also identified not changing their habits, opinions or beliefs given the content, either because they were already familiar with the concept (e.g. "… I don't think I will be making any changes to my study habits or my mindset. I feel like that I already had the growth mindset throughout middle school and high school."), or they weren't fully convinced by the message of growth mindset (e.g. "I am not a full believer in the growth mindset idea yet"). The examples presented by students relate closely to Carol Dweck's

(2000) theory and growth mindset, where she details how growth mindset can lead to use of more effective strategies and, consequently, improved achievement.

One final theme students reflected on was about their individual positionality. As, one student describes:

> I think most students of color feel this pressure because they might be feeling that their families and parents sacrificed too much for them to attend college, so they feel like they have to get good grades. I personally feel this pressure because being [ethnicity], my family expects a lot from me. Also, since my parents moved from [country] leaving everything behind to improve my life and future I feel obligated to work hard and succeed. In my culture the child is expected to take care of his or her parent and the rest of the family.

For this student, the external pressure described makes performance and grades much more salient, leaving no space for embracing challenges or forming a passion for learning. Students bring their individual lived experiences with them every day to school and classes, and their identities affect their sources of motivation and general beliefs. This is an important theme to consider when developing universal interventions to promote social-emotional skills or deciding on social emotional competencies. Gloria Ladson-Billings (1995) discusses the importance of incorporating aspects of students' home/community environment into the classroom through culturally relevant pedagogy. Similarly, this qualitative result highlights the importance of considering students' cultural background when teaching these skills and the possibility of designing curricula around social-emotional skills that also aid students in affirming their own cultural backgrounds.

Integrating culturally relevant pedagogy would allow practitioners to design meaningful social-emotional learning programs which appeal to a diverse body of students.

Limitations

There were some important limitations that warrant consideration from this analysis. First, all coding was conducted by one individual, which could have introduced bias into the coding process. Attempts were made to establish reliability of the coding scheme through peer debriefing, and close adherence to coding methods to assure consistency of the coding process. Nonetheless, relying on one coder could have introduced potential bias in the resulting codes and interpretation. Additionally, analyzing this dataset involved many hours of reading and coding for one individual, which could have led to coding fatigue and the miscoding of some passages. Second, passages were transferred from HTML directly to NVivo; obvious spelling mistakes were corrected to minimize measurement error in the NVivo query. Even so, this process may have introduced bias into the coded passage by mistakenly inferring corrections where none was necessary. Third, the difference between tasks in 2015 and 2016 also may have affected how students responded. Students in 2016 tended to dedicate more of the space in their writings in the final reflection question as opposed to 2015. Since students in 2015 were asked to allocate in total around 56 words of their 150-250-word reflection on each of their definitions, this left little space for them to respond to the reflection part of the assignment. Finally, member-checks were not available for these data. This means that students were not able to revise the interpretations made for the passages that they wrote, and the coder could have over- or under-interpreted the meaning behind these passages.

Conclusion

The preceding qualitative analysis provided insight into students' views and ideas about social-emotional skills and related concepts. These results showed evidence that students engage deeply with these topics, if presented with the opportunity, and reflect about the role these skills play in their lives and achievement. Furthermore, students were able to pick up on nuances which are often overlooked in studies, for example that perseverance in effort is not always enough if not applied to the best strategies, or that individuals are a combination of fixed and growth mindset that is dependent on the context. Examining students' individual experiences also emphasized the impact of individuality and positionality when it comes to the examining the relationship between social-emotional skills and achievement.

Chapter 6: General Discussion

This dissertation explored the value of social-emotional skills in college. Two separate analyses were conducted with two cohorts of students from a freshman first-year experience course. The first analysis used growth curve modelling to explore the association among students social-emotional skills, achievement, and enrollment. The second set of analyses delved deeper into students' conceptualization of these skills by examining students' written reflections. Chapters 4 and 5 respectively present both of these analyses, their results, limitations, and discussion of specific findings. The aim of this chapter is to provide a general discussion, integrating both into a cohesive set of findings and linking them back to the issues that motivated the research.

The first finding that merits further consideration is the puzzling relation between social-emotional skills and students' academic achievement. The quantitative results found no association of students' scores on grit, growth mindset and general self-efficacy scales and student outcomes (i.e. enrollment and GPA trajectory). This is counter to what would be expected from theories of social-emotional skills. Additionally, for the outcomes of first semester GPA, results showed a small but significant association with perseverance of effort; and a negative association was found with general self-efficacy. These results are indicative of the difficult and convoluted association between perseverance of effort and general self-efficacy (see Appendix A), and, hence, these results could not bring more clarity to which skills were most important. The limitations associated with this analysis, presented in the quantitative chapter, might diminish the reliability of these results; specifically, threats to internal validity such as the construction of the instrument scales and student responses favoring social desirability. Additionally, it was necessary to model

the outcome variable of GPA as a continuous variable, ignoring the upper bound of 4.0 which caused a ceiling effect reflected in the non-constant variance in model residuals. Finally, the number of students who completely dropped out from the overall dataset was around 10%, which may have affected the prediction of enrollment.

Despite the counterintuitive results from the quantitative analysis, these results point to a more complex association between social-emotional skills and achievement that was suggested in the qualitative data, when we consider them together with what we observed through the quantitative analysis. First, students in their reflections explicitly mentioned paying less attention to grades and test scores in favor of learning. Second, students highlighted seeking challenges and not being afraid of committing mistakes. Given students' increased agency in college, seeking challenges could translate to enrollment in more difficult courses with stricter grading standards and background requirements. Third, many students reacted negatively towards a predefined measure of intelligence as reflected in either standardized testing or grades.

The quantitative and qualitative findings above evoke a larger discussion about conceptualization of college student success in higher education research and policy. The heightened agency provided to students in college and their increased independence as emerging adults allows them to tailor their academic experience to meet their specific goals. Consequently, greater goal achievement may not be reflected in students' individual grades, particularly if students selecting more challenging courses are hence receiving poorer grades when compared to other students (i.e. effects of grade inflation; Sabot & Wakeman-Linn, 1991). Thus, promoting social-emotional skills may not lead to outcomes that we would traditionally expect, or even may seem as having the opposite effect. Future

research should continue to examine other college outcomes, such as personal goals, participation in educationally purposeful activities (Kuh, et al., 2006) or career success, to evaluate the practicality of social-emotional skills in college beyond GPA-based measures, particularly for different subsets of students such as the underserved students examined in this study.

A second important general finding was the difficulty in finding a clear conceptual and operational distinction among the social-emotional skills used in this study. As assessed in the qualitative results of this dissertation, while describing the concept of growth mindset students also mentioned other skills, such as perseverance and self-confidence. Likewise, the quantitative analysis found a high correlation among social-emotional variables, particularly between perseverance of effort and general self-efficacy. The factor analysis also highlighted many operational similarities among the scales used in this analysis, for example, items from the general self-efficacy scale loaded highly on the perseverance of effort factor and vice versa. This issue also relates to the validity and reliability of the measures used, which echoes a larger limitation in the field.

This lack of clarity has been addressed by many researchers as the jangle fallacy in the literature. For example, self-confidence, self-concept, and self-efficacy often become misconstrued as the same in practice and research (Bong & Skaalvik, 2003). Such is also the case with grit, where many researchers have found a strong correlation between grit and conscientiousness (e.g. Credé, Tynan & Harms, 2016; Duckworth & Quinn, 2009), which bring to doubt its discriminant validity. Besides conceptual overlap, there is also a degree of operational overlap between constructs. Muenks et al. (2017) point out that the measure of perseverance of effort scale described in the grit instrument was developed to

tap into the ability to sustain effort in the face of adversity. However, the items in this measure (e.g. “I finish whatever I begin”) do not necessarily reflect long-term goals. Instead, they suggest that the measure for this construct instead relates more closely to effort regulation (Pintrich, Smith, Garcia & McKeachie, 1991) which is described as persisting in tasks even when they are not motivating. Hence there is evidence that these constructs are more closely related than studies present them conceptually to be, which should be a caution to both researchers and practitioners in this field who seek to prioritize one set of skills over others.

General Limitations

Each chapter expanded on the limitations related to the specific analyses that were presented. However, there are also important general limitations that require further discussion. This dissertation attempted to bring together a qualitative and quantitative analysis under a mixed-methods framework. However, this was inevitably not fully incorporated into a cohesive study. Data collection and analysis were conducted separately and at different times, limiting my capacity to fully integrate both criteria into a coherent study design. Additionally, the original design of this study included a third analysis combining the qualitative codes with the quantitative analysis to examine relationships among them, yet this final analysis was not feasible given some constraints of the data. For example, the extensive amount of qualitative data used in this study made it difficult to engage in a more rigorous procedure of establishing reliability for the codes created. While the process detailed in Chapter 5 was appropriate for validation in constant comparison analysis—where the intention was not to provide a quantification of the codes, but

plausible relations in the data given the codes generated—it would not have been appropriate to include these as quantitative variables within a statistical model.

Furthermore, the sample utilized in this study was not representative of all U.S. college students but represented a select group of students who were part of a first-year experience course within a college support program. These students represented a segment of entering students into a liberal arts college in 2015 and 2016 who were identified as likely to need extra support given certain background and experience characteristics if they were to succeed. This sample limitation represents a threat to external validity; findings from this study should not be taken to be generalizable to all students at highly selective universities. At the same time, they may be more like students who attend slightly less selective colleges and universities. Regardless, examples from this dissertation study do present interesting avenues for future research and implications for practical applications.

This study also focuses on a small subset of social-emotional skills (i.e. growth mindset, grit, and general self-efficacy) and does not provide an exhaustive evaluation of all social-emotional skills. It is possible that a critical social-emotional skill was omitted from this study which better captures college student success.

Implications

This study provides important contributions to the field of social-emotional skills in higher education. First, it emphasized the importance of developing a thorough understanding of social-emotional skills using both qualitative and quantitative approaches. Although many correlational studies examine the association between social-emotional skills and academic achievement, few have incorporated qualitative data to frame and interpret their findings. Other authors have alluded to the importance of

incorporating qualitative findings to assess the effectiveness of social-emotional skill interventions (see Harackiewicz & Priniski, 2018), but scarcely any have ventured to answer their research questions by integrating both analyses. This study presents an example of said integration with the hopes of propelling additional mixed-methods research in this area.

Second, the quantitative analysis provided a novel way to examine the association between social-emotional skills and achievement by using growth curve modelling. This analysis provided a new framework through which to examine these skills, which emphasizes students' continuous progression and adaptation, an approach richer than providing a vision of that student at a given timepoint through cross sectional examination. While some limitations restricted the plausibility of this analysis, it still presents an exciting possibility for future motivational researchers.

Third, this dissertation identified important practical implications as well in relation to social-emotional skills teaching and learning. Based on the qualitative results of this study, it was clear that students engaged deeply with the topic of growth mindset and intelligence through their reflection task. Studies could take a closer look at the content and style of students' writings about these topics to develop interventions.

Future Directions

It has been acknowledged that the field of social-emotional skills in higher education is riddled with incongruities. However, one of the compelling issues is the need to integrate these skills into a larger motivational framework to examine the mechanism through which these skills relate to achievement behavior. Miele and Scholer (2018) provide one plausible avenue by describing a theory of motivational regulation to examine

how students identify and address motivational deficits. Their framework states that during task engagement, students are constantly regulating their emotional state and engaging in strategies that will counteract motivational deficits assessed within motivational components. These motivational components are described as self-efficacy, intrinsic value, promotion value, etc. In this framework, social-emotional skills could be considered components of motivation which require metacognitive skills of regulation. Hence, teaching students strategies that support them to appropriately handle deficits in these components would promote successful task completion (i.e. studying for a test). The theory described provides only one example of a motivational framework that could incorporate these skills, and additional research efforts to study these mechanisms are required.

As suggested above, there could be some benefit to integrating theories of reflection and depth of cognitive processing into social-emotional interventions in higher education. For example, Costa and Kallick (2000) describe different strategies to promote metacognitive reflection, and Kember et al. (2008) present a protocol to assess the depth of reflective thinking in students' written reflection. Future intervention research could utilize this research to evaluate the impact of reflection, with the aim of developing a curriculum to promote social-emotional skill learning in college students.

Finally, larger more complex longitudinal studies in this field are necessary to fully understand the impact of social-emotional skills in achievement. Longitudinal studies could provide a deeper insight into the causal relationships between social-emotional skills and college student success (i.e. achievement and retention). A careful longitudinal design examining a number of skills at different timepoints would also allow researchers to

determine how students' skills shift and change throughout their college trajectory and examine mediators which affect this association.

Conclusion

The field of social-emotional skills in higher education is a muddled one. Creating a more complete understanding requires designing larger, intentional studies which examine data from different sources, tackling different pertinent issues. This study represents an initial effort in this direction through a quantitative exploration of the association between these skills and achievement, and a qualitative examination of students' understanding of these skills. While this study was unable to clarify pressing questions in the field, it provides additional data which help identify possible avenues and approaches for future research. Ultimately, it will be the mission of future researchers to continue to critically examine these skills, to determine their role in college student development, and to address how we can promote greater equity of opportunity for all college students.

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Appendix A.

Post Hoc: Examining Model Assumptions

This appendix explores some of the limitations detailed in Chapter 4. These include a) the high correlation between GSE and PE, b) non-normality of GPA and c) heteroskedasticity in level-1 residuals.

High Correlation Between GSE and PE

Perseverance of efforts and general self-efficacy were the only two noncognitive variables to show a significant correlation to GPA at time 1. However, as noted in chapter 4, the correlation between these two variables was high (r = .75) and it was unclear from the analysis if the significance of both variables was just an artifact of this high correlation. To explore this issue, I examined evidence of multicollinearity within the model using variance inflation factors (VIF) and compared different models dropping one of the predictors.

VIF measure the effects of collinearity on the variances of the estimators (Gunst, 1984). Authors use the square root of the VIF to express the proportional change in the confidence interval for the coefficients, and a general rule of thumb suggests that any VIF smaller than 4 is indicative of inconsequential collinearity. Table A1 shows the VIF scores estimated and their square-root for each predictor in the model.

Table A1.
Variance inflation factors for GPA model predictors

Predictor	**VIF**	**√VIF**
Semester	6.88	2.62
Semester^2	7.02	2.66
Credits	3.02	1.73
Entity	1.48	1.21
Inconsistency of interests	1.60	1.26
Perseverance of effort	2.53	1.59
GSE	2.29	1.51
ACT	1.19	1.09
Age	1.07	1.03
Female	1.15	1.07
Pell	1.24	1.11
First Gen	1.11	1.05
White	1.32	1.15
Cohort	1.27	1.13

VIF scores for perseverance of effort and GSE were below 4 (see Table A1), which provides evidence that the correlation between these variables did not lead to issues of collinearity. The semester variable had a high VIF, but this is expected given that semester^2 is also included in the model - this is not expected to affect the p-value. Additionally, I evaluated the effects of removing individual predictors from the model by using a function to cycle through fitting different models and computing comparisons using likelihood ration tests (see drop1merMod; Bates, et al., 2015) . From the results, it seems that perseverance of effort ($\chi^2(1) = 9.67$, $p < 0.01$) and GSE ($\chi^2(1) = 6.81$, $p < .01$) both uniquely contributed to the model.

While this analysis does not completely unravel the complex association between these variables and how they relate both together and individually to the outcome, it does provide some evidence that each predictor is important in its own right and excludes issues of collinearity.

Transformation of GPA

As mentioned in chapter 4, GPA was highly left skewed, with most of the data falling between 3 and 4 (M = 3.17, SD = .61, Median = 3.29). To address this issue, I transformed the data to increase the distance between the scores and force normality. A Tukey power transformation performs iterative Shapiro Wilks tests to find the lambda, or power, that makes the data fit the normal distribution (Tukey, 1957). This iterative process resulted in a lambda of 2.9, hence creating a new GPA variable. Figure A1 shows the two density plots before and after transforming. The transformed GPA variable has a larger spread with data ranging from 1.22 to 55.71 (M = 31.37, SD = 13.44, Median = 32.14). I then ran the model using the transformed outcome variable to see if it changed the results presented in chapter 4.

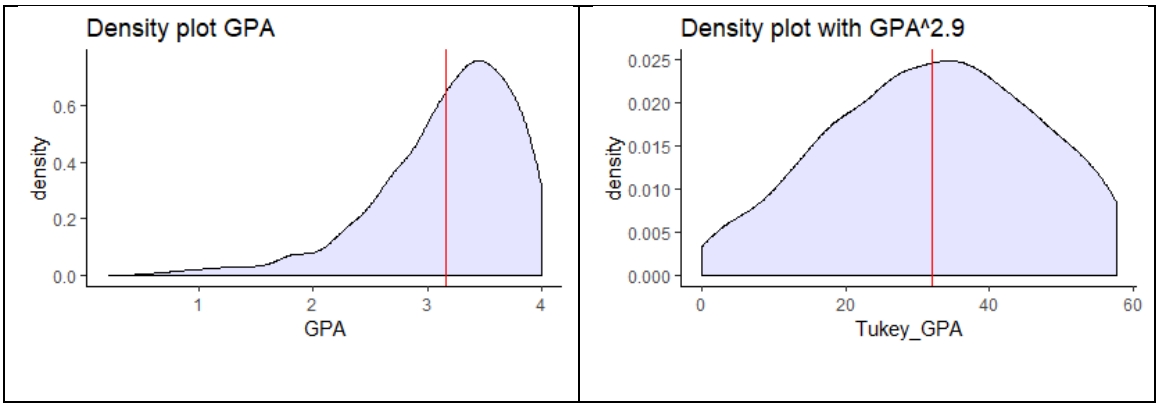

Figure A1. Density plot GPA with the original GPA variable (left) and transformed GPA (right).

Table A2.
Results of Growth Curve Model for Grade Point Average using Transformed GPA

Parameter		Coefficient	SE	*T* value
Intercept:				
	Intercept	32.15***	1.73	18.51
	Semester	-3.34***	0.54	-6.10
	Credits	1.31*	0.60	2.17
	Entity	-0.75	0.75	-0.99
	Grit II	0.15	0.78	0.19
	PE	3.43***	0.99	3.44
	GSE	-2.62**	0.93	-2.79
	Cohort (2016)	-.66	1.35	-1.23
	ACT	1.65**	0.63	2.59
	Age	-.24	0.60	-0.39
	Female	2.68	1.37	1.95
	Pell	-0.44	1.33	-0.33
	First Gen	-1.21	1.27	-0.95
	White	3.35*	1.41	2.37
	$(\text{Semester})^2$	.65***	0.11	5.68
Slope:				
	Credits	-0.46*	0.21	-2.16
	Entity	-0.17	0.25	-0.68
	Grit II	-0.24	0.24	-0.98
	PE	-0.25	0.32	-0.77
	GSE	0.06	0.29	0.20

Note: *p < .05, **p < .01, ***p < .001. Grit II = Grit Inconsistency of interests, Grit PE = Grit Perseverance of Effort, GSE = GSE.

Overall results did not change using the transformed model (see Table A2), however the issue of heteroskedasticity at level one was not fixed by the transformation, which I discuss in the next section.

Heteroskedasticity of Level 1 Residuals

From the residual plot below (Figure A2) we can observe that the model variance is not constant across datapoints. As mentioned in the limitations, GPA is subject to a ceiling effect by being bounded at a value of 4.0. This effect could reduce tenability of the assumptions underlying the quantitative model. About 3.6% of the data or n = 36 students had at least one semester with a 4.0 GPA, and many more students were close to this ceiling. The model residuals in Figure A2 illustrate this ceiling effect, wherein predictions are bounded around 4.0. This leads to a funneling effect, where residual variance is much larger at lower GPAs and much smaller at higher GPAs. Accordingly, the assumption of homoscedasticity at the first level of the model is clearly violated. The regression standard error of 0.41 is probably an overestimate for GPAs above 3.0 and an underestimate for GPAs below 3.0. Consequently, the coefficient standard errors and resulting statistical inferences should be interpreted with added caution.

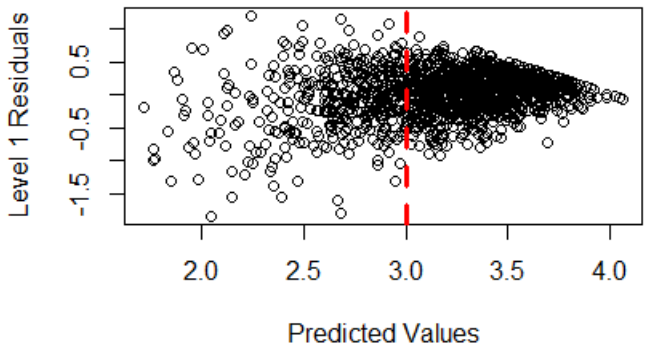

Figure A2. Residual plot of level one residual plotted again predicted value.

In addition to causing heteroskedasticity and unreliable standard errors, ceiling effects in a longitudinal model could also cause bias in the estimates of the coefficients. Wang, Zhang, McArdle and Salthouse (2009) examined the consequences of ceiling

effects using Monte Carlo simulations. They manipulated the proportion of ceiling data and examined 500 replications of the data. They demonstrated that the ceiling effect led to biased parameter estimations, both in the shape of the curve and the magnitude of the changes. However, this bias was directly related to the proportion of subjects at the limit where higher percentage of subject at or close to the limit led to more increased bias. In this study, subjects who were at the ceiling, also represented a small percentage of the data (< 1 %) across semester. Hence, we can conclude that, while the ceiling effect of GPA may have introduced some bias to the estimated coefficients that this bias was relatively small.

Appendix B.

Refection Prompts

Reflection Prompt: 2015 Cohort

Reflection Assignment #3

Directions: Review this week's learning resources, including readings, websites, videos, podcasts, and power points. Read or review from beginning to end with the goal of understanding what each thinker has to say, engaging with the ideas, arguments, questions, and information they have presented.

Write a reflection essay of between 150-250 words that addresses the prompts and questions below. You should type your essay directly into the assignment box.

1. Write a definition of intelligence that includes exactly 32 words. Secondly, re-create a definition with only 16 words. Lastly, make a definition in 8 words. What essence has been distilled in this process?

2. Write a definition of "the growth mindset" that includes exactly 32 words. Secondly, re-create a definition with only 16 words. Lastly, make a definition in 8 words. What essence has been distilled in this process?

3. What in this week's unit did you find thought-provoking, interesting, compelling, and/or perplexing? Or, what questions did the learning resources raise for you?

4. How might this week's content be useful to you?

The major assessment/grading criteria for this assignment include:

-The essay demonstrates independent thinking, fresh analytical insights, and original interpretations of readings and other resources.

-The essay demonstrates language control, logical organization, effective paragraphing, transitions, clear sentence development, spelling, and grammar.

-The essay demonstrates and documents specific references (quotes and/or paraphrasing) to the diversity of the readings. Please reference parenthetically at end of sentence and/or long quotes, i.e.(Nathan, p.21). None of your quotes should be longer than 5 lines. If you have a quote longer than 5 lines you should work to paraphrase. You should strive to integrate references to at least 4-5 learning resources

Reflection Prompt: 2016 Cohort

Reflection Assignment #3

Directions: Review this week's learning resources, including readings, videos, and lecture power points. Read or review from beginning to end with the goal of understanding what each thinker has to say, engaging with the ideas, arguments, questions, and information they have presented.

Write a reflection essay of between 250-500 words that addresses the prompts and questions below. You should type your essay directly into the assignment box.

1. Write a definition of *intelligence* that includes exactly 32 words.

2. Write a definition of "the growth mindset" that includes exactly 32 words.

3. What in this week's unit did you find thought-provoking and why?

4. Based upon this week's resources are there any changes you would make this semester/year?

<u>The major assessment/grading criteria for this assignment include:</u>

-The essay demonstrates independent thinking, fresh analytical insights, and original interpretations of readings and other resources.

-The essay demonstrates language control, logical organization, effective paragraphing, transitions, clear sentence development, spelling, and grammar.

-The essay demonstrates and documents specific references (quotes and/or paraphrasing) to the diversity of the readings. Please reference parenthetically at end of sentence and/or long quotes, i.e.(Nathan, p.21). None of your quotes should be longer than 5 lines. If you have a quote longer than 5 lines you should work to paraphrase. You should strive to integrate references to at least 2-3 learning resources.

Appendix C.

Results from NVivo Work Query: Definitions of Intelligence

This appendix presents the results of the word query described in chapter 5. This query was run using NVivo and included the 100 most frequently mentioned words, their synonyms and counts from students' definitions of intelligence. These words were then categorized into their corresponding part of speech (i.e., noun, verbs, adjectives, pronouns, and adverbs). I eliminated pronouns (e.g., one and everyone); adverbs (e.g., also, many, and well); nouns that referred to the person (e.g., self and individual): words that were redundant given the assignment (i.e., intelligence and defined); and non-descriptive nouns (e.g.. things). This resulted in a list of 73 words.

Table C1.
Results from NVivo definitions of intelligence word query

Word	Part of Speech	Variants of Words
knowledgeable	noun	knowledge, knowledgeable
ability	noun	abilities, ability
learns	verb	learn, learned, learning, learns
applying	verb	applied, apply, applying
skills	noun	skill, skilled, skillfully, skills
information	noun	information
understand	verb	understand, understandable, understanding, understandings, understands
use	verb	use, used, useful, usefully, uses, using
differently	adjective	differ, different, differently
able	adjective	able
think	verb	think, thinking, thinks
life	noun	life
situations	noun	situation, situations
acquire	verb	acquire, acquired, acquires, acquiring
new	adjective	new
brains	noun	brain, brains
knows	verb	know, knowing, knows
problem	noun	problem, problems

measures	verb	measurable, measure, measured, measurement, measurements, measures, measuring
solving	verb	solve, solving
capacity	noun	capacities, capacity
means	noun	mean, meaning, meanings, means
process	noun	process, processed, processes, processing
making	verb	make, makes, making
ideas	noun	idea, ideas
retain	verb	retain, retained, retaining
experiences	noun/verb	experience, experiences
gain	verb	gain, gained, gaining, gains
smarts	noun	smart, smarts
mental	noun/adjective	mental, mentality, mentally
world	noun	world, worldly
work	noun	work, worked, working, works
critically	adjective	critical, critically
logic	noun	logic, logical, logically, logics
obtain	verb	obtain, obtained, obtaining, obtains
test	noun	test, tested, testing, testings, tests
reasoning	noun/verb	reason, reasoning
creativity	noun	creative, creatively, creativity
subjects	noun	subject, subjects
change	verb	change, changed, changes, changing
adapt	verb	adapt, adaptation, adaptations, adapting, adapts
grow	verb	grow, growing, grows
awareness	noun	aware, awareness
communication	noun	communicate, communication, community
tasks	noun	task, tasks
thought	noun	thought, thoughts
live	verb	live, lives, living
comprehend	noun	comprehend, comprehended
memory	noun	memories, memory
amount	noun	amount, amounts
taking	verb	take, takes, taking
comes	verb	come, comes
sets	verb	set, sets, setting, settings
concepts	noun	concept, conception, concepts
school	noun	school, schooling
believe	verb	believe, believing
areas	noun	area, areas

level	noun	level, levels
mindset	noun	mindset, mindsets
topics	noun	topic, topics
capable	adjective	capabilities, capability, capable
various	adjective	various
create	verb	create, created, creating
connections	noun	connect, connected, connections, connects
time	noun	time, times
emotional	adjective/noun	emotional, emotionally, emotions
mind	noun	mind, minded, minds
book	noun	book, books
decisions	noun	decision, decisions
complex	adjective	complex
multiple	adjective	multiple
order	noun/verb	order
abstract	adjective/verb	abstract, abstractly

Note: Words are arranged from most – to least frequently mentioned.

Appendix D.

Codebook: Growth Mindset Definitions

This appendix contains the codebook for the growth mindset definition section of students' written assignments. The table presents the name, number of students references, description and examples for each code mentioned in Chapter 5.

Table D1.
Codebook Growth Mindset Definitions

Name	Number of references	Description	Example
Growth/Improvement	188	Subjects describe growth mindset as an expansion, growth, increase or improvement	"Growth Mindset is when one strives to gain more knowledge than they already have"
			"…to learn and increase their overall intelligence"
Effort/Hard work	106	Subjects mention effort, hard work or practice as a mechanism through which to expand their minds.	"Your basic qualities are never fixed, and can be improved upon over time with hard work"
			"And also you apply hard work and practice to improve yourself"
Learn from setbacks	58	Students express learning from mistakes, setbacks, or challenges as part of their definitions	"…also to change as a person as a whole and overcome many challenges."
			"…to learn and pursue through your mistakes."
Neuroplasticty	34	Subjects mention mechanisms of neuroplasticty such as forming neural connections, rewiring their brains, expanding brain cells etc. as part of their growth mindset definitions.	"…someone to constantly make new neurological connections by forming neurological pathways"
			"Intelligence developing via brain stimulation."
Perseverance	28	Subjects mention characteristics akin to "keep going" such as resilience, perseverance and persistence.	"Growth mindset is persevering, or not giving up."
			"…thrive to succeed no matter how many times you've fallen"
Goal accomplishment/setting	28	In their definitions of growth mindset subjects describe	"It can also be seen as goal setting or believing that one can achieve anything."

		reaching and achieving goals as well as goal setting.	“The essence is that if we set are minds to it, we can achieve the goal that we are reaching.”
Keeping a positive outlook/Optimism	22	Expressions of optimism such as having a positive outlook, thinking about things optimistically, and seeing things on the bright side are included in this code.	"Optimistic view of the human intelligence"
			"The *growth mindset* is when a person optimistically believes that they can enhance their intelligence."
Beyond limits	17	Students express growth mindset as going above and beyond one's own limits, or beyond what is normal	"This is recognizing the fact that there is no limit to personal knowledge. "
			"Growth mindset is defined as something that isn’t just about what effort is put in. It is definitely a part of it however more focused on continually pushing yourself past the limits."
Focusing on learning goals	14	Concepts of learning and having the motivation and passion for learning are included in the growth mindset definition	"The growth mindset is someone who never stops learning"
			"The growth mindset can be defined as changing students’ perspectives so they become more willing and able to learn- in turn, helping them to achieve their goals in a more successful manner"
Confidence in their abilities	6	Concepts of self-confidence are related to the growth mindset definitions, such as believing in yourself, or removing self-doubt	"…you basically never doubt that you are able to do something"
			"It is not[new] news to anyone that if you believe in yourself it’s going to get you a lot further than if you have a lot of self-doubt. "
Trying new strategies	22	Students mention trying new strategies, habits, or behaviors as part of expressing growth mindset.	" This includes using new strategies and opening up to new ideas."
			"Through new strategies and efforts your intelligence can exponentially grow."

Appendix E.

Codebook: Reflection - Applied to their lives

This appendix contains the codebook for the reflections section of students' written assignments. The table presents the name, number of students references, description and examples for each code mentioned in chapter 5.

Table E1.
Codebook applied to their lives reflection section

Name	No. of references	Description	Examples
Growth Mindset	90	Students explicitly discussed their beliefs about their own mindsets (fixed and growth) or intelligence. .	"This week content will help me because it shows that people can work on their intelligence and it is not fixed, so I tells me that the harder I work the better the outcome will be regarding my school work and other aspects of life too. "
			"This weeks lesson has really opened my eyes and made me realize that you can expand on the knowledge that you already have; knowledge isn't fixed."
Behavioral intentions or planned behavior	55	Students describe behavioral changes that they can implement in their studies or overall habits.	"This week's content was very useful because I learned a couple of things to ease my studies like studying in different spots so the brain can recall things better."
			"…it taught me skills that can help my concentration by not studying every day but every other day or so."
			"Starting a new habit will take time but if I keep trying, I will one day feel satisfied."
Seeking future challenges	11	Students talk about taking on more future challenges	"However this year, since it is my first year in college, I have hope that I can rebuild my motivation and become a better student and person by challenging myself with hard courses, like my biology class."
			"I've also taught myself not to fear challenging courses because if there is anything I don't know; I can learn it."
Societal value of intelligence	2	Students discuss an over value of	"Something I found thought-provoking was how crazy everybody

		intelligence, related to their context	in this world actually worry about intelligence. Like, why would it be such a big deal in this world?"
Importance of change	4	Students mention the importance of changing or adapting	"I have been many people but I don't know who I will be. I have to live in the moment and not worry about tomorrow."
Growth mindset as necessary for success/content important for career	9	Students identified growth mindset as an important skill for success or for their future career	"I will tell myself that I cannot do that YET. This will be beneficial to me in the future because it will help me in becoming successful in the career of my choosing."
Positive outlook	7	Students mentioned the importance of being optimistic or maintaining a positive outlook	"This week's content will be useful to me as it serves a reminder that every single positive or negative thought impacts one's brain and to always have a positive mindset."
			"This information is useful to me because like what Dan Gilbert states, my day can be better if I view it through a positive lens, which I do need to work on!"
The impact of culture on mindsets/intelligence	13	Students brought up topics of standardized testing, intelligence, scores, etc. in relation to society or their context	"In many countries, intelligence is measured by how well you score on tests. I don't believe that is an accurate way of measuring someone's intelligence because some people are not good test takers, for example, due to having test anxiety."
			"It seems like in today's society we make the standardized tests such as the ACT and the SAT the end all and be all. I think that this something we need to change it because one test cannot quantify your intelligence, rather it rates our test taking abilities"
Value of grades	12	Students are reflecting on their grades, what they mean and how they can adapt to them	"While grades are a big part of school, I have to understand that I'm here to learn, first and foremost."
			"This concept makes me look at college work differently and if I do get a bad grade on something, instead of freaking out about it and getting anxious about it, talk to someone and figure out what I can do to eventually get there."
Interpersonal relationships	5	Students discussed interpersonal relationships in the	"I will try to cherish other people and their abilities even though they are different than mine."

		context of growth mindset	
Gratitude	2	Students discussed appreciation, gratitude and giving thanks.	"This made me realize how grateful I am towards my father, who works all day just to bring food to the table."
			"I am already in the habit of helping people out, thanking someone whenever they did something I needed and did something correctly. I guess I will just need to make sure that everybody is appreciated for what they are doing and tell others that they are doing a good job."
No change in beliefs	16	Students also expressed having no change after engaging in the topics of intelligence and growth mindset.	"Based upon these resources I wouldn't make any changes, I really love the way college is going"
			"To answer the last question, I don't think I will be making any changes to my study habits or my mindset. I feel like that I already had the growth mindset throughout middle school and high school."