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Noncognitive Characteristics and Family Income: The Impact of Socioeconomic Status on Grit Levels and Mindset Types

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by

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A Dissertation submitted to the Education Faculty of Lindenwood University in partial fulfillment of the requirements for the degree of

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Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

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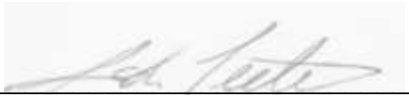
Signature:  Date: 8-19-2020

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Abstract

Noncognitive characteristics have been identified as essential predictors of academic success (Duckworth, 2016, 2019; Farrington et al., 2012). Grit and growth mindset are two noncognitive characteristics that predict academic success; therefore, this study was conducted to determine if there is a difference in grit level and mindset types among students from different socioeconomic backgrounds (Duckworth, 2019; Dweck, 2010b). Researchers and educators have focused heavily on identifying and implementing interventions to improve students' cognitive factors, yet little attention has been given to finding ways to improve students' noncognitive traits (Cooper, Krieg, & Brownell, 2018). High school students from a school district in southeast Missouri completed a 12-item grit survey and a mindset assessment profile. The sample consisted of two stratified groups. One group was selected based on eligibility to receive a free or reduced-price meal. The second group was comprised of students who did not receive free or reduced-price meals. The results of the study indicated there was not a significant difference in grit scores or mindset types between the two strata; however, the data indicated grit levels and mindset types were strongly correlated. Since the scope of this study was limited, more studies should be conducted using these variables to determine if a difference in grit levels or mindset types exists among students from different socioeconomic backgrounds.

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Chapter One: Introduction

As of 2017, the United States was still struggling to perform above average in science, math, and reading when compared to other industrialized nations (DeSilver, 2017). Among the countries included in the Organization for Economic Cooperation and Development (OECD), the United States placed 30th in math and 19th in science (DeSilver, 2017, para. 2). According to the National Center for Educational Statistics, dropout rates in the United States, as of the year 2000, were above 10% and decreased to 6.1% by 2016 (United States Department of Education [USDOE], 2017a, para. 2). Student misbehaviors resulted in 2.6 million student suspensions from public schools and over 110,000 student expulsions (USDOE, 2018, para. 7).

From 2011-2016, the number of students receiving special education services reached 13%, with a vast majority of these students having a specific learning disability (USDOE, 2017b, para. 2). Children with disabilities in an adjusted regulatory cohort graduated at a rate of 64.6%, while students with limited English proficiency graduated at a rate of 65.1% in the same year (USDOE, 2017b, para. 9). Students from families living in low socioeconomic environments dropped out at a rate (7.2%) almost double the dropout rate (3.9%) of students from the highest income quarter (USDOE, 2016b, para. 5).

Reading scale scores, according to the National Assessment of Educational Progress (NAEP), remained stagnant for eighth-grade readers who improved only five percentage points from 1992 to 2015, while a five-percentage-point drop in reading scores was recorded for 12th graders during the same period (USDOE, 2016a, para. 1). Minimal growth was noted in math scale scores for eighth and 12th-grade students from

2005 to 2015 (USDOE, 2016a). In response to the decline in achievement, Duckworth (2016) suggested noncognitive factors, such as grit and growth mindset, have a significant impact on academic outcomes. According to Duckworth (2016), schools that focus too heavily on talent or giftedness deem noncognitive characteristics such as effort, resilience, grit, and self-perception as secondary factors to success.

Psychologists and educators alike have researched noncognitive characteristics to better understand individual behavior (Bandura, 1982; Rotter, 1966; Shanker, 2016). Self-efficacy, locus of control, self-regulation, and self-esteem may improve academic outcomes with various levels of success, since these characteristics are linked to a belief in one's own ability and thinking one has power over events in life (Shanker, 2016). However, Duckworth and Yeager (2015) explained noncognitive characteristics are better indicators of academic success than are intelligence, talent, or giftedness. When students delay the gratification of behaviors that hinder academic achievement, they are building resilience, which can improve academic outcomes (Duckworth, Tsukayama, & Kirby, 2013).

Noncognitive characteristics such as grit can lead to sustained self-regulation and help students achieve short- and long-term goals (Eskreis-Winkler, Gross, & Duckworth, 2016). Although some individuals may view successful outcomes as a product of luck or fate, Rotter's (1966) theory of internal locus of control relies on one's ability to see a successful result as an internal reward for one's effort, skillset, and knowledge. Thus, an individual controls the outcome (Rotter, 1966). External locus of control, on the other hand, is the belief fate, luck, or an external force led to a successful result (Rotter, 1966).

The continual evolution of noncognitive skill building from a young age can lead to the strengthening of other noncognitive skills such as self-efficacy and internal locus of control (Lubotsky & Kaestner, 2016). Furthermore, the mindset a student has is a strong predictor of academic success (Dweck, 1986, 2007a; Dweck, Walton, & Cohen, 2014). Mindset is classified as growth-based, or the belief one's ability to learn can grow, while fixed-based is when a person believes the ability to learn is set at birth and does not change (Dweck, 1986, 2007b). Dweck (2016) indicated students with growth mindsets are more likely to succeed in academic challenges, graduate on time, and attend college than are students with a fixed mindset. How students with different mindsets view challenges, failures, and learning deficiencies likely determines the amount of effort put forth and the level of resilience students have during academic tasks (Dweck, 2016).

Although numerous researchers have analyzed the impact of poverty on education, little attention has been given to the impact of poverty on noncognitive factors (Biddle, 2014; Bower & Rossi, 2016; Langenkamp & Carbonaro, 2018; Wadsworth et al., 2008). A primary focus of this study was to shed light on how students of low socioeconomic status perceive their academic selves by measuring their grit levels and determining from which mindset they work. According to Luby et al. (2013), children raised in poverty have difficulties regulating stressful events and are more likely to experience poor developmental and behavioral outcomes. From a medical perspective, an association exists between poverty and a smaller volume of "white and cortical gray matter and hippocampal and amygdala" (Luby et al., 2013, p. 1135). Noncognitive factors have a latent relationship with poverty since families living in low socioeconomic environments often struggle with lack of parental involvement, low caregiver education

levels, and an increase in stressful life events, which can all lead to decreased self-esteem, self-efficacy, and locus of control (Luby et al., 2013).

Weinger (1998) conducted a study linking low socioeconomic status and low levels of self-perception, as well as neglected emotional well-being and decreased attention span. These noncognitive factors are significant indicators of academic success (Duckworth, 2016; Laursen, 2015), and when children are exposed to deleterious environments, their ability to use noncognitive factors diminishes (Luby et al., 2013). According to Krishnan and Kutikova (2013), poverty can lead to low levels of self-esteem and self-efficacy, but interventions, over time, can improve noncognitive factors in students who live in low socioeconomic environments.

In contrast, students benefit from increased family support, which makes them more likely to realize desired academic and career outcomes (Metheny & Hawley-McWhirtner, 2013). Although a correlation exists between high socioeconomic status and success, information linking socioeconomic status and noncognitive factors to this success is still lacking (Metheny & Hawley-McWhirtner, 2013). Studies with findings of a direct relationship between low socioeconomic status and noncognitive characteristics such as grit and growth mindset were limited at the time of this study.

Background of the Study

Talent is only a small part of the equation of success, and persevering effort must be present if one is going to succeed (Duckworth & Gross, 2014). Grit is "the tenacious pursuit of a dominant superordinate goal despite setbacks" (Duckworth & Gross, 2014, p. 1). Intellect is not fixed, and natural intelligence does not replace hard work and tenacious effort when pursuing a goal (Duckworth, 2016). Grit significantly impacts

successful outcomes, and standardized assessments such as state benchmark exams, the ACT, SAT, and other college entrance exams are not as accurate at predicting success in college as are grades (Laursen, 2015). Thus, the perseverance of grinding out the daily classwork and homework regimen in high school will get students further in academia than almost anything else (Laursen, 2015).

Students considered talented are not necessarily working within what Dweck (2016) termed a *growth mindset.* A growth mindset is when one focuses on improving, regardless at what level one may be currently operating, while those with a fixed mindset feel their fate is predetermined and the ability within them is the highest level they can reach (Dweck, 2016). Educators must extinguish the fixed mindset and prove a student's intelligence is merely one piece of the puzzle (Cook, Wildschut, & Thomaes, 2017). To increase student perseverance levels, educators must intervene, since "academic-mind-set interventions target students' core beliefs about school and learning, such as 'Can I learn and grow my intelligence?' (growth-mind-set beliefs), and 'Why should I learn?' (sense-of-purpose beliefs)" (Paunesku et al., 2015, p. 2). Paunesku et al. (2015) argued that when a student struggles, he or she has the opportunity to grow and is capable of learning.

Researchers have indicated poverty can hinder cognitive functions, because "poverty-related concerns consume mental resources, leaving less for other tasks" (Mani, Mullainathan, Shafir, & Zhao, 2013, p. 976). Individuals living in low socioeconomic environments are more likely to behave in counterproductive ways including frequent tardies, decreased productivity, and poor decision-making for the future, which can lead to more severe poverty (Mani et al., 2013). Children living in poverty over a long period

experience increased academic failure and patterns of poverty leading into adulthood (Hair, Hanson, Wolfe, & Pollak, 2015). Magnetic resonance imaging (MRI) scans have revealed poverty among preschool-aged children has neurological ramifications, which can lead to adverse effects on long-term memory and previous knowledge acquired (Luby et al., 2013).

A low socioeconomic environment can impact noncognitive factors such as self-efficacy perceptions of occupational choices among adolescents and young adults (Hsieh & Huang, 2012). According to Hsieh and Huang (2012), learning experiences are shaped by self-efficacy beliefs, and self-efficacy beliefs are negatively impacted by a low socioeconomic environment. Thus, the lack of educational and occupational role models for students living in a low socioeconomic environment ultimately shapes their perceptions and beliefs about their own academic and occupational future (Hsieh & Huang, 2012). Students' perceptions of self-worth and self-esteem are other noncognitive factors influenced by a low socioeconomic environment, according to Weinger (1998). Students of poverty may begin "to turn demeaning perceptions against themselves," which may lead to a belief their opportunities are narrowed due to stigmatization (Weinger, 1998, p. 116).

Haigen and Hao (2017) found grit and classroom discipline are useful predictors of improved academic outcomes among students in poverty. Although other researchers indicated the upward mobility of students living in low socioeconomic environments can be affected by grit, grit alone may not be the single factor in upward mobility (Kundu, 2017). The shared variable among these students was that they were taught to "navigate success in different settings" and overcome other disadvantages such as substance abuse,

single-parent households, homelessness, or incarceration, which often stem from poverty (Kundu, 2017, p. 74). Poverty can limit cognitive functions (Mani et al., 2013), and children who fall 1.5% below poverty thresholds have shown a 3% to 4% deficiency in gray matter volumes of the brain, which impacts long-term memory function (Hair et al., 2015, p. 4).

The impact of growth mindset on academic achievement is well-documented (Dweck, 1986, 2007a, 2008, 2009; Elish-Piper, 2014). Growth mindset has a positive effect on student outcomes across nationalities and socioeconomic status, which is important, as impoverished students often adopted a fixed mindset (Claro, Paunesku, & Dweck, 2016). Claro et al. (2016) confirmed when students developed growth mindsets, the adverse effects of poverty "were appreciably buffered" (p. 8664).

Theoretical Framework

This study was based upon theoretical research from previous studies conducted on grit and mindset and the impact of these noncognitive qualities on academic performance. According to Dweck (2016), reforms in the way schools shape mindset must show learners how their ability to learn can grow. The idea of schools using noncognitive, personal qualities such as grit and growth mindset is a new perspective on educational reform (Duckworth & Yeager, 2015). When students have a growth mindset and believe their ability to learn is malleable, their academic outcomes are positively impacted (Dweck, 2008). Similarly, grit or resilient perseverance through obstacles during one's educational journey positively impacts success (Duckworth, 2016). Nonacademic characteristics not directly related to cognitive learning have been

researched and correlated with academic improvements (Dixson, Worrell, Olszewski-Kubilius, & Subotnik, 2016).

According to Duckworth (2016), psychologists have studied success and failure among individuals and groups for over a century. In an early study in the 19th century, Francis Galton analyzed the origins of high achievement and concluded "outliers" reveal[ed] success is based on "unusual ability" in combination with exceptional "zeal" and "the capacity for hard labor" (as cited in Duckworth, 2016, pp. 20-21). In the 1950s, psychologists were explaining motivation through the hedonic pleasure principle, which defines human emotional experience as a scale that ranges from good to bad, with human motivation staying as close to *good* as possible (Schacter, Cendan, Dodson, & Clifford, 2001). Atkinson (1964) posed the theory of achievement motivation which "accounts for the determinants of the direction, magnitude, and persistence of behavior," graded by a series of standards that the consequence of the individual's actions will be favorable and successful, or an unfavorable failure (pp. 240-241). Kukla (1974) concluded motivation to achieve is based on how one perceives one's own ability.

In addition to how individuals perceive their abilities, Ames and Archer (1987) revealed the achievement goals of mothers have a significant impact on what types of achievement activities their children choose. Mothers who praise demonstrations of mastery raise children who choose less-strenuous achievement activities, but when mothers praise effort, children select more difficult tasks (Ames & Archer, 1987). Dweck (1986) analyzed motivational processes that impact cognitive tasks in fruitful ways. Dweck's (1986) focus was "on psychological factors, other than ability, that determine how effectively the individual acquires and uses skills" (p. 1040). Based upon

two theories of intelligence, Dweck (1986) determined when individuals believe intelligence is fixed, their goal orientation is to avoid judgments and seek praise; however, when individuals think intelligence is malleable, the goal is focused on increasing competence to foster learning.

In 2001 and 2004, researchers analyzed the critical role internal poverty plays in teen pregnancy and determined perceptions of poverty are linked to assumptions of learning ability and future occupation (Young, Martin, Young, & Ting, 2001; Young, Turner, Denny, & Young, 2004). Bandura's (1982) self-efficacy theory defined internal poverty as the perception of how successfully one can accomplish tasks and actions necessary for a successful outcome. Self-efficacy is referred to as the "Biology of Confidence," an argument that internal mechanisms which positively impact motivation are "tools that can be manipulated" (Van Der Roest, Kleiner, & Kleiner, 2011, p. 26).

There is a risk of presenting old ideas in a new way, and the conceptual network of terminology should be analyzed for specific characteristics (Anderson, Turner, Heath, & Payne, 2016). Self-efficacy, locus of control, fate control, grit, optimism, and resilience are a few terms used to describe noncognitive characteristics (Anderson et al., 2016). Although there are significant variations of the meanings of the terms, they refer to a person's attitude about his or her future, the perceived ability to impact the future, and the ability of a person to cope with obstacles through resilience (Anderson et al., 2016; Arias, 2016).

Statement of the Problem

United States school districts are struggling to lead globally (DeSilver, 2017). To become global leaders, educators seeking to improve learning and performance should

consider noncognitive factors such as grit and growth mindset, since researchers have established a correlation among noncognitive factors such as willpower, self-control, and cognitive activity (Magen, Kim, Dweck, Gross, & McClure, 2014; Malouf et al., 2014; Pappano, 2013). Garcia (2014) demonstrated a need to promote noncognitive skills in educational policy; however, few researchers have indicated effective interventions to determine how low socioeconomic environment impacts noncognitive characteristics.

Schools have focused interventions on factors such as classroom size, school size, curriculum standards, and technological interventions, but have not fully implemented strategies which focus on noncognitive characteristics such as mindset and grit level (Rattan, Savani, Chugh, & Dweck, 2015). Teaching students to adopt a growth mindset and to develop other positive psychosocial characteristics can improve resiliency and academic outcomes, while closing achievement gaps among racial, gender, and socioeconomic groups (Rattan et al., 2015). Students learn the brain is a growing muscle and that by taking on challenges, the neurons in their brain "grow new, stronger connections" (Rattan et al., 2015, p. 722).

Furthermore, self-perception plays a vital role as a mediator between what one knows and how one acts (Pajares, 1996). Academic self-efficacy was discovered to be a better predictor of academic outcomes than grit or hope (Dixson et al., 2016). Other noncognitive characteristics, like self-control, may couple with grit, since developing grit may not be enough to overcome social and economic barriers hindering academic outcomes (Duckworth & Gross, 2014). Progress on this issue may not reach its full potential until national, state, and local policymakers support research on noncognitive

characteristics and how these factors impact education (Yeager, Paunesku, Walton, & Dweck, 2013).

Purpose of the Study

The purpose of this project was to determine the difference between grit and growth mindset scores among secondary school students of differing socioeconomic environments from a school district in southeast Missouri. These noncognitive factors have been empirically proven to be significant predictors of academic success, while poverty hinders educational growth (Duckworth, 2016; Dweck, 2009). The focus of this study was based on a potential difference in grit score measured by the Grit survey and mindset type measured by the Mindset Assessment Profile of students based on socioeconomic status. Scores were analyzed based upon the students' socioeconomic backgrounds as determined by participation in a free or reduced-price meal program.

Research questions and hypotheses. The following research questions and hypotheses guided this study:

1. What is the difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals?

$H1_0$: There is no difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

$H1_a$: There is a difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

2. What is the difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals?

$H2_0$: There is no difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

$H2_a$: There is a difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

3. What is the correlation between student grit and student mindset?

$H3_0$: There is no correlation between student grit and student mindset.

$H3_a$: There is a correlation between student grit and student mindset.

Significance of the Study

This research will contribute to the field of study by indicating if a difference in noncognitive characteristics exists between students who are considered low socioeconomic status and students who are not considered low socioeconomic status. This study was conducted to address a gap in research by determining if students of different socioeconomic backgrounds have a significantly different level of noncognitive characteristics. A difference in noncognitive characteristics between socioeconomic groups would be a significant discovery. Claro et al. (2016) explained how the presence of improved noncognitive characteristics, such as grit and growth mindset, can lessen the negative influence of poverty on academic performance. Previous research designs involved various tools to measure noncognitive characteristics (Duckworth & Yeager,

2015; Dweck et al., 2014; Yeager et al., 2013); however, none of these researchers analyzed low socioeconomic status as a significant variable impacting the presence of noncognitive characteristics.

Definition of Key Terms

The following key terms are defined for the purposes of this study:

Achievement gap. Achievement gap is the disproportional deviation of academic achievement between groups of students (Ansell, 2011). This gap is found in grade point averages (GPAs), standardized test scores, dropout rates, and college completion rates (Ansell, 2011).

External locus of control. Rotter (1966) explained external locus of control is the perception outcomes of events are, at least in part, independent of one's actions, and fate, luck, or some external force causes all or some of the outcomes.

Fixed mindset. Fixed mindset is the idea people are born with a set amount of intellect or ability, and no amount of rigorous effort or practice can change academic outcomes (Dweck, 2008). People with fixed mindsets may be prone to vacate difficult tasks when struggling or may give up on a goal after a single failed attempt (Dweck, 2008).

Grit. Grit is exhibited when one perseveres through struggle and shows passion for completing long-term goals and the strenuous effort put forth despite failures (Duckworth, 2016). Grit has been shown to indicate "incremental predictive validity of success measures" more successfully than IQ, talent, or personality factors (Duckworth, Peterson, Matthews, & Kelly, 2007, pp. 1087-1089).

Growth mindset. Growth mindset is the idea an individual's abilities can grow through cultivated efforts (Dweck, 2008). A growth mindset exists when one believes academic ability is malleable and can develop with resilience through experience and adaptability (Dweck, 2008).

Internal locus of control. Rotter (1966) explained internal locus of control is the perception the outcome of an event is, at least in part, dependent upon one's own behavior.

Internal poverty. Internal poverty is rooted in the self-efficacy theory, which is a person's belief he or she is and will continue to be unable to accomplish significant goals (Young et al., 2001). A more precise definition of internal poverty includes low educational goals, low personal efficacy, low occupational goals, and external locus of control (Young et al., 2004).

Noncognitive characteristics. Noncognitive characteristics are measured traits people often exhibit such as self-esteem, social engagement, persistence, self-control, risk preference, grit, academic resilience, and perseverance (Humphries & Kosse, 2017). The definition of noncognitive characteristics is synonymous with behavioral skills, soft skills, noncognitive abilities, socio-emotional skills, personality traits, and character (Garcia, 2014).

Poverty. Poverty refers to a student's family socioeconomic status. The definition of poverty used in this study is from the 2015 *Poverty Guidelines for the 48 Contiguous States and the District of Columbia* (United States Census Bureau, 2016).

Resilience. Resilience is the ability of a person to gather "strength and resources" to cope with "difficulties" and adversity that may hinder the successful completion of desired goals (Arias, 2016, p. 13).

Self-control. Self-control is the ability to placate impulses and focus on short- and long-term goals (Malouf et al., 2014).

Self-regulation. Self-regulation is the voluntary control of attentional, emotional, and behavioral impulses in the service of personally valued goals and standards (Duckworth & Carlson, 2013). Self-regulation is the behavioral management that lessens the frequency of strong compulsions (Shanker, 2016).

Limitations and Assumptions

The following limitations were identified in this study:

A survey was selected as the instrument for this study. Since the participants self-reported their opinions, they may have answered questions on the Grit-S and Growth Mindset Survey in a way they perceived as more desirable. Student self-reporting was used as opposed to researcher observation due to time constraints (Duckworth & Quinn, 2009). However, Duckworth and Quinn (2009) found teachers, faculty, and administrators could complete an informal version of the grit survey if they were familiar with the students. Data were gathered from students in grades 9-12 who attended a predominantly Caucasian school district located in a low socioeconomic area; therefore, the findings may not be generalizable to other areas of the nation. A more representative sample may result in different outcomes. Furthermore, the data were collected during one academic school year, which does not necessarily represent the income levels, grit levels, or mindset types exhibited by students throughout their school careers. Some

students may have just recently become impoverished, while others may have spent their entire lives in systemic poverty.

The following assumptions were acknowledged in this study:

1. Students answered the survey questions honestly and without bias.

2. Students who participated in the free and reduced-price meal program met state and federal guidelines of the program.

Summary

Researchers have not found a proper place for noncognitive skills as educational change agents (DeSilver, 2017). However, a serious inquiry into how individual noncognitive characteristics impact learning outcomes may be necessary (DeRadd, 1996; Duckworth, 2016; Dweck, 2016; Galla & Duckworth, 2015). Grit, resilience, self-efficacy, internal locus of control, and growth mindset have been shown to improve academic outcomes (Duckworth, 2016; Dweck, 2016; Hsieh & Huang, 2012; Mone, Baker, & Jeffries, 1995; Rotter, 1966), while grit and growth mindset are often better predictors of academic outcomes than talent, IQ, and other cognitive measures (Duckworth, 2016; Duckworth et al., 2007; Dweck, 2016).

Although interventions to teach students how to increase grit and growth mindset are few, research needs to be conducted to focus on noncognitive factors among subgroups to determine what leads to the development of these traits (Duckworth, 2016; Duckworth et al., 2007). Grit may not be enough to stand alone as an agent of educational change, but when studied with resilience, self-efficacy, self-esteem, locus of control, and other psychosocial behaviors, grit may be an extremely effective outlier that improves academic outcomes (Kundu, 2017). Growth mindset has been demonstrated as

a noncognitive characteristic that improves academic outcomes across the spectrum of income levels (Kundu, 2017).

Developing positive self-concept may be difficult for students of a low socioeconomic environment, and these students often adopt negative self-images based on public messages about poverty (Weinger, 1998). However, when a student's low socioeconomic environment is combined with high grit levels and a growth mindset, the negative effects of poverty diminish and academic outcomes improve (Biddle, 2014).

The purpose of this study was to examine grit and growth mindset levels of students from different socioeconomic environments. Students who attended a rural, high-poverty southeast Missouri school were selected as the sample. The findings from this study will add to the body of research on grit, growth mindset, and noncognitive skills and how socioeconomic perceptions shape these characteristics. The administrators from the school involved in the research may use these data to address issues with noncognitive traits and to improve learning. Although the limited scope of the population may not be generalized, a study of noncognitive traits among students from a low socioeconomic environment will add to the body of literature in a neglected area of scholarship.

In Chapter Two, a review of literature is presented. Noncognitive characteristics are thoroughly explored, and an analysis of how these factors are predictors of academic success is included. Also, the diversity of noncognitive characteristics is examined and dissected into more specific behaviors that combine to make up a person's grit and mindset. A discussion of how socioeconomic status impacts the presence of noncognitive characteristics is included in the chapter, as well as how these

characteristics are influenced by family dynamics. Research on student behavior at school and disciplinary reactions is presented. Also included is an examination of literature from the field of neuroscience regarding noncognitive characteristics and the brain.

Chapter Two: Review of Literature

Schools in the United States are lagging behind other industrialized countries (DeSilver, 2017). Missouri students' proficient reading and math scores have decreased slightly since 2017 and must improve to be above national averages (USDOE, 2019). Districts have tried multiple programs focused on improving standards, integrating technology, and training teachers, but have failed to recognize noncognitive factors may be better indicators of academic success than IQ, talent, or giftedness (Duckworth, 2016; Dweck, 2016; Hsieh & Huang, 2012; Mone et al., 1995).

In 2013, the USDOE began promoting the study of noncognitive characteristics and asserted school leaders, policymakers, researchers, and parents should find ways to include "grit, tenacity, and perseverance in curriculum, teaching practices, teacher professional development, programs, technology adoption, and out-of-school support" (Hoerr, 2013, p. 84). These characteristics can positively impact academic outcomes as much or more than intellectual ability (Sparks, 2015). Noncognitive characteristics such as resilience, self-efficacy, locus of control, grit, mindset, and self-esteem have been studied by psychologists and educators to determine the roles these factors play in student success and academic outcomes (Duckworth, 2016; Dweck, 2016; Hsieh & Huang, 2012; Mone et al., 1995; Rotter, 1966).

Noncognitive characteristics need more attention from schools, because cognitive functions can become slowed down by poverty, which may lead to poor decision-making (Mani et al., 2013). Children living in poverty over time experience increased academic failures (Hair et al., 2015) and will likely develop low self-esteem, a decrease in self-efficacy, and a decline in self-perception (Weinger, 1998). Furthermore, children raised

in poverty may develop smaller volumes of cortical gray and white brain matter (Luby et al., 2013). These brain deficiencies may be a significant factor in the correlation between low socioeconomic status and low academic outcomes (Hair et al., 2015).

Although studies have shown a correlation between low socioeconomic status and decreased academic performance, less attention has been given to research examining how low socioeconomic status impacts noncognitive factors such as grit and growth mindset (Fletcher & Wolfe, 2016; Hair et al., 2015; Judge, 2013; Khanam & Nghiem, 2016; Lam, 2014). Student personality and behavior characteristics can predict academic, career, and life outcomes, yet these skills not rooted in intelligence or cognition are rarely implemented into school accountability systems (West, 2016).

The purpose of this study was to examine the difference between the grit level and mindset type of secondary students of varying socioeconomic status levels at a school in southeast Missouri. A review of the literature yielded significant information pertaining to grit and growth mindset, which are two specific noncognitive characteristics (Duckworth, 2016; Dweck et al., 2014). The research discussed in this literature review sheds light on the multi-faceted nature of noncognitive characteristics, how these characteristics are developed and shaped in a person, how they impact academic performance, and how they may lessen the impact of poverty on a child's educational outcomes (DeDonno & Rivera-Torres, 2018; Duckworth, 2016; Duckworth & Quinn, 2009; Gutman & Schoon, 2013).

The terminology used to describe noncognitive characteristics is still under debate, and the term has been changed over time by different researchers (Farrington et al., 2012). Noncognitive skills, developmental factors, socio-emotional skills, and soft

skills are terms that have also been used to describe noncognitive characteristics (Farrington et al., 2012; Fletcher & Wolfe, 2016). For the purpose of this study, the term *noncognitive characteristics* will be used to describe predictors of academic achievement not directly related to intelligence, talent, or any other cognitive determinants.

Specifically, the two noncognitive characteristics measured in this study were grit and growth mindset. However, a multitude of other noncognitive characteristics were examined in the review of literature, because these characteristics share many traits associated with grit and growth mindset (Bandura, 1982; DeRadd, 1996; Duckworth, 2016; Dweck, 2010b; Hsieh & Huang, 2012; Masten et al., 2014). Self-efficacy, locus of control, self-control, resilience, tenacity, attention span and focus, as well as self-esteem and the Big Five personality traits are other noncognitive factors explored in the literature (Bandura, 1997; Duckworth, 2016; Rotter, 1966). Many of the findings are from landmark studies conducted within the last 60 years (Bandura, 1982; Rotter, 1966), while more recent findings determine the role grit and growth mindset have played in producing academic outcomes (Haigen & Hao, 2017; Yeager et al., 2014).

Furthermore, negative correlations between low socioeconomic status students and academic performance are discussed. The literature indicates low socioeconomic status has a significant negative impact on GPA, graduation rates, college retention, occupational success, and cognitive functioning but also indicates low socioeconomic status can hinder the development of noncognitive skills that impact academic success (Claro et al., 2016; Fletcher & Wolfe, 2016; Judge, 2013; Young et al., 2001). Although the link between poor academic performance and low socioeconomic status is well-

documented (Khanam & Nghiem, 2016), the link between noncognitive characteristics and low socioeconomic status has been studied much less (Fletcher & Wolfe, 2016).

Theoretical Framework

The theoretical framework behind grit is rooted in psychology research. Grit can be described as a persistent perseverance of effort toward an interest for a long period of time in spite of adversity or setbacks (Duckworth et al., 2007). Grit and its components have been studied as predictors of success (Wolters & Hussain, 2015). Theoretically, grit is divided into two constructs: consistency of interest and perseverance of effort (Duckworth et al., 2007).

Research on grit is based on a framework of factors leading to achievement and success that include perseverance, attitude, self-confidence, mindset, and resilience (Duckworth et al., 2007). In 1892, Sir Francis Galton studied successful individuals across multiple fields of business, education, and art and found their success was accomplished through "zeal" and "hard labor" (Galton, 1892, p. 33). Over 30 years later, Cox analyzed the childhood traits of persistence, motivation, effort, self-confidence, and character (Cox, 1926). These traits were found to be predictors of achievement equal to a high IQ (Cox, 1926).

In the 1940s, researchers of the Terman longitudinal study of mentally gifted children presented similar conclusions, finding that perseverance, goal coherence, and self-confidence were better predictors of educational and occupational success than IQ (Terman & Oden, 1947). More recently, Ericsson and Charness (1994) analyzed expertise and found expert performers in music, art, sports, and chess spent more than 10 years of daily, deliberate practice and theorized natural ability is less important than

purposeful effort. Also, Heckman (2007) found evidence supporting the skill formation theory, that prior noncognitive outcomes developed during childhood are correlated with current noncognitive outcomes.

The construct of grit is also related to the Big Five personality dimensions, "a hierarchical model of personality traits" that includes openness to experiences, conscientiousness, extroversion, agreeableness, and neuroticism (Gosling, Rentfrow, & Swann, 2003, p. 506). The Big Five personality traits have been used to predict success, with the trait of conscientiousness the best predictor of task performance (Duckworth et al., 2007). Since conscientiousness and perseverance of effort are closely related, the Big Five personality traits have become a theoretical foundation of grit (Fite, Lindeman, Rogers, Voyles, & Durik, 2017). The conscientiousness trait has also been related to implicit theories of abilities, since they have both been linked to perseverance of effort and the consistency of interest components of grit (Karlen, Suter, Hirt, & Merki, 2019).

Mindset researchers began in the 1970s with studies on the behavior patterns of task performers and found two common responses labeled *helpless* and *mastery-oriented* responses (Diener & Dweck, 1978). Those who avoid challenges when failed attempts occur are classified as helpless, and those who deliberately select challenges based on difficulty and persevere in spite of failed attempts are labeled mastery-oriented (Dweck & Leggett, 1988). Subject responses to these challenges became the topic of further research based on how individuals orient their task goals (Dweck & Elliot, 1988). Those with helpless response patterns choose tasks that are performance-oriented to prove competency to others, while people with mastery-oriented response patterns choose tasks

that are learning-oriented to increase competency (Dweck & Leggett, 1988). Implicit theories of intelligence then became the focus of further research.

Implicit theories of intelligence describe how a person views his or her abilities (Karlen et al., 2019). Implicit theories assist in determining student mindsets about how well one can perform a task "along a continuum from incremental to entity theory" (Dweck & Leggett, 1988, p. 257). Those who possess an incremental theory, or a growth mindset, feel abilities are malleable and can improve with effort, while those who believe the entity theory, or have a fixed mindset, think abilities are predetermined and limited in spite of effort or practice (Dweck & Leggett, 1988). Thus, implicit theories of intelligence are linked to grit, as students with an incremental theory of learning display higher perseverance of effort and consistency of interest (Zirenko, 2018).

Noncognitive Characteristics

The study of noncognitive skills can be traced back to 1958 when the *National Child Development Study* was conducted in the United Kingdom, and researchers found improvements in noncognitive skills were responsible for over one-third of the link between education and health and could become a goal for interventions to change the mental health status of children from low socioeconomic backgrounds (Carter, Richards, Hotopf, & Hatch, 2019, p. 190). Also, in 1976, Bowels and Gintis analyzed the impact of school on noncognitive traits and how these traits resulted in a strengthened labor market. In 1979, researchers identified 1,203 trait descriptors still being used as of 1996 to determine which of these traits were relevant to learning (DeRadd, 1996, p. 187).

Since then, researchers have begun analyzing noncognitive skills and their relationship to outcomes for school-aged children (Gutman & Schoon, 2013).

Publications using keywords pertaining to noncognitive characteristics have increased by 400%, and many of these studies focus on the relationship between noncognitive characteristics and academic outcomes (Smithers et al., 2018, p. 3). The research indicates noncognitive skills have a significant impact on student dropouts (Lessard, Butler-Kisber, Fortin, & Marcotte, 2014) and cognitive outcomes (Garcia, 2014).

Duckworth (2016) stated students who possess high levels of academic resilience will perform just as well or better than students who have a higher aptitude and IQ. This was supported by Duckworth et al. (2007), who found students with increased noncognitive skills outperformed students who lacked noncognitive skills, despite IQ or GPA. The promotion of noncognitive characteristics has been a major focus of the USDOE, which seeks to promote academic resilience and tenacity in schools (Stokas, 2015).

Children who have strong noncognitive skills at an early age will be more productive and better off later in life (Smithers et al., 2018). Certain noncognitive characteristics can scaffold the development of other skills linked to improved academic outcomes or better standards of living, especially at a younger age (Smithers et al., 2018). For instance, internal academic locus of control is positively correlated with grit and positive thinking; when positive thinking skills improve, grit levels increase, and the internal academic locus of control is strengthened as well (Çelik & Sariçam, 2018).

However, the focus on noncognitive skills does not necessarily need to begin at any certain age, since older and younger students' noncognitive growth measures reveal little difference in most cases (Lubotsky & Kaestner, 2016). Noncognitive skills like tolerance, kindness, and collaboration are crucial for late adolescence (Edwards, Catling,

& Parry, 2016), especially when considering aspects of relationship-building skills that are best learned at the elementary age (Harms, 2004). Students who begin kindergarten at an older age may show higher measures of noncognitive skills, yet younger students begin showing equal measures by the first grade despite an age difference (Lubotsky & Kaestner, 2016). The landmark High/Scope Perry Preschool Program study, which focused on early childhood interventions for disadvantaged children, has been cited to show the positive impacts of interventions designed to impact students' cognitive and noncognitive outcomes later in life (Song, 2019).

Interventions to improve noncognitive characteristics can take many shapes and may focus on small, specific skills or larger tasks that can be built on later in life (Lubotsky & Kaestner, 2016). The ability to forego smaller, immediate rewards in exchange for a larger but delayed reward can be accomplished without additional willpower if the rewards are "reframed" (Magen et al., 2014, p. 9786). An individual's perception of rewards and outcomes can effectively shape behavior and may be the key to more permanent behavior changes (Magen et al., 2014). Instead of offering a small amount of money now or a larger amount of money later, the researchers offered $5 now and no money later, or no money now and $10 later, which resulted in students exhibiting delayed gratification more often (Magen et al., 2014, p. 9786).

Noncognitive Characteristics and Academic Performance

Noncognitive factors have a significant correlation with academic outcomes (Duckworth, 2016; Duckworth & Quinn, 2009; Gutman & Schoon, 2013; Yeager, Hanselman, & Walton, 2019). The link between noncognitive outcomes and academic performance is strengthened when one analyzes the "skill formation theory," in which

children's previous cognitive and noncognitive formations are "related to their current outcomes" (Khanam & Nghiem, 2016, pp. 606-607). If continued without intervention, these deficiencies may cause a child to struggle into adulthood, since cognitive and noncognitive skills have different uses for multiple tasks in occupational and social aspects of life (Cunha, Heckman, & Schennach, 2010; West et al., 2016). Coneus and Laucht (2014) found noncognitive characteristics not only impact academic performance but also affect social outcomes during adolescence. These researchers followed children from birth to adolescence and concluded a child's attention span, approach to strangers, distractibility, and prevailing mood are directly related to noncognitive characteristics and academic performance (Coneus & Laucht, 2014). The authors further indicated interventions for noncognitive characteristics are best implemented at an early age, as these characteristics are more malleable during that period of life (Coneus & Laucht, 2014). However, which noncognitive characteristics have the biggest effect on academic outcomes has not been determined by scholars (Claro & Loeb, 2019).

Students who are considered gifted but also have a diagnosed learning disability have been the focus of many researchers interested in noncognitive characteristics and academic outcomes; many of these twice-exceptional students have a cognitive disadvantage yet still perform well enough for gifted programs (Beckmann & Minnaert, 2018). The noncognitive characteristics of the students were identified, and the researchers found these students have low self-perception and difficulties developing relationships but still maintain high motivation levels, adequate coping skills, and perseverance (Beckmann & Minnaert, 2018). Students who are gifted and learning disabled may benefit most from early interventions, which can offset low self-confidence,

periods of low motivation, and low self-efficacy that could lead to frustration with the learning process (Ottone-Cross et al., 2018). A common combination of students who are both gifted and learning disabled are students with attention deficit-hyperactivity disorder, and early interventions may help these students since they tend to struggle when developing close relationships, display disruptive behaviors in class, are disorganized, and are often critical of themselves (Amran & Majid, 2019).

Furthermore, how researchers and educators implement interventions to improve various noncognitive characteristics has not been the focus of many research studies (Lubotsky & Kaestner, 2016). Even with the significant attention noncognitive characteristics have received among scholars and researchers, no one has discovered a way to show students how to improve noncognitive characteristics, nor has significant curriculum for teaching these factors been developed (Tough, 2016). In one study, predictive analytics was applied to map the noncognitive skills possessed by students, and the data were used to design curriculum that improved student noncognitive skills (Yi, Kang-Yi, Burtin, & Chen, 2018). The tested group who were taught how to enhance their noncognitive skills improved academically by 9% compared to the control group (Yi et al., 2018, p. 1). Also, bi-weekly small group and individual noncognitive-based meetings with struggling students for a length of two school years yielded academic growth of 11% among younger students and 22% among older students (Martins, 2017, p. 10). Another study was focused on teaching students about academic mindsets, academic behaviors, learning strategies, and social skills via role-playing, lecture, and demonstrations, and resulted in improved attitudes toward school, learning, and growth mindset (Merino, Jooste, & Vermeulen, 2019).

However, it must be noted the findings from many studies highlight evidence refuting the power of grit and mindset over academic achievement, stating the link is unmistakable, but the relationship is "complicated" (Bazelais et al., 2018, p. 6). The fear of singling out racial and/or economic minorities as unmotivated leads many scholars to wonder if grit levels and growth mindset have merely been dampened by environmental circumstances beyond the students' control (Bahník & Vranka, 2017). Although students with high grit levels participate in purposeful and deliberate practice and stay committed to tasks when failed attempts occur, the cognitive processes that correlate grit with academic success are unclear (Luthans, Luthans, & Chaffin, 2019). In fact, one study yielded data that showed students with low grit scores performed just as well as students with high grit scores (Holdan, Lias, Locke, Elfen, & Buzzelli, 2018).

Other researchers, using different mindset measurements than the original mindset studies, discovered higher socioeconomic status was correlated with fixed mindsets toward math, and socioeconomic status did not play a significant role in mindset development (Destin, Hanselman, Buontempo, Tipton, & Yeager, 2019). Furthermore, grit has come under scrutiny with researchers indicating grit is backed by contradictory evidence; however, this supposed lack of empirical support is due to grit being measured by perseverance and not passion (Jachimowicz, Wihler, Bailey, & Galinsky, 2018). Once scholars adequately included passion along with perseverance, grit predicted academic success (Jachimowicz et al., 2018). These concerns may indicate a need for future research to focus on the specific difficulties at-risk groups face and how noncognitive factors such as grit and mindset play a part in alleviating these difficulties.

Executive Function

Executive function is a term used to describe working memory, impulse control, effortful control, attention control, and decision-making; executive function is controlled cognitively and emotionally (Scorza, Araya, Wuermli, & Betancourt, 2016). Although the literature on neuroscience indicates executive function and self-control are often given similar meanings, executive function refers to response inhibition, short-term memory, and the ability to switch perspectives, while self-control inhibits emotions and impulsivity (Blair, 2016). Repeat stressors in childhood and adolescence, such as poverty, family problems, and fear, have been shown to cause a decrease in executive function (Scorza et al., 2016).

Executive function is a significant predictor of student academic performance, and a delay in executive function has been found to be associated with many indicators that lead to an Individualized Education Plan (IEP) for special education students (Samuels, Tournaki, Blackman, & Zilinski, 2016). The results of a 2019 study showed the working memory aspect of executive functioning at preschool age was a predictor of adequate working memory as well as math and reading proficiency by the age of 15 (Ahmed, Tang, Waters, & Davis-Kean, 2019). The authors explained an adequate working memory through executive functioning is a significant predictor of academic achievement later on in life, and a lack of self-regulation and attention span at an early age does not necessarily mean this deficiency will last into adolescence (Ahmed et al., 2019).

Executive function has been a mediator between students from low socioeconomic environments and academic achievement, since the students' level of

executive function lessens the impact of parental education and family income on academic outcomes (Lawson & Farah, 2017). The development of executive functioning in early childhood is affected by the relationships the child develops with other children and significant caregivers; in addition, when these relationships are impacted by stress brought on by low socioeconomic environments, the development of executive function could be delayed (Finegood & Blair, 2017). Poverty also hinders a child's ability to develop *effortful control*, which is how a child uses executive functioning to plan, restrain emotions, and regulate temperament (Sturge-Apple, Davies, Cicchetti, Hentges, & Coe, 2017). The relationship between child poverty and effortful control is due to "elevated cortisol activity arising from increased uncertainty and unpredictability in rearing contexts" often experienced by children from a low socioeconomic background (Sturge-Apple et al., 2017, p. 20).

Resilience

Resilience is identifiable by the various traits one demonstrates when faced with an adverse situation that may hinder a desired outcome or goal (Arias, 2016). Yeager and Dweck (2012) explained how the level and longevity of resilience can be impacted by the mindset one possesses. This finding supports the idea resilience may develop over time, as it is often "based on the way individuals interpret and process an experience" (Arias, 2016, p. 13). Resilience is linked to self-efficacy, because perseverance level is correlated to the belief in one's ability to achieve a goal or to successfully perform a task (Arias, 2016). Students with challenges in domestic life, such as family problems or stressors common in low socioeconomic status families, can have lower resiliency levels due to a lack of support available in the immediate family (Johnston, Bailey, & Wilson,

2014). Individuals with a healthy resiliency level likely have a support group of family, friends, and mental health professionals who have nurtured a consistent trust and willingness to help through adverse issues (Johnston et al., 2014). As a major component of grit, resilience is an element found in the variables that make achievement possible (Duckworth, 2019). Resilience is what propels a person forward when adversity and failed attempts have weakened passionate pursuit of a goal, and the psychological factors that grow resilience are most effective when practiced from an early age (Duckworth, 2019).

Self-Efficacy

Dixson et al. (2016) explained noncognitive characteristics such as hope, grit, and self-efficacy correlate with academic performance, yet academic self-efficacy has the strongest relationship with academic outcomes. What a person believes he or she can do in certain situations for certain tasks has a direct impact on performance (Dixson et al., 2016). Academic self-efficacy used to self-regulate learning can lead to students who understand the process of learning and management of learning, while those who lack this self-efficacy have a negative belief about their own ability to learn and will demonstrate more procrastination (Batool, Khursheed, & Jahangir, 2017).

Bandura (1997) explained self-efficacy and self-esteem are directly correlated with procrastination, but self-esteem may not necessarily cause procrastination and low-performance outcomes; it simply lowers one's self-efficacy (Mone et al., 1995). However, low self-esteem and a lack of self-efficacy can be cured, according to Kosterlitz (2015), through *learned confidence*. Confidence in one's work is a key factor in enjoyment of the work, and when a person achieves a high grit level, a growth

mindset, courage, and self-compassion, he or she will have the proper traits to become a confident worker and learner (Kosterlitz, 2015). This confidence, as explained in an article by Kosterlitz (2015), can perpetuate significant noncognitive characteristics used to achieve desired goals.

Another factor that negatively influences self-efficacy may be due to what Duckworth (2016) called a "fleeting interest in everything" (p. 101). When studying the psychology of interests, researchers have discovered few people have an "all-at-once discovery" of their passionate pursuits, but will likely go through a journey of developed discovery (Duckworth, 2016, p. 103). However, if students perceive passionate pursuits as something they must instantly love or instantly succeed at, then they may find themselves with low self-esteem and a shattered self-efficacy when this passionate journey turns into a short and failed adventure (Duckworth, 2016). This idea is significant, as research conducted in 2011 revealed self-efficacy is a better predictor of GPA than measures of coherence, locus of control, and hope (Van der Westhuizen, De Beer, & Bekwa, 2011). Tepper and Yourstone (2018) conducted a study that measured noncognitive characteristics of students and found students with comparable ACT scores and GPAs would likely outperform classmates if they perceived their skill levels to be higher and had a lower rate of discouragement when faced with difficult tasks.

Intrinsic Motivation

Noncognitive characteristics such as intrinsic motivation can increase reading scores among students, according to Froiland and Oros (2014). In one study, when students were able to intrinsically see the benefits of reading and maintaining high GPAs, reading levels were improved (Froiland & Oros, 2014). When students perceive

themselves as competent in a subject and can relate that subject to their lives, intrinsic motivation increases (Peciuliauskiene, 2019). Intrinsic motivation has also been cited as a significant indicator of improved math comprehension, even more so than prior knowledge of these subjects (Niemi, Kuikka, & Hannula, 2005). In other words, a student's motivation level can be a better predictor of academic success than the academic level he or she begins with during the first term of the school year. However, intrinsic motivation levels of students from low socioeconomic backgrounds can be much lower than their advantaged peers, since low socioeconomic status students often perceive social mobility as something that will likely not occur in their lives (Browman, Destin, Carswell, & Svoboda, 2017). The effect of low socioeconomic status on academic achievement can be reduced when students interact with academic challenges and exhibit intrinsic motivation (Chen, Kong, Gao, & Mo, 2018).

Internal Locus of Control

How students perceive their abilities and control over their outcomes is a significant factor of academic achievement, and when stressful situations present themselves, it is one's perception of control that can contribute to other noncognitive factors such as resilience, grit, and mindset (Au, 2015). When learning goal orientation and internal locus of control are presented together, they have a significant positive impact on academic self-concept (Albert & Dahling, 2016). An internal locus of control can offset the effects of poverty by tempering the factors of generational poverty such as prolonged periods of unemployment, lack of job training and skills, and absence from an educational setting (Ng-Knight & Schoon, 2017). Also, how parents perceive their locus of control before the birth of their children up to age eight has a significant effect on each

child's cognitive and noncognitive development (Golding, Gregory, Ellis, Iles-Caven, & Nowicki, 2017).

Self-Representation

Social psychologists have suggested researchers distinguish two parts of self-representation related to academic achievement by looking at a student's academic self-concept and self-esteem (Cvencek, Fryberg, Covarrubias, & Meltzoff, 2018). These characteristics are formed in students once they enter a learning environment and are further developed as students progress through school; therefore, elementary students have very little academic self-concept since they have not attended a significant amount of school, and their self-esteem is based on non-academic influences (Cvencek et al., 2018). However, academic self-concept begins developing further once students begin to compare themselves to other students academically and socially, which suggests characteristics such as socioeconomic status and other demographic measures may contribute to a student's level of academic self-concept (Cooper et al., 2018).

Academic self-confidence has been directly related to resilience and can be influenced by past and present academic experiences (Ben-Naim, Laslo-Roth, Einav, Biran, & Margalit, 2017). This may explain why academic self-confidence is often lower among upperclassmen (Haktanir et al., 2018). However, when students set high personal standards, improve organizational skills, and develop positive mindsets, a positive self-concept will likely emerge (DeDonno & Rivera-Torres, 2018).

Another self-representation is self-esteem, which is positively associated with academic outcomes, since self-esteem is directly related to motivation, mindset, and overall self-value (Topçu & Leana-Taşcılar, 2018). Self-esteem has been cited as a

predictor of academic performance, perseverance of effort, consistency of interests, and grit; however, the relationship is weak (Weisskirch, 2018). Self-esteem plays a role in academic achievement indirectly by impacting other factors such as goal aspirations and feelings about one's self during the pursuit of a goal, thus one can be academically successful and have low self-esteem or can be academically unsuccessful and have high self-esteem (Weisskirch, 2018). This was illustrated in a study of Asian American students who stated they have lower self-esteem than other racial groups in spite of excelling academically (Chen & Graham, 2018).

Academic Self-Regulation

Academic self-regulation refers to a student's ability to make decisions based on attainable learning goals and controlling emotions while being aware of potential academic obstacles and limitations (Sahranavard, Miri, & Salehiniya, 2018). Students who use self-regulation components have more success with planning, positive self-efficacy, and overall better academic performance than students who cannot control emotional influencers (Sahranavard et al., 2018). Self-regulated learning involves the process of self-control combined with academic self-efficacy; tasks such as goal setting, planning, and seeking feedback are components of self-regulated learning (Duckworth, Taxer, Eskreis-Winkler, Galla, & Gross, 2019). When students have an intervention to teach them self-regulatory strategies, they can improve their academic self-regulation; however, the effects of the intervention are not permanent and may need to be duplicated annually (Claro & Loeb, 2019; Wibrowski, Matthews, & Kitsantas, 2017).

The impact of self-regulation on academic performance should be analyzed through a multifaceted lens that considers emotional regulation and behavioral regulation

(Edossa, Schroeders, Weinert, & Artelt, 2018). Emotional regulation is defined as the act of "monitoring, evaluating, and modifying emotional reactions" to "accomplish one's goal," while behavioral regulation is one's "ability to monitor attention and inhibit behavior in favor of goal achievement" (Edossa et al., 2017, p. 1). Similarly, self-regulated learning is often confused with self-control; however, self-regulation is based on more extensive goal-oriented planning and motivation to complete these goals (Duckworth et al., 2019). Academic self-regulation can also be defined as a fluid relationship between emotional regulation and behavioral regulation; children who can regulate their emotional state will also be able to control their behavioral state and vice versa (Edossa et al., 2017).

When searching for literature to link academic outcomes with self-regulation in relation to focus and motivation, one finds academic outcomes vary between students who understand tested concepts but do not focus their attention and students who neither focus their attention nor understand tested concepts (Lipina et al., 2013). Other research has been focused on the role early development of noncognitive skills plays in student attention span, mood, and focus during adolescence (Coneus & Laucht, 2014). Coneus and Laucht (2014) found boys with low noncognitive skills had lower socioemotional outcomes, and out of all the noncognitive predictors of academic outcomes, attention span was the most significant predictor.

One strategy for developing self-regulation skills is self-distancing (Grenell et al., 2019). Self-distancing refers to the process of finding the meaning of a negative experience, attempting to understand why the failure occurred, and engaging in external self-reflecting, which is a tool that can influence the way one perceives self and abilities

(Kross & Ayduk, 2011). Self-distancing has also been linked to other self-regulation skills such as executive functioning, perseverance, and emotional control (Grenell et al., 2019). Children up to age five who increased self-distancing also improved executive functioning by "transcending their egocentric perspective of the situation," which "underscores the critical role of representational capacities in self-control" (White & Carlson, 2016, p. 419).

Self-Control

Self-control can be described as "the alignment of thoughts, feelings, and actions with enduringly valued goals in the face of momentarily more alluring alternatives" (Duckworth et al., 2019, p. 374). How students align alluring gratifications can lead to success through goal completion or a failed attempt (Duckworth et al., 2019). Self-control is one of many traits found to "rival IQ and family socioeconomic status" when predicting academic performance during adolescence (Park, Tsukayama, Goodwin, Patrick, & Duckworth, 2017, para. 3). Self-control is self-initiated, so when a student stops playing video games to work on math, the student is exhibiting self-control; however, when the teacher or parent tells the student to stop playing video games to work on math, the student is being controlled by an external variable (Duckworth et al., 2019). This is a significant dilemma, since 50% of teens look at social media on a variety of devices, 51% watch television, and 60% send and receive text messages while doing homework (Duckworth et al., 2019, p. 378). Although student responses on surveys have indicated the belief academic work is important for the future, students also listed most academic work as averse to digital distractions and other forms of entertainment that are in competition with academic pursuits (Inzlicht, Bartholow, & Hirsh, 2015). Therefore,

self-control in academic settings is an important topic for future academic research (Inzlicht et al., 2015).

Self-control is a predictor of academic achievement throughout early childhood through adolescence and is impacted by poverty; however, various interventions have been effective (Blair, 2016). Duckworth and Seligman (2017) determined students who exhibit high levels of self-control perform better in school and are more likely to attend college than students who lack the natural ability of self-control. Negative home environments, household chaos, and low socioeconomic status are predictors of low self-control, according to Holmes, Brieant, Kahn, Deater-Deckard, and Kim-Spoon (2019). Furthermore, the authors found when children do not develop adequate self-control by ages 8.5 to 11.5, the children exhibit high risk-taking behaviors by age 15 (Holmes et al., 2019).

Interventions may be based on eliminating distractions during an academic process, such as putting the phone out of sight while doing homework, focusing attention away from uncontrollable distractions, changing one's outlook on the academic task to a more positive one, and simply forcing oneself to complete the task at hand despite external temptations (Duckworth et al., 2019). School leaders can intervene by designing curriculum, classroom lessons, and building policies that reduce the problem of self-control in the classroom, such as maximizing engagement through group work, presenting enjoyable lecture methods, and limiting overhead announcements through the intercom system to certain times of the day (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2014). However, some researchers have indicated hampering short-term rewards might not always be the answer, arguing if a person has been exhibiting self-

control for a long period of time, the short-term reward may be less effective (Reynolds & McCrea, 2019).

Metacognition

Metacognition is a significant predictor of academic achievement and is related to many facets of executive functioning, as both metacognition and executive functioning can enable a child to regulate his or her behavior and thinking (Roebers, 2017). Ceasing an activity when asked to, developing a strategy, or participating in a goal-oriented event despite distractions are examples of metacognition at work in a student's mind (Roebers, 2017). A meta-analytic study was conducted to determine the correlation among metacognition, intelligence, and academic performance (Ohtani & Hisasaka, 2018). Metacognition was a predictor of academic outcomes even when intelligence was controlled, which suggests educational practices should be focused on metacognitive interventions and assessments (Ohtani & Hisasaka, 2018). Furthermore, when students succeed at problem-solving using metacognitive skills, there is an increase in self-confidence and a more positive mindset; students will grow to have greater trust their personal talents and skills (Cikrikci & Odaci, 2016).

Grit

Grit, as defined by Duckworth et al. (2007) and Duckworth (2016), was the focus of this current research and is defined as resilient perseverance and passion for long-term goals. Grit is a better indicator of success than high IQ, high levels of talent, and being academically gifted (Duckworth, 2016; Duckworth et al., 2007; Duckworth, Gendler, & Gross, 2014). Students who have grit are resilient and develop positive outlooks on failed attempts (Perkins-Gough & Duckworth, 2013). Students increase grit levels by

accessing other noncognitive characteristics, which make up what grit encompasses, such as self-control, resilience, tenacity, and the ability to forego short-term temptations to accomplish long-term goals despite setbacks (Duckworth & Gross, 2014; Von Culin, Tsukayama, & Duckworth, 2014). Grit is made up of perseverance but also passion, which is an intense feeling toward a personally important value and the catalyst of tenacious motivation (Jachimowicz et al., 2018).

Grit has the potential to be a predictor of success in school and college (Duckworth, 2009); in one study, the most successful students in school were those who had grit traits, not talent (Perkins-Gough & Duckworth, 2013). Those who possessed grit and talent showed the highest level of success, which indicates noncognitive measures can be considered an essential part of academic success (Perkins-Gough & Duckworth, 2013). This finding signifies "cognitive-based predictors are not as comprehensive as we tend to believe" (Duckworth, 2009, p. 280).

In 2014, Hsin and Xie established effort, measured by "attentiveness and work ethic," is a significant reason why Asian Americans reach higher levels of academic achievement than their white counterparts (p. 8416). Furthermore, cognitive ability, intelligence, and talent are not significant indicators of academic outcome variations between white and Asian children (Hsin & Xie, 2014). Rather, the gap is due to noncognitive variables such as parental expectations, motivational processes, and self-control (Hsin & Xie, 2014). Interventions can lead to an increase in grit, indicating grit levels are malleable, especially when students are taught goal setting and positive attitudes toward grit (Alan, Boneva, & Ertac, 2019).

Self-control as an element of grit was discussed by Duckworth and Gross (2014), who argued the two are related but separate determinants of success. Some individuals have high levels of self-control and a low grit level, and vice-versa; therefore, even though the two noncognitive measures require a student to focus a behavior with an anticipated outcome, both "operate in different ways and at different time scales" (Duckworth & Gross, 2014, p. 319). Although grit can improve academic outcomes, it does not solve every problem a student may face, and should be accompanied by positive thinking, morality, resilience, and hope (Duckworth, 2016).

Self-control has been related to multiple behaviors such as impulse control, emotional control, and the ability to control thoughts, while a lack of self-control is seen as the root of "many societal problems such as crime and substance abuse" (DeRidder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2018, p. 76). Self-control strategies may be organized according to the situation (Duckworth, Gendler, & Gross, 2016). Duckworth et al. (2016) argued impulses seem to grow stronger over time, so "intentionally choosing to be in situations that favor goal-oriented valuation systems over temptation-orientated valuation systems" will lead to more successful self-control outcomes (p. 40). Teaching students "situation-modification strategies" and "situation-selection strategies" can help students plan "physical or social situations" (Duckworth et al., 2016, pp. 40-41). According to Duckworth, Kim, and Tsukayama (2013), negative life events are predictive of a decrease in self-control among early adolescents in terms of academic outcomes, health, and criminal behavior, despite socioeconomic level and general intelligence.

In addition to self-control, Duckworth (2016) explained effort is a significant part of grit. Effort and the behavioral performance reductions a person experiences over time are due to the strong adverse feeling experienced during a mental task such as calculation, higher-order thinking, or other cognitively demanding tasks (Kurzban, Duckworth, Kable, & Myers, 2013). Thus, displaying mental effort is a mixture of competing sensations, since completing a difficult task to achieve a goal is rewarding while at the same time becoming more difficult, tiresome, painful, and frustrating to maintain over time (Kurzban et al., 2013).

The adverse nature of mental effort for complex and difficult tasks can also be rooted in the brain's adaptive problem of prioritizing tasks and choosing what needs to be done now, next, and later (Kurzban et al., 2013). This phenomenology of effort can be understood as the difference in the cost and benefit of the mental task and the "computations of their benefits and cost relative to other operations to which the same process might be applied" (Kurzban et al., 2013, p. 662). When a student is asked to perform a mental task such as a series of math problem calculations, he or she will determine the benefit of the assigned task, weigh it against other options available (daydreaming, playing on a smartphone, talking to a classmate), and then decide which of the activities has the most efficient opportunity cost (Kurzban et al., 2013). Effort can add value to the final product or goal, and if effort is rewarded often, students will be more willing to put forth effort in the future (Inzlicht, Shenhav, & Olivola, 2018).

Effort is often based on attitude, and student attitudes toward subjects like math and science have been positively correlated with achievement in those subjects (Al-Mutawah & Fateel, 2018). If the student has a positive attitude toward math problems

and perceives the task to be more beneficial than daydreaming, the perceived effort of completing the math problems will be less averse, but if the student perceives checking his or her smartphone as the option with the most benefit, then he or she will perceive doing the math problems as more averse since there is a more beneficial option available (Kurzban et al., 2013). Grit has also been positively correlated with achievement in math (Al-Mutawah & Fateel, 2018).

When students navigate competing sensations, self-control may assist in the cost-benefit analysis since it is encouraged by self-regulation (Shanker, 2016). Self-control consists of preventing intense impulses, while self-regulation is behavioral management that reduces how frequently strong impulses occur (Shanker, 2016). Duckworth and Carlson (2013) explained a student's self-regulation of "attentional, behavioral, and emotional impulses" can be a significant indicator of school success (p. 222). Since students can learn to better manage or regulate these tempting impulses, they can learn to overcome "genetic factors" and cultivate self-regulatory strategic plans (Duckworth & Carlson, 2013, p. 223). The process of self-control requires students to process metacognitive, prospective strategies to distinguish between desired and undesired impulses (Duckworth et al., 2014, 2016).

Grit accounts for significant differences in successful outcomes such as level of education attained, higher GPAs, the length of time spent on a task without changing objectives (getting distracted, taking breaks), and the degree of motivation exhibited when working toward goals (Duckworth et al., 2007). Motivation is important because grit is "differentially related to three distinct motivational approaches," which include pleasure, engagement, and meaning, but grit is also highly correlated to self-control, or

the ability to forego giving in to impulses that lead to distraction (Von Culin et al., 2014, p. 1). Hence, people with grit will find pleasure in the process of learning just as they may find pleasure in playing video games but can inhibit the temptation to let the non-goal-oriented pleasure interfere with the goal-oriented pleasure (Eskreis-Winkler et al., 2016). Grit's link to academic outcomes is most prominent among students who are "at the high and low end of the [cognitive] ability distribution" with the lowest-ability student using grit in a "compensatory" way (Light & Nencka, 2019, p. 12). Students with lower ability levels who are academically successful may be accomplishing these goals by increasing effort, resiliency, persistence, and other factors of grit, while higher functioning students are combining collegial processes of ability and grit to overcome challenges (Light & Nencka, 2019, p. 12).

Mindset

According to Dweck (2008), the way a learner perceives the ability to gain knowledge has a significant correlation with how well he or she will perform in an academic setting. Dweck (2008) determined those with a fixed mindset perceive failure as self-defining and often resort to blaming or excuses; however, those with growth mindsets see failure as a learning opportunity. How a student perceives his or her abilities will determine how motivated he or she is to put forth the required effort (Dweck et al., 2014). Growth mindset interventions have been shown to increase motivation among students (Rhew, Piro, Goolkasian, & Cosentino, 2018). Two different mindsets can determine how students view their intelligence, thus their potential (Dweck, 2010a). Students with a fixed mindset will place the perceptions of others as the highest priority and will fear failure, while students with a growth mindset are more willing to

admit academic deficiencies and identify them as learning opportunities (Dweck, 2010b).

Mindset has a common relationship with other noncognitive characteristics as well (Cavanagh et al., 2018). Like grit, a student's mindset is strongly correlated with the student's perceptions about effort and failed attempts (Dweck, 2008). Dweck (2008) found students with growth mindsets have a better understanding of how academic ability grows through long periods of hard work and react to failed attempts by studying differently and/or more often. Students with fixed mindsets may feel dumb and want to avoid school or consider cheating (Dweck, 2008). Those with fixed mindsets not only perform poorly in learning opportunities, they often reject opportunities (Cimpian, Arce, Markman, & Dweck, 2007).

Individuals with a growth mindset and high grit level will be able to take constructive criticism and turn it into an opportunity for improvement (Hogan & Larkin-Wong, 2013). These individuals view the evaluation process as a peek into their ability to get better and an opportunity to see where to focus their practice (Hogan & Larkin-Wong, 2013). Interventions to increase the growth mindset of students were discussed by Yeager et al. (2014), and their research revealed growth mindset interventions decreased failing grades for low-performing students while improving grades in ninth-grade core subjects. Furthermore, this study showed students with a fixed mindset chose easier problems to work, had higher levels of performance-avoidance (procrastination), and generally believed difficulty with hard problems meant they were not intelligent (Yeager et al., 2014). Mindset interventions, when combined with strategies that enhance

motivation, effort, and grit, lead to significant improvements in academic outcomes (Bedford, 2017).

One factor concerning the mindset of a child is how parents perceive failure as enhancing or devastating, but mindset is not influenced by the parents' level of education (Haimovitz & Dweck, 2016). Parents who see failing as debilitating are prone to focus on their child's performance and not on the child's learning process, which leads to a fixed mindset development within the child (Haimovitz & Dweck, 2016). In addition, mindset is also shaped by how parents praise a child's effort and hard work toward a goal (Gunderson et al., 2013). Students with a growth mindset are more likely to enroll in rigorous courses that better prepare them for college, and these students will also likely experience positive feedback from parents, teachers, and peers for their apparent motivation (Yeager et al., 2019).

Parental praise of a child's effort encourages the child to develop beliefs about his or her ability and malleability, but when parents praise their child's ability or intelligence, this leads to the development of a fixed mindset (Gunderson et al., 2013). A fixed mindset is often developed at a young age due to the inherent idea one is born with a pre-determined level of intelligence that cannot grow (Dweck, 1986, 2007b; Mueller & Dweck, 1998). When parents praise a persevering effort, they are shaping the child to believe his or her abilities can grow with enough effort (Dweck, 1986, 2007b; Mueller & Dweck, 1998). The literature further indicates a change in students' mindset can change resilience level in school when they believe social attributes can be developed (Yeager & Dweck, 2012). In a study conducted by Yeager and Dweck (2012), the authors found

aggression and stress due to bullying can be decreased when a growth mindset is adopted, which could lead to improved academic performance and general happiness at school.

Mindset interventions can increase growth mindsets in students who are at-risk of dropping out; growth mindset interventions delivered online improved semester GPAs by 6.4%, according to Paunesku et al. (2015, pp. 5-6). Also, Yeager and Dweck (2012) found when a student's mindset changes, an improvement in academic outcomes occurs. According to the incremental theory, intelligence is malleable and can grow, while intelligence is fixed according to the entity theory (Blackwell, Trzesniewski, & Dweck, 2007). When students are taught the incremental theory of intelligence, they make higher grades (Blackwell et al., 2007). A student's understanding of intelligence theories is affected by teachers and parents, and the mindset of a student's classmates can influence the student's attitude toward fixed and growth mindset theories (King, 2019). Even if a student has a growth mindset and fully understands the neuroscience found within the *incremental* and *implicit* theories of intelligence, the presence of multiple classmates with fixed mindsets can be harmful to the student's growth mindset attitude (King, 2019).

In Yeager and Dweck's (2012) study, students who were shown empirical data on how the brain works and the process the brain goes through when "forming new connections between the neurons" during the learning process, demonstrated a 0.23 GPA increase (p. 304). Another mindset intervention involves teaching students about brain plasticity and how the neuroscience of learning works, which will lead to an understanding of rigor, failed attempts, and why it is important to see academic struggles as learning opportunities (Yeager et al., 2019). In Yeager et al.'s (2019) study, these

interventions were taught in multiple lessons, online, and improved grades within the target group with the most challenges in school.

Noncognitive Characteristics and Low Socioeconomic Status Students

Academic achievement is heavily influenced by students' socioeconomic status as well as their perceptions of learning and their academic abilities (Claro et al., 2016). Students living in low socioeconomic environments are not as likely to develop adequate noncognitive skills (Claro et al., 2016). This fact stands out in light of data showing 51% of public school students qualify for free or reduced-price meal plans, which is an indicator a student's family is below the federal low-income threshold (Tough, 2016, p. 1). However, researchers may be getting closer to discovering a psychological cause, in addition to a lack of resources, as to why these students suffer academically (Destin et al., 2019). Students who develop a growth mindset and a higher level of resilience increase academic outcomes despite poverty's negative impact on academic performance (Claro et al., 2016). In some cases, students from low socioeconomic backgrounds sustain academic motivation despite difficulty, which may be due to how they perceive the link between socioeconomic mobility and academic success (Browman et al., 2017).

Also, teachers express concern since many students from low-income backgrounds have more difficulty staying motivated and are more likely to fall into the educational achievement gap (Tough, 2016). However, recent research indicates noncognitive skills curb the effects of a family's low socioeconomic status, and these moderations are most noteworthy during the developmental stages of early childhood and early adolescence (Liu, 2019). Students from various economic backgrounds who are exposed to mindset interventions exhibit a stronger interest in academic subjects and

improve academic outcomes (Broda et al., 2018). If educators can find ways to improve the noncognitive skills of students from low socioeconomic backgrounds, the achievement gap may lessen (Liu, 2019).

Other research reveals students of low socioeconomic status have difficulty with attention control in addition to the traits of executive control such as initiation, task monitoring, and organizing (Lipina et al., 2013). These findings are supported by other, more recent research results where students who were exposed to noncognitive and social-emotional interventions focused on the five competency domains of social and emotional learning (self-awareness, self-management, social awareness, relationship skills, and responsible decision making), as well as positive attitudes toward self and others, demonstrated significant academic growth (Taylor, Oberle, Durlak, & Weissberg, 2017; Liu, 2019). Social-emotional learning can often produce higher rates of academic benefit for minority and low socioeconomic students (Taylor et al., 2017).

Do students raised in a low socioeconomic environment have lower levels of important noncognitive characteristics such as growth mindset and grit? Destin et al. (2019) found students from higher socioeconomic backgrounds are more likely to have growth mindsets, and students with growth mindsets make better grades. In other words, students from higher socioeconomic status backgrounds may see themselves in more positive ways and are likely to develop a more positive mindset, which improves the probability of higher academic achievement (Jury, Smeding, Court, & Darnon, 2015). These self-perceptions often determine the level of academic motivation that leads to successful academic and occupational trajectories, and when students from low socioeconomic backgrounds are “led to feel that opportunities for successes and

advancement are available to them rather than feeling that opportunities were out of reach," their academic motivation levels increase (Destin et al., 2019, p. 2). Mindsets, attitudes, and self-beliefs are constantly affected by a person's life experiences and societal messages, and if those experiences and messages are perceived as hopeless due to poverty, then motivation and mindset will suffer (Haimovitz & Dweck, 2016).

At-risk students will likely experience academic difficulty (Oreopoulos, Brown, & Lavecchia, 2017). Yet, when early intervention programs are readily available, along with increased access to books in the home, at-risk students improve interpersonal skills and literacy development (Judge, 2013). Interventions that lessen the reading gap for at-risk students are constructed using social-emotional learning, and factors that predict reading achievement among at-risk students are based on changes in noncognitive behaviors such as effort and resilience (Judge, 2013). A more recent study was focused on at-risk students and academic achievement, and social-emotional competence was identified as a key predictor of academic resilience (Domitrovich, Durlak, Staley, & Weissberg, 2017).

Noncognitive Characteristics and Correlations between Parent and Student

Research results indicate specific environmental factors at school and home can shape noncognitive characteristics, especially during early childhood (Tough, 2016). Also, parents may pass on noncognitive traits to their children; parent and student Grit-S scores have been reported to have a "small positive" correlation, which indicates parents who have high grit levels will have children with high grit levels (Nikolaus et al., 2019, p. 214). Other researchers focused on students from low socioeconomic environments and their educational expectations indicated a strong correlation between the mother's self-

esteem and the child's academic expectations and cognitive ability (Kim, 2014). When the child's mother acquired a GED, the child demonstrated improved cognitive ability and higher educational expectations, which indicated the effects of poverty on education can be lessened when mothers are better able to encourage children's self-esteem (Kim, 2014).

These findings compare to the landmark study by Rosenberg, Schooler, and Schoenbach (1989), who showed a child's academic expectations can be improved when the child maintains healthy self-esteem. When children witness their parents, especially mothers, fulfilling academic goals such as finishing college, children may have a better chance of developing a growth mindset and other positive perceptions of academic pursuits (Destin et al., 2019). However, stress during childhood is cited as one of the most crucial factors that hinders a child's noncognitive characteristics (Tough, 2016).

Lack of financial security may hinder a child's cognitive ability but may not be the cause of low noncognitive skills among students living in low socioeconomic environments, according to Khanam and Nghiem (2016). Noncognitive characteristics are influenced by mother's education level, the presence of both biological parents in the home, the child's health, the parent's health, and parenting style (Khanam & Nghiem, 2016). Also, a child's social network, number of friends, and socioeconomic background of friends can have an effect on his or her noncognitive characteristics (Lavy & Sand, 2019). Cognitive factors may be influenced by private school, tutors, and extracurricular activities (Khanam & Nghiem, 2016.)

Low-income families who suffer from prolonged distress are often reactive instead of proactive when handling their finances, may not make financial investments

for the future, and often develop simple occupational skills that limit their ability to earn higher wages (Lam, 2014). These factors often lead to parents neglecting to focus on the social capital they give their children through lower expectations, a lack of involvement at school, and a lack of monitoring their children's behaviors and activities (Lam, 2014). These students, as a result, can develop an external locus of control and adopt a performance-avoidance mentality (Lam, 2014; Novotný & Křeménková, 2016). However, families from a low socioeconomic status background with higher Grit-S scores correlate with longer periods of food security when compared to similar families with lower Grit-S scores (Nikolaus et al., 2019).

The findings from a study in 2014 indicated children who experience adversity, such as family stress, during early childhood could have less-developed brains and lack various noncognitive factors such as high resiliency levels (Masten et al., 2014). Adverse experiences such as divorce, long-term physical or mental abuse, and neglect can involve prolonged negative impacts, while other adverse experiences such as a domestic abuse incident or brief periods of homelessness may lead to short-lived adversity (Edwards et al., 2016). The link between long periods of family adversity and behavioral problems, as well as low academic outcomes, is well-documented; however, in many cases, these people have gone on to enjoy normally functioning lives, which shows those with a high level of resilience are able to "moderate the relationship between adverse experiences and negative outcomes" (Edwards et al., 2016, p. 26). This link is especially evident when education programs include prepared interventions to improve the resiliency levels of students who have experienced a traumatic event (Rochester, 2019). Another study was conducted to determine if a positive relationship between students and teaching staff led

to increased student resiliency; student outcomes improved when teachers took the impact of being at-risk into consideration when working with students (Sanders, Munford, Liebenberg, 2016).

Children and families considered homeless or highly mobile achieve less in school, have lower academic outcomes, and have a negative expectation for the future (Masten et al., 2014; Tovar-García, 2017). However, students show significant resilience when the family and school provide positive support to overcome the negative effects of being homeless or highly mobile (Masten et al., 2014). Also, among students who are considered homeless and highly mobile, emotional control and social competence intervention techniques practiced by the child and family contribute to improved academic outcomes (Lafavor, 2018).

When at-risk students practice emotional control and social competence, academic results significantly improve (Lafavor, 2018). When schools develop curriculum focused on noncognitive skills and social emotional learning and implement these curricula for an adequate duration over an at-risk child's academic career, students from a low socioeconomic status background will improve multiple noncognitive skills (Yang, Datu, Lin, Lau, & Li, 2019). Family is not the only important influence; the socioeconomic status of a student's friends and social network is also a significant indicator of how a student may demonstrate noncognitive characteristics (Lavy & Sand, 2018).

The way in which parents intervene on their child's behalf can also have a significant impact on student noncognitive characteristics (Spruijt, Dekker, Ziermans, & Swaab, 2019). Parent-led interventions can shape adolescent self-control when parents

deal with stress in a positive way (Suizzo et al., 2017). Parental modeling, especially from the father, can have a significant impact on a child's noncognitive behaviors (Suizzo et al., 2017). Students from low socioeconomic homes often exhibit decreased school readiness and behave in ways not conducive to learning, which then leads to learning difficulties in the future (Morgan et al., 2017). Environmental stress present in impoverished neighborhoods and low socioeconomic families directly impacts executive functions such as emotional control, self-control, and self-monitoring (Mance et al., 2019).

Noncognitive Behaviors and Discipline Outcomes

Noncognitive characteristics that contribute to social-emotional behavior problems are linked to family income (Noonan, Burns, & Violato, 2018). Student behaviors (self-control, willpower, perseverance) in school are significant contributors to academic success (Gregory & Fergus, 2017). Increased hyperactivity, peer-related problems, and inattention at school often lead to missed time in the classroom and negatively impact academic outcomes (Noonan et al., 2018). However, self-control interventions have been shown to improve habitual behaviors and can shape undesirable and desirable behaviors equally (DeRidder et al., 2018). This is especially true for at-risk students, and according to one study where interventions were targeted to at-risk students, socio-emotional competence was a mediator between academic outcomes and low socioeconomic status (Domitrovich et al., 2017.)

Suspending students from school for various disciplinary infractions has been shown to hinder academic progress; with over 2.5 million out-of-school suspensions and 100,000 expulsions occurring every year in U.S. schools, students who lack noncognitive

skills make up a large majority of these statistics (Greene, 2018, p. 23). Students who lack noncognitive skills such as self-control and impulsivity often exhibit "more extreme" behaviors that are often physical, yet these behaviors are how the student is communicating difficulty in meeting an expectation (Greene, 2018, p. 23). Over the past 20 years, schools have gone from a zero-tolerance mindset, rooted in suspensions and expulsions, to alternative styles of correcting misbehavior involving teachers, administrators, and parents teaching students who lack noncognitive characteristics (Skiba & Losen, 2016). Teaching students the skills needed to build relationships with teachers and peers, focus their attention, and decrease outbursts have been shown to decrease misbehavior and discipline infractions (Skiba & Losen, 2016). School-based mental health services have been recommended by researchers and the Council for Children with Behavior Disorders to improve the social-emotional skills of students (Kern et al., 2017).

The link between poverty and childhood behavior problems is well-documented; however, the effect of the degree and longevity of poverty on a child's behavior is still not fully known (Mazza et al., 2017). Some studies support the idea the longer a child spends in poverty, especially from birth to three years old, the more likely the child will develop behavior issues later in life; fluctuations in behavior correlate with times the family's socioeconomic status rises above and falls below the poverty line (Rekker et al., 2015). According to Rekker et al. (2015), changes in parenting styles or parental behaviors have no impact on the child's behavior, which contradicts other studies showing parental interventions may lead to improved behavior. Interventions at school, such as self-regulated learning through tutoring, have shown to be moderately successful

at changing a student's behavior issues; however, teaching students from a low socioeconomic status background how to self-regulate their learning is best done by focusing on the root causes of the problems caused by poverty (Vandevelde, Van Keer, & Merchie, 2017).

Noncognitive Characteristics and Neuroscience

Neuroscience advancements and motivational studies have been used to improve educational settings and can now help educators and researchers understand noncognitive behaviors as well as motivation and learning processes (Ng, 2018). Researchers have a better understanding of what types of learning are assisted by neurological processes and how these processes impact behaviors such as motivation, resilience, self-esteem, and mindset types (Bassett & Mattar, 2017). While most attention has been focused on how the brain improves the ability to develop cognitive skillsets, an increase in research focused on the neurological development of noncognitive skills is evident (Myers, Wang, Black, Bugescu, & Hoeft, 2016). Neuroscientists established those who exhibit a growth mindset and are intrinsically motivated exhibit "a higher Pe (error positivity) waveform response" linked to a "heightened awareness of and attention to mistakes" (Ng, 2018, p. 4). Also, the anterior cingulate cortex, which is the part of the brain used to adapt behavior and neutralize negative feedback, is strongly related to growth mindsets, positive attitudes toward learning, and the ability to see a failed attempt as a learning opportunity (Ng, 2018). Grit and mindset are both linked to the "functional connectivity between ventral striatal and bilateral prefrontal networks thought to be important for cognitive-behavioral control," which indicates these noncognitive skills are linked to brain development and not just environmental interventions (Myers et al., 2016, p. 1521).

If noncognitive characteristics are shaped by the brain, then one can argue noncognitive characteristics may be shaped by poverty as well (Dike, 2017). Children born and raised in poverty may exhibit irregular brain development, which can lead to behavior problems by school age (Dike, 2017). The relationship between poverty and brain development is brought on by various risks such as "food security, infectious disease, and psychological stress" (Jensen, Berens, & Nelson, 2017, p. 225). Chronic stress, or toxic stress, can cause "physiological and neurological adaptations in children that affect the way their minds and bodies develop," which impacts the way they perform in an academic setting (Tough, 2016, p. 4).

However, parenting-based interventions reduce the impact of poverty on brain development if implemented from early childhood up to the age of 11; therefore, the effects of poverty on brain development and noncognitive behaviors are not necessarily permanent (Brody et al., 2017). The hippocampus, the center of emotional control, memory, and automated nervous system, is significantly impacted by adversity related to low socioeconomic status during childhood, which leads to a lack of important cognitive and noncognitive behaviors (Yu et al., 2018). This is especially true for children between eight and 12 years old (Yu et al., 2018).

Summary

The review of literature revealed noncognitive characteristics can occur in many forms including behaviors, perceptions, and attitudes, but the term can also be used to refer to a person's belief about his or her future and the perceived ability to change it (Anderson et al., 2016; Farrington et al., 2012). Noncognitive characteristics have been used to improve labor markets (Bowels & Gintis, 1976) as well as academic outcomes

(Duckworth, 2016; Duckworth & Quinn, 2009; Gutman & Schoon, 2013). Students must understand the learning process and avoid procrastination behaviors (Batool et al., 2017). Noncognitive characteristics and academic performance are linked by the skill formation theory, which describes the way previous noncognitive outcomes are related to current noncognitive outcomes (Khanam & Nghiem, 2016). Thus, when deficiencies of noncognitive outcomes are present, interventions are crucial for the child's future academic and occupational outcomes (Cunha et al., 2010.)

Grit and growth mindset are significant indicators of improved academic outcomes (Duckworth, 2016; Duckworth et al., 2007; Dweck et al., 2014). Grit is a better indicator of GPA than talent, IQ, or giftedness (Duckworth, 2016), while students who have a growth mindset perceive failure as an opportunity to learn and prefer challenging work over easy work (Cimpian et al., 2007; Dweck, 2008; Hogan & Larkin-Wong, 2013). Students who have a growth mindset tend to have higher grit levels (Perkins-Gough & Duckworth, 2013). Grit and mindset share many characteristics with other noncognitive factors (Gutman & Schoon, 2013). Noncognitive and cognitive formations combine over the course of early childhood and can shape a child's perceptions and abilities well into adolescence (Cunha et al., 2010).

Self-efficacy, self-regulation, executive function, grit, mindset, and self-control are some of the most influential noncognitive characteristics in terms of academic performance (Claro & Loeb, 2019). Self-control is a quality factor of a person's grit, and habit is a vital factor in a person's level of self-control; therefore, developing healthy habits can improve one's grit level (Galla & Duckworth, 2015; Walton, 2014). Noncognitive characteristics like grit and growth mindset can be developed through

parental interventions, and how parents perceive failure and success can reshape what a student believes about his or her ability to learn (Haimovitz & Dweck, 2016). How parents praise effort can also lead to a growth mindset in students, while parental praise of a student's ability can lead to a fixed mindset (Gunderson et al., 2013).

Students of low socioeconomic status have decreased attention span, motivation, and academic performance (Browman et al., 2017). Students of low socioeconomic status may not be as likely to develop high grit levels and growth mindsets, but when these noncognitive factors are acquired, academic performance increases (Claro et al., 2016). Students from low socioeconomic families may have lower cognitive abilities, but the cognitive deficiency is not necessarily the cause of an absence of significant noncognitive skills (Khanam & Nghiem, 2016). Students from higher socioeconomic status backgrounds have a more positive perception of themselves, which can lead to adequate levels of noncognitive characteristics such as mindset and efficacy (Jury et al., 2015).

Factors that hinder noncognitive characteristics are related to societal and environmental influences such as neighborhoods, prolonged distress, and a lack of social capital (Lam, 2014). Parental involvement and expectations are factors that can improve noncognitive factors among students of low socioeconomic status (Lam, 2014). The relationship between a parent and a child has a mediating role between a child's reading ability and socioeconomic status, and "this relationship was moderated by students' learning motivation" (Chen et al., 2018, p. 4). Children may adopt many of the noncognitive characteristics of their parents, while parents can shape their child's self-esteem and academic expectations (Kim, 2014; Rosenberg et al., 1989).

Children will often adopt the perceptions present in their surroundings, whether that be the household or neighborhood (Khanam & Nghiem, 2016), and long-term environmental stress such as poverty can hinder noncognitive skill development (Lam, 2014). This hindrance is correlated with a lack of noncognitive characteristics and leads to increased discipline infractions (Gregory & Fergus, 2017), resulting in more than 2.5 million suspension days each year in U.S. schools (Greene, 2018, p. 23). However, interventions can be implemented to teach noncognitive behaviors such as self-control and impulsiveness (Greene, 2018).

Neuroscience has increased understanding of how noncognitive characteristics are developed and maintained (Ng, 2018), and noncognitive skills are linked to brain development and not simply the environment (Myers et al., 2016). Being born and raised in poverty can alter brain development (Dike, 2017). This altered brain development may be due to food insecurity, stress, and disease brought on by poverty (Jensen et al., 2017). Adversity in the early stages of life affects the development of the hippocampus region of the brain, which acts as a behavioral center (Yu et al., 2018).

In Chapter Three, the research design is presented, and the research questions and hypotheses are listed. The population and sample are described, and details about instrumentation are offered. Data collection and analysis are discussed, and the ethical considerations are explained.

Chapter Three: Methodology

The purpose of this study was to determine if a difference in grit scores and mindset types exists between students with free and reduced-price meal status and students with full-price meal status. Also, this study was conducted to determine if students of low socioeconomic backgrounds have different grit levels and mindset types than students of middle to high socioeconomic status. The findings from this study may be used to determine how students perceive talent and a natural ability to learn versus learning through perseverance and systemic effort (Duckworth, 2016; Dweck, 2016). Schools may use the data from this study to develop interventions with a focus on increasing student grit and shaping mindset type.

Research Design

This study consisted of a quantitative approach which included surveying students who attended one school district in southeast Missouri. The surveys were used to determine the students' grit scores and Mindset Assessment Profile scores. The survey instruments yielded data on student perceptions about academic failure, goal setting, cognitive stamina, and cognitive plasticity (Duckworth, 2016; Dweck, 2016).

Surveys were chosen for this study, because noncognitive factors are often based on perceptions and beliefs (Domitrovich et al., 2017). The survey is an adequate tool to collect perceptions about grit and mindset among the sample and generalize the data to the population, as discussed in Creswell (2018). Surveys allow the study to be conducted in a more economical way and produce data much more quickly than interviews or longitudinal studies (Creswell, 2018). The survey used in this study was conducted on

paper at the site. All participants took the survey at the same time and within the same time frame.

Research questions and hypotheses. The following research questions and hypotheses guided this study:

1. What is the difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals?

$H1_0$: There is no difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

$H1_a$: There is a difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

2. What is the difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals?

$H2_0$: There is no difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

$H2_a$: There is a difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

3. What is the correlation between student grit and student mindset?

$H3_0$: There is no correlation between student grit and student mindset.

$H3_a$: There is a correlation between student grit and student mindset.

Population and Sample

The population of this study consisted of 107 high school students attending grades 9-12 at a public school district in southeast Missouri. For this study, a stratified sampling method was used. A stratified sample is acquired by dividing the population into subgroups or strata based on some type or factor relevant to the study (Bluman, 2015).

Once the strata were identified, participants were selected from each subgroup (Bluman, 2015). The two strata used in this study consisted of students who participated in a free or reduced-price meal program or those who were considered full-pay status. The participating school ensured simple random sampling was applied within each stratum, and each sample was deidentified with an alphanumeric code. Only socioeconomic status information the school previously gathered for free or reduced-price meal applications were utilized. This information was gathered by the school's administration and was not made available to the researcher. The sample was made up of 54 students. Only students who received parental permission participated in the study.

Instrumentation

The instruments for this study included the 12-item Grit Scale (see Appendix A) and the Mindset Assessment Profile (see Appendix B). The Grit Scale, developed by Duckworth, is designed to assess an individual's grit level based on answers to survey statements that pertain to persistence, resilience, and the ability to forego immediate gratification for the benefit of a long-term goal (Duckworth & Quinn, 2009). The Mindset Assessment Profile is a Likert-type scale with statements pertaining to one's

belief in brain plasticity, the ability to learn more through practice, and perceptions about hard work and failure (Paunesku et al., 2015).

The Grit Scale consists of 12 Likert-type statements designed by Duckworth, while the Mindset Assessment Profile contains eight Likert-type statements designed by Dweck (Duckworth & Quinn, 2009; Silpakit, Silpakit, & Chomchuen, 2015). Each statement on the Grit Scale yielded one point, according to the student's response, then points on the Grit Scale are added and divided by eight (Duckworth, Peterson, Matthews, & Kelly, 2007). This led to a Grit score ranging between one and five (Duckworth, Peterson, Matthews, & Kelly, 2007). The Mindset Assessment Profile score ranges from one to four, based on student responses, and a low score indicated a fixed mindset, while a high score indicated a growth mindset (Paunesku et al., 2015).

Measuring grit. On the Grit Scale, the students self-reported by selecting options from a five-point scale (5 = *very much like me*, and 1 = *not at all like me*) and completed the survey within five minutes (Tough, 2012). Duckworth (2016) administered the scale to the 2004 incoming class at the West Point Military Academy to compare aptitude and grit scores during Beast Week, when candidate dropout is most common. Grit was a more significant indicator of cadet dropout than the rigorous aptitude test administered by West Point, which indicates talent and aptitude "said nothing about grit, and vice versa" (Duckworth, 2016, p. 9).

Measuring growth mindset. Mindset was measured through a Likert-type survey with eight statements pertaining to perceptions of hard work, learning difficulties, and academic struggle (Paunesku et al., 2015). Upon completion of the survey, the numbers to the corresponding statements were added to obtain a Mindset Assessment

Profile number (Paunesku et al., 2015). This number determined the participant's current mindset.

Validity and reliability of the Grit Scale. The Grit Scale was developed by Duckworth (2016) and measures perseverance and passion for long-term goals. Evidence of the validity of the Grit Scale can be found in multiple studies (Beri & Sharma, 2019; Duckworth & Quinn, 2009; Sturman & Zappala-Piemme, 2017). Validity is defined as an assessment measuring what it is intended to measure and used for the purpose in which it is intended to be used (Fraenkel, Wallen, & Hyun, 2015). The Grit Scale has a strong constructive validity for measuring perseverance and passion for long-term goals (Duckworth & Quinn, 2009). It also has a strong predictive validity associated with components of grit (Beri & Sharma, 2019; Datu, Valdez, & King, 2015). The Grit Scale has an internal reliability of α =.82, with .70 for the effort subscale, and .83 for the interest subscales (Von Cullin et al., 2014, p. 3).

Validity and reliability of the Mindset Assessment Profile. The Mindset Assessment Profile is a four-item Likert-type survey with statements describing a growth or fixed mindset and was determined to be valid since it measures mindset, achievement motivations, and goal motivations (Cook, Gas, & Artino, 2018). Clinical experiments were the basis of the qualitative research in the area of growth mindsets to measure construct validity (Cimpian et al., 2007). The Mindset Assessment Profile contains 10 statements and was determined to be reliable and reproducible (Silpakit et al., 2015).

Data Collection

Permission was received from the school district's superintendent to conduct research on the students. Once Lindenwood University Institutional Review Board

approval was obtained (see Appendix C), research study assent forms (see Appendix D) and research study consent forms (see Appendix E and F) were sent to the students and parents by district administrators. Included with these documents was a letter of introduction (see Appendix G) which had an explanations of the study's purpose, statements explaining student confidentiality and that participation was voluntary. Students and parents returned these forms to the district's administration. A prompt was read to the students (see Appendix H) before they took the survey, they were informed the survey was not a test, no grade would be given, and their responses would be seen by no one other than the researcher.

Students were informed their responses would be anonymous and any personal identifiers had been redacted by the school district's administration. The students were told their participation was voluntary, they could stop at any time, and questions would be answered. The surveys were distributed by the district administration to the participants based on each student's participation in a free or reduced-price meal program or full-pay status. Each survey was numbered and assigned an alpha-numeric code indicating each student's participation in a free or reduced-price meal program (R) or full-pay status (P).

Data Analysis

To answer research questions one and two, a two-sample *t*-test was used to identify whether statistically significant differences in grit scores and mindset types existed between two categories of students. The two-sample *t*-test is an appropriate statistical test, since it is used to determine if a difference in the dependent variable exists between the mean value of the two-category independent variable (Bluman, 2015). The

assumptions of normality were assessed, and the two-sample *t*-test was used to determine if the null hypotheses would be rejected or not rejected with 95% accuracy (Bluman, 2015). To answer research question three, the Pearson Product Moment Correlation Coefficient (PPMCC) was used to determine if a strong positive linear correlation existed between grit levels and mindset types.

Ethical Considerations

While conducting the research, no harm came to any of the participants. Respect, dignity, and autonomy were taken into consideration at every step of the research process, and all physical, psychological, and social risks were eliminated, while the benefits to the research were maximized. Only those students who received permission from parents or guardians were allowed to participate. Every student willingly and voluntarily agreed to participate in this study. The following steps were taken to ensure the students' names, identities, beliefs, attitudes, perceptions, and other demographic data remain confidential.

1. All collected data were secured under lock and key in a cabinet accessible only to the researcher.

2. Any electronic data gathered were secured on a personal computer and password-protected by the researcher.

3. Identifiable statistics discussed were modified to preserve the anonymity of the participants. Alpha-numeric codes were used to protect demographic factors, attitudes, beliefs, and perceptions of the students.

4. Each student received an Informed Consent Form that explained the purpose of the research, any possible risks, and the chance to withdraw from the study.

Summary

In this chapter, an overview of the research design and research questions was provided. Also, the hypotheses, the population and sample, the instrumentation, data collection, and data analysis were presented. Measuring grit and mindset types and the validity and reliability of the Grit Scale and Mindset Assessment Profile were discussed. Ethical considerations were detailed regarding confidentiality and anonymity.

In Chapter Four, a brief overview of the study is offered. Then, the analyses of the data are presented. Tables and figures are provided to further highlight the statistical findings from each survey.

Chapter Four: Analysis of Data

Noncognitive characteristics have a significant impact on students' academic outcomes (Browman et al., 2017; Duckworth & Carlson, 2013; Dweck, 2016). Also, poverty can have a negative impact on academic outcomes and specific noncognitive factors (Luby et al., 2013). However, noncognitive factors such as grit and growth mindset have been proven to be predictors of academic success (Dweck, 1986; Duckworth, 2016), and according to Claro et al. (2016), can even temper the effects of poverty on learning.

This study was conducted to determine if students of different socioeconomic status have significantly different grit levels and mindset types. If a difference exists, the findings may assist schools when implementing programs to serve the unique needs of students. Differences in the levels of the tested noncognitive characteristics among the two strata may provide educators and researchers a better understanding of how students from various socioeconomic status backgrounds develop and maintain noncognitive factors. This study adds to the existing body of research on noncognitive factors, poverty, grit, mindset, and their influence on academic outcomes. The information gained in this study may be beneficial to educational institutions, government agencies, and communities seeking ways to improve noncognitive characteristics and academic outcomes among students in their care.

Data were obtained through the Grit Survey and the Mindset Assessment Profile. Additional data pertaining to student participation in free and reduced-price meal programs or full-pay status were used to stratify the sample based on socioeconomic status. The data were analyzed using a two-sample *t*-test to address research questions

one and two. To respond to research question three, the PPMCC was used to determine the correlation between grit levels and mindset types.

Participants

Of approximately 107 students attending 9th-12th grades at the participating district, 29 students received parental permission and 26 students over 18 years old expressed interest in participating in the study, yielding a total of 55 participants. Of the 55 participants who received parental permission and expressed interest in participating in the study, 54 were present at school the day the surveys were administered. A total of 50.4% of the 9th-12th grade population were surveyed for this study. A sample of 54 yielded a margin of error of 9.43%, with a confidence level of 95%.

Participant Subgroups

The sample was divided into two groups: participation in the free and reduced-price meal program and full-pay meal status. Of the 54 students who participated in the study, 26 met the financial qualifications for free and reduced-price meals, while 28 students were classified as full-pay meal status (see Table 1). Since qualifications for being "at-risk" were not considered in this study, students who may have met the criteria for being classified as a member of a super subgroup were not collected. Race and gender data were not gathered. The only demographic information used for the purposes of this study was inclusion in the free and reduced-price meal program or the full-pay program.

Table 1

Participant Information

Grade	Number of Participants	Free/Reduced Meal	Full-Pay
9th	7	5	2
10th	4	1	3
11th	18	9	9
12th	25	11	14
Total	54	26	28

As of the spring semester as of the 2019-2020 school year, 107 students in grades 9-12 attended the participating school, and 54 took the 12-point Grit Survey and the Mindset Assessment Profile. Students who received free and reduced-price meals represented 48% of the sample, while those classified as full-pay status represented the remaining 52% of the sample.

Mindset Assessment Profile Scores

The total mean from the Mindset Assessment Profile was 31.48, which placed the 54 students in a profile range described as feeling uncertain if their intelligence could really change. The Mindset Assessment Profile mean for students who met the criteria for free and reduced-price meals was 32.96, with a range of 24. Students who were classified as full-pay meal status had a mean score of 30.2, with a range of 24.
The mean from the group of students who qualified for free and reduced-price meals yielded a sample variance of 43.87, and the mean for students who were full-pay yielded a sample variance of 33.31. The population variance was 38.65. The standard deviation for students who qualified for free and reduced-price meal programs was 6.62, and the standard deviation for students considered full-pay status was 5.77. The *p*-value of the sample was calculated as 0.1127. An analysis of the data revealed the *p*-value (0.1127)

was larger than the .05 alpha (α), indicating the null hypothesis ($H1_0$) was not rejected. There was no significant difference in mindset scores between students who participated in a free or reduced-price meal program and students who were considered full-pay status.

Table 2

t-Test of Mindset Assessment Profile Scores

Measure	Free/Reduced-Price Meals	Full-Pay Status
M	32.9	30.2
Range	24	24
Sample Variance	33.3	43.8
SD	6.6	5.7
p-value	0.1127	0.1127
t-score	1.62	1.62

12-Item Grit Survey Scores

A two-sample *t*-test was used to compare the scores on the 12-item Grit Scale (see Table 3). The total sample had a mean grit score of 3.25. The mean grit score for students who met the criteria for free and reduced-price meals was 3.28, with a range of 1.92. Students who were classified as full-pay status had a mean grit score of 3.21, with a range of 2.25. A comparison of the mean scores from both surveys are shown in Figures 1 and 2. The sample variance of the grit scores for students who qualified for free and reduced-price meals was 0.22305, while the sample variance for students with full-pay status was 0.2462189655. The population variance was calculated as 0.2279381344. The standard deviation for grit scores of students who qualified for free and reduced-price meals was 0.472, and the standard deviation of the grit scores from students who were considered full-pay status was 0.496. The *p*-value was calculated as

0.6107. Since the *p*-value was greater than the alpha (.05), the null hypothesis ($H2_0$) was not rejected. Thus, there was no significant difference in grit levels between students who participated in a free or reduced meal program and students who were considered full-pay.

Table 3

t-Test of Grit Levels

Measure	Free/Reduced-Price Meals	Full-Pay Status
M	3.28	3.21
Range	1.92	2.25
Sample Variance	0.22305	0.24621
SD	0.472	0.496
p-value	0.6107	0.6107
t-score	0.055	0.055

Figure 1. A comparison of the 12-item Grit Scale mean scores.

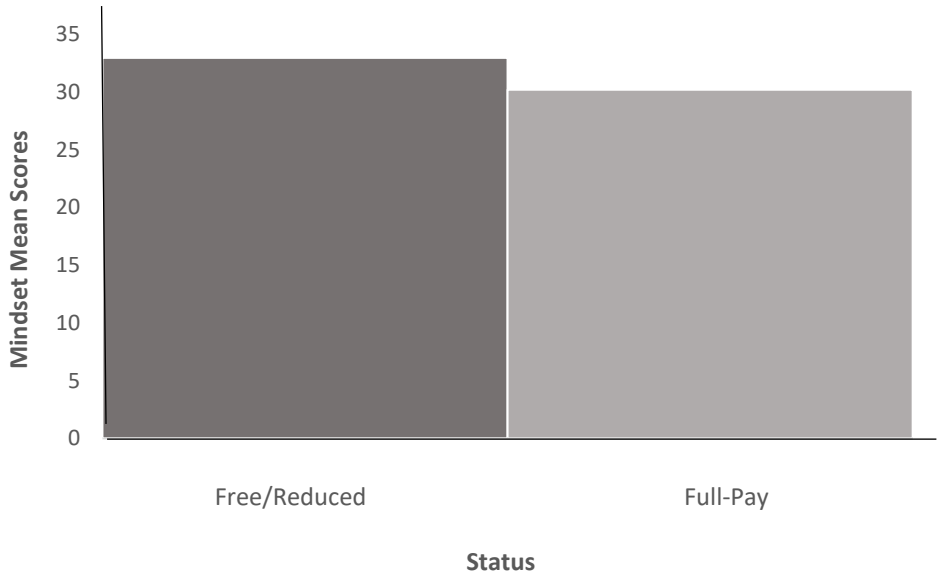

Figure 2. A comparison of the Mindset Assessment Profile mean scores.

Correlation between Grit Level and Mindset Types

Another purpose of this study was to determine the correlation between grit level and mindset type. Using the scores gathered from the 12-item Grit Survey and the Mindset Assessment Profile, the PPMCC was applied. Since surveys were coded for anonymity when students completed the two instruments, the surveys were collated so the scores could be paired and a correlation between grit level and mindset type could be calculated.

Grit and Mindset Correlation for Free/Reduced-Price Meal Status

The analysis revealed a strong correlation of .074 between the grit levels and mindset types of students who participated in free and reduced-price meal programs (see Figure 3). Students with low to average grit levels also indicated lower Mindset Assessment Profile scores. These data indicated students who lacked the characteristics that make up grit, such as resilience, perseverance, and effort, likely did not believe an

individual's learning ability was malleable. Also, these students are likely to have fixed mindsets. However, students who had scores indicating the presence of growth mindsets also showed the presence of higher grit levels.

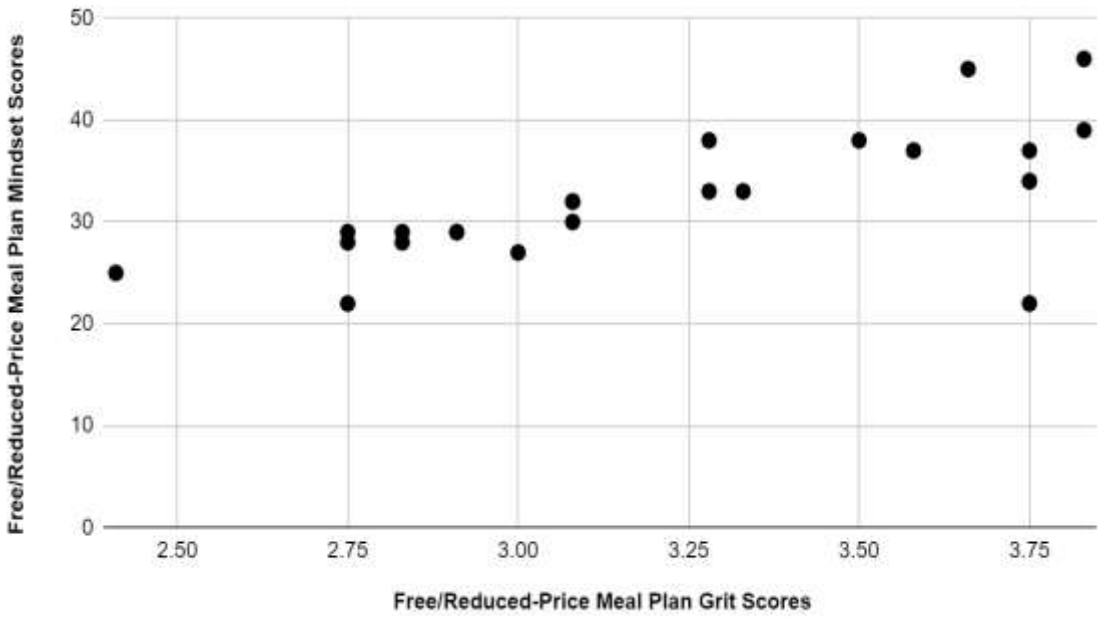

Figure 3. Scatterplot showing the correlation between Mindset Assessment Profile scores and grit levels among students who participated in free and reduced-price meal plans.

Grit and Mindset Correlations for Full-Pay Meal Status

Students considered full-pay status also demonstrated a significant correlation between grit level and mindset type. Data gathered from calculating the PPMCC indicated a 0.73 correlation between the two noncognitive characteristics (see Figure 4). Income did not seem to hinder a relationship between mindset type and grit level as data indicated a high grit level likely leads to a growth mindset. The data revealed similar results for both stratified samples. Students from lower socioeconomic status backgrounds who possessed growth mindsets also showed higher grit levels. Schools and

researchers may use this information to study a potential link between the two noncognitive characteristics.

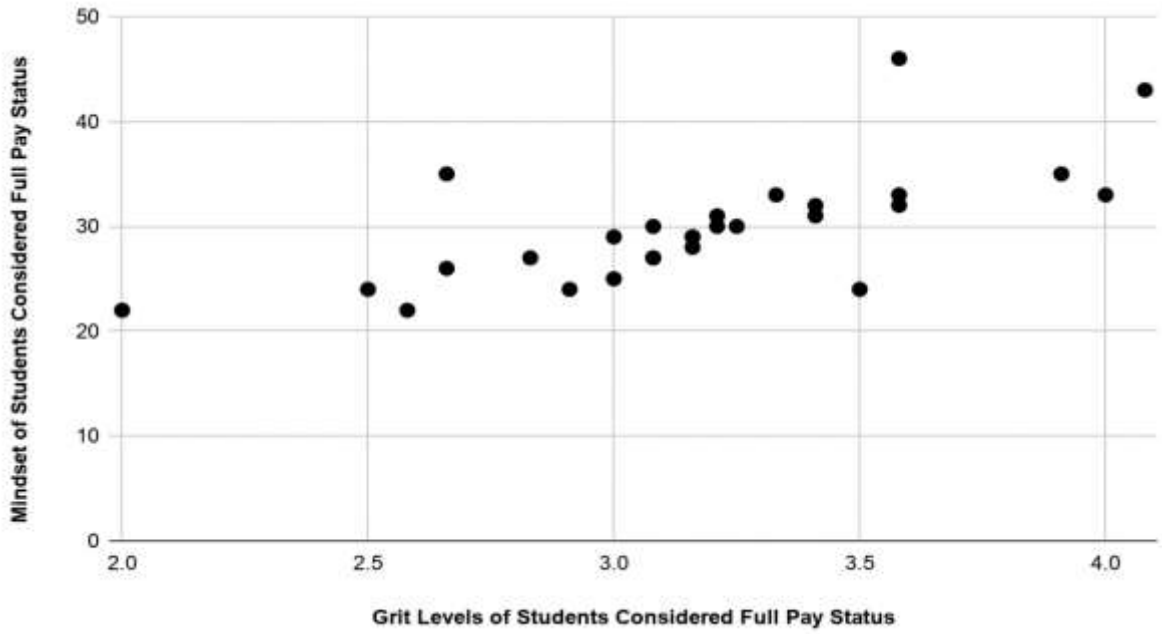

Figure 4. Scatterplot showing the correlation between Mindset Assessment Profile scores and grit levels among students with full-pay lunch status.

Student Response Data: Mindset Assessment Profile

Figure 5 represents student responses to Statement 1: *No matter how much intelligence you have, you can change it a good deal*. Most students (55%) agreed, 4% disagreed a little, and 4% disagreed a little with this statement. Students agreed a lot (9%), agreed a little (28%), and agreed (55%) with the statement.

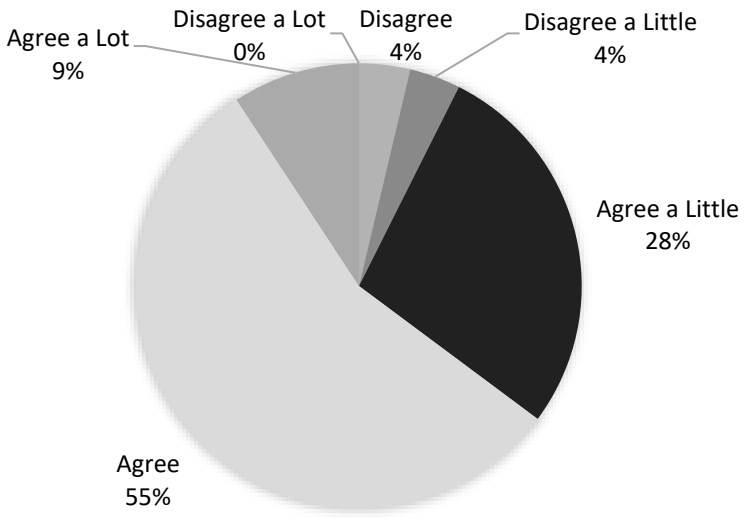

Figure 5. Student response to mindset statement 1.

Figure 6 shows student responses to Statement 2: *You can learn new things, but you cannot really change the basic level of intelligence*. Few students (4%) agreed a lot, 15% agreed, and 13% agreed a little with the statement. The majority of students disagreed (53%), and 11% disagreed a little.

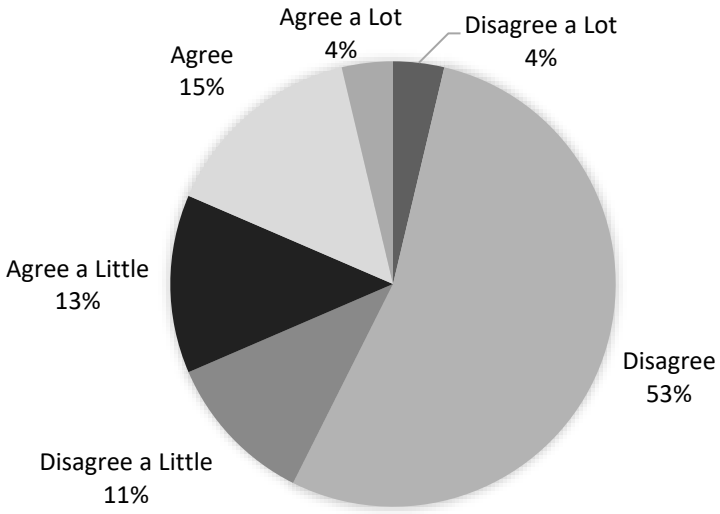

Figure 6. Student response to mindset statement 2.

Figure 7 shows student attitudes towards effort and resilience. Statement 3 read: *I like my work best when it makes me think hard.* Students agreed (24%), agreed a lot (11%), or agreed a little (26%) with the statement. Students disagreed (11%) and disagreed a little (28%) with the statement.

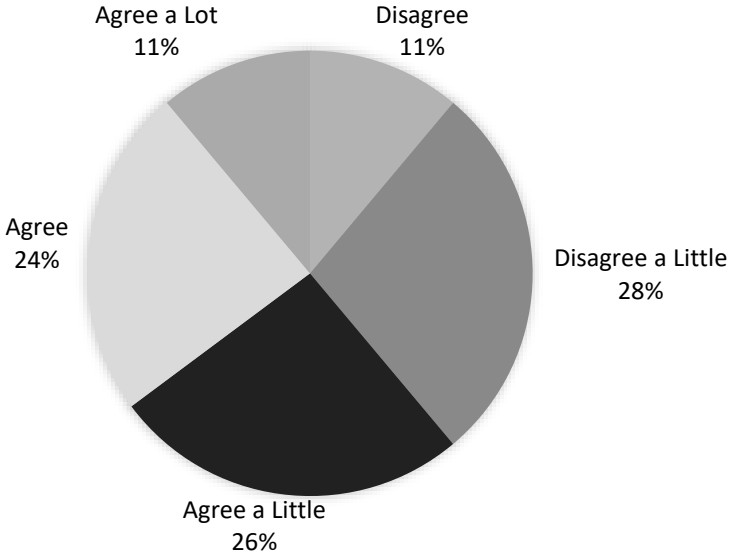

Figure 7. Student response to mindset statement 3.

Figure 8 shows data from Statement 4: *I like my work best when I can do it really well without too much trouble.* Many students agreed (48%), some agreed a little (11%), and 28% agreed a lot. Few students disagreed (9%), 2% disagreed a lot, and 2% disagreed a little.

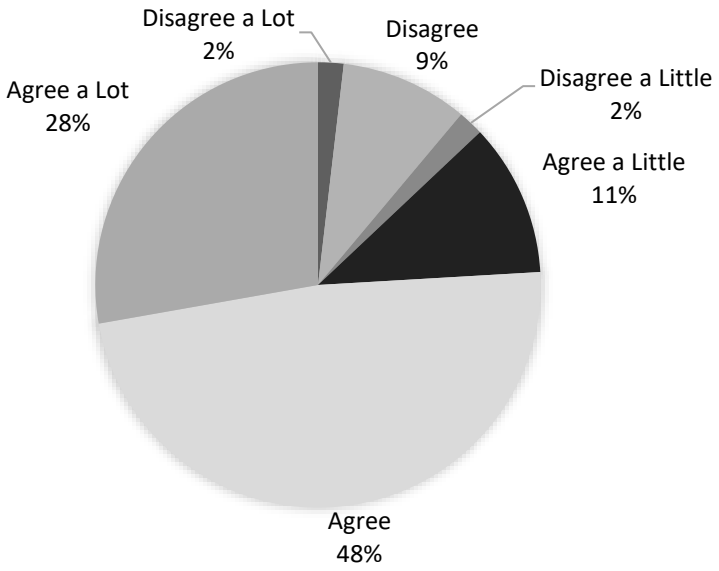

Figure 8. Student response to mindset statement 4.

Figure 9 shows student responses to Statement 5: *I like work that I'll learn from even if I make a lot of mistakes*. Few students disagreed (4%) or disagreed a little (7%). More students agreed a lot (28%), agreed a little (20%), or agreed (41%) with the statement.

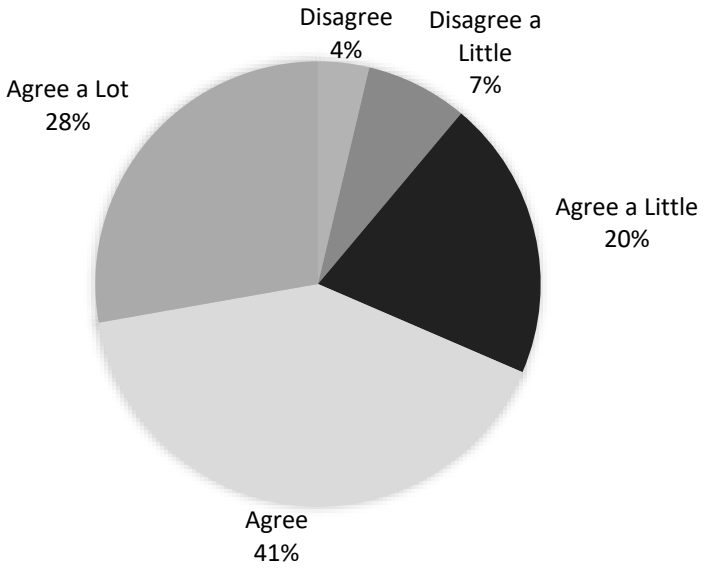

Figure 9. Student response to mindset statement 5.

Figure 10 shows the responses to Statement 6: *I like my work best when I can do it perfectly without any mistakes*. Most students agreed a lot (24%), agreed (41%), or agreed a little (13%) with the statement. Fewer students disagreed a lot (9%), disagreed (7%), or disagreed a little (6%).

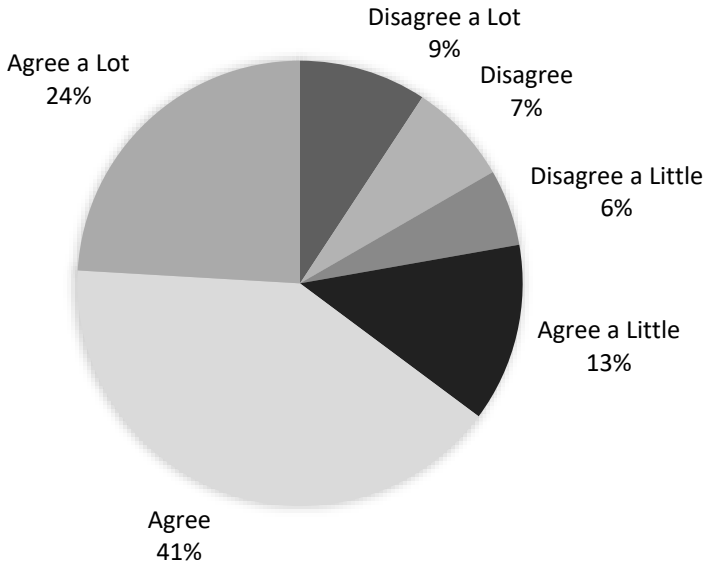

Figure 10. Student response to mindset statement 6.

Figure 11 shows data from responses to Statement 7: *When something is hard, it just makes me want to work more on it, not less.* Some students disagreed (6%) or disagreed a little (17%) with the statement. More students agreed (37%), agreed a lot (22%), or agreed a little (18%).

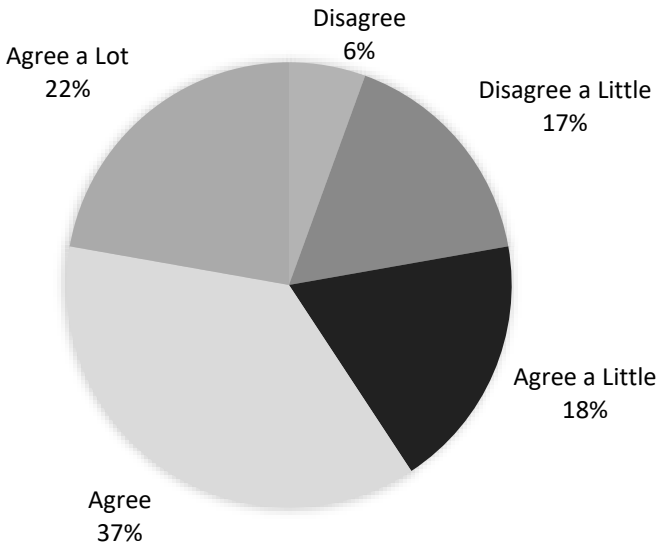

Figure 11. Student responses to mindset statement 7.

Figure 12 illustrates data from mindset Statement 8: *To tell the truth, when I work hard, it makes me feel as though I'm not very smart.* Few students agreed (7%), agreed a little (11%), or agreed a lot (2%) with the statement. More students disagreed a little (6%), disagreed (57%), or disagreed a lot (17%) with the statement.

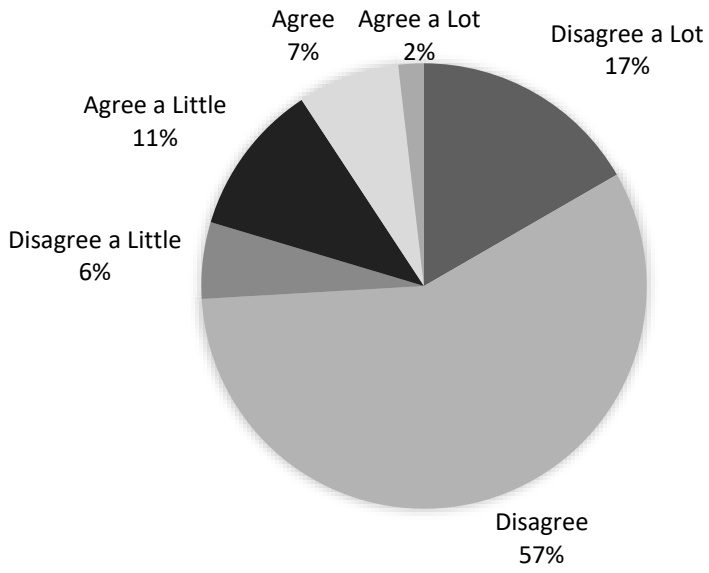

Figure 12. Student response to mindset statement 8.

Student Response Data: 12-Item Grit Survey

Figure 13 represents data resulting from Grit Survey Item 1: *I have overcome setbacks to conquer an important challenge.* Most students selected very much like me (16%), mostly like me (33%), or somewhat like me (47.1%). However, 3.9% chose the *not much like me* option.

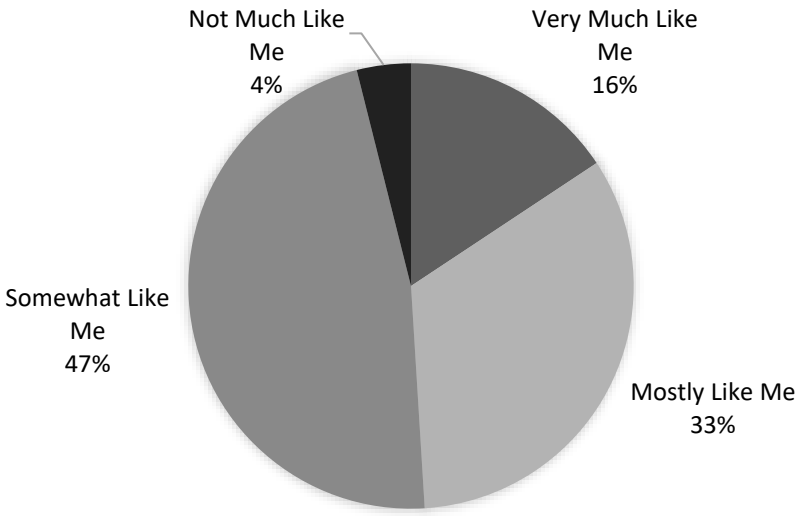

Figure 13. Student response to grit statement 1.

Figure 14 illustrates student responses to Item 2 on the Grit Survey: *New ideas and projects sometimes distract me from previous ones.* The majority of students selected very much like me (20%), mostly like me (36%), or somewhat like me (30%). Fewer students selected the not much like me option (14%).

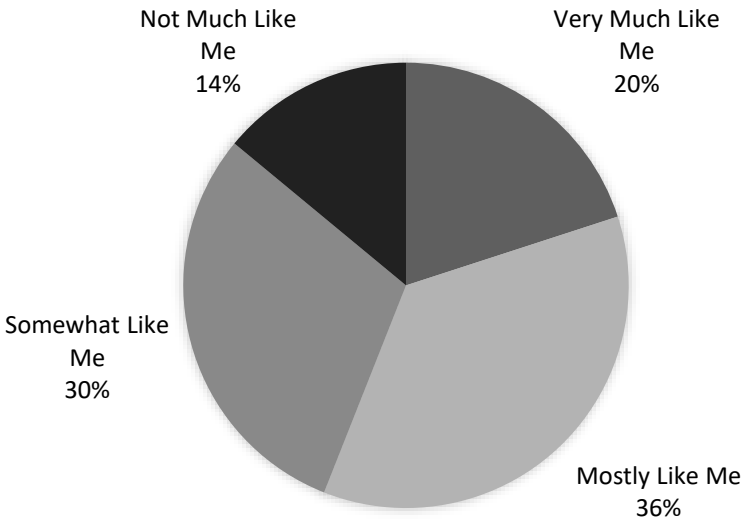

Figure 14. Student response to grit statement 2.

Figure 15 shows data from Grit Survey Item 3: *My interests change from year to year*. Some students selected very much like me (8%), mostly like me (19%), or somewhat like me (27%). However, more students selected not much like me (42%), and few chose not much like me at all (4%).

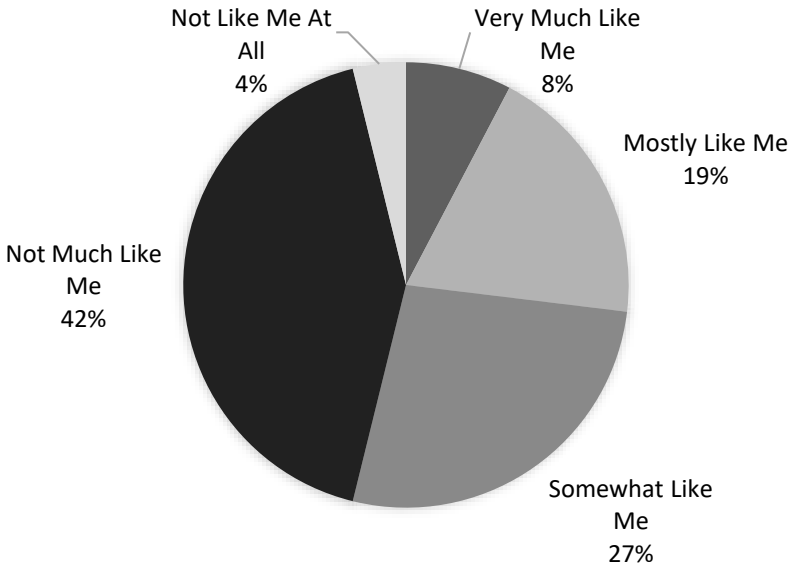

Figure 15. Student response to grit statement 3.

Figure 16 presents data related to Grit Survey Item 4: *Setbacks don't discourage me.* Most students selected very much like me (10%), mostly like me (19%), or somewhat like me (40%). Some students selected not much like me (27%) or not like me at all (4%).

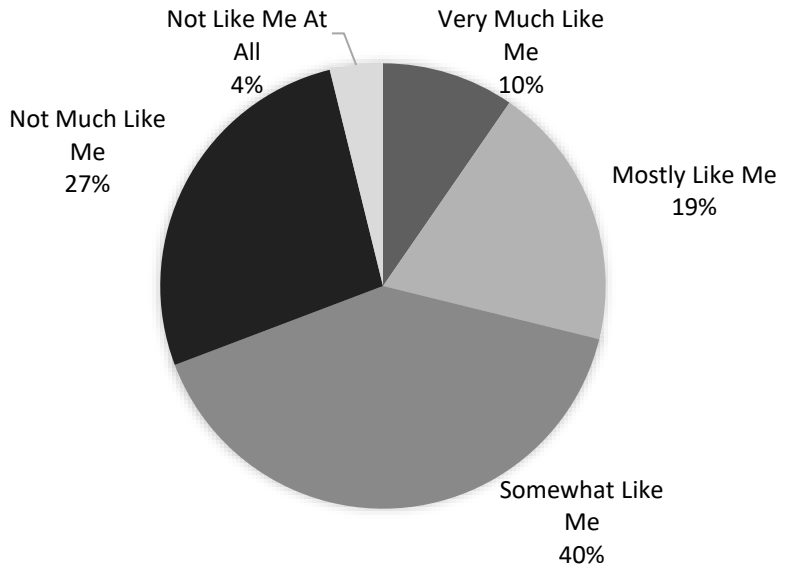

Figure 16. Student response to grit statement 4.

Figure 17 displays data from Grit Survey Item 5: *I have been obsessed with a certain idea or project for a short time but later lost interest.* Most students selected very much like me (10%), mostly like me (33%), or somewhat like me (34%). However, 6% of students selected not like me at all, and 17% selected not much like me.

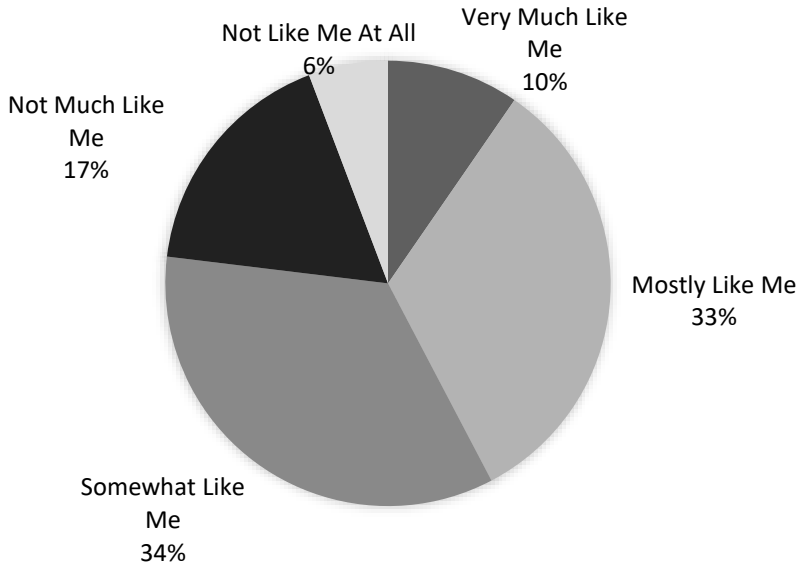

Figure 17. Student response to grit statement 5.

Figure 18 shows data from Grit Survey Item 6: *I am a hard worker*. All students selected somewhat like me (24%), very much like me (50%), or mostly like me (26%).

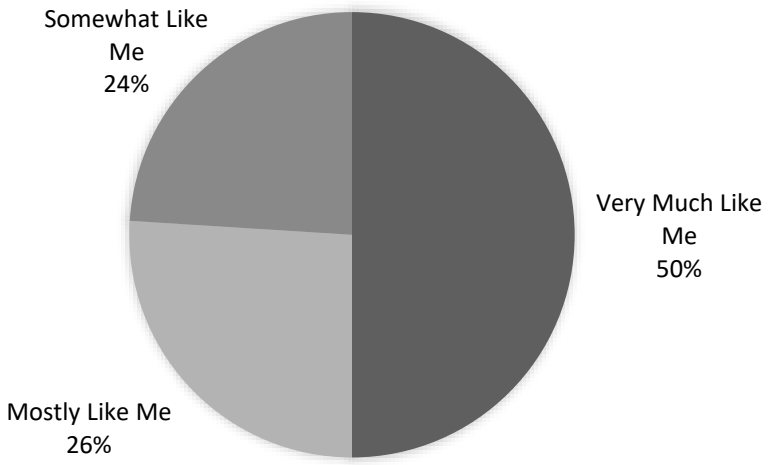

Figure 18. Student response to grit statement 6.

Figure 19 shows how respondents answered Grit Survey Item 7: *I often set a goal but later choose to pursue a different one*. Some students selected very much like me (10%), mostly like me (12%), or somewhat like me (35%). The other students selected not like me at all (4%) or not much like me (39%).

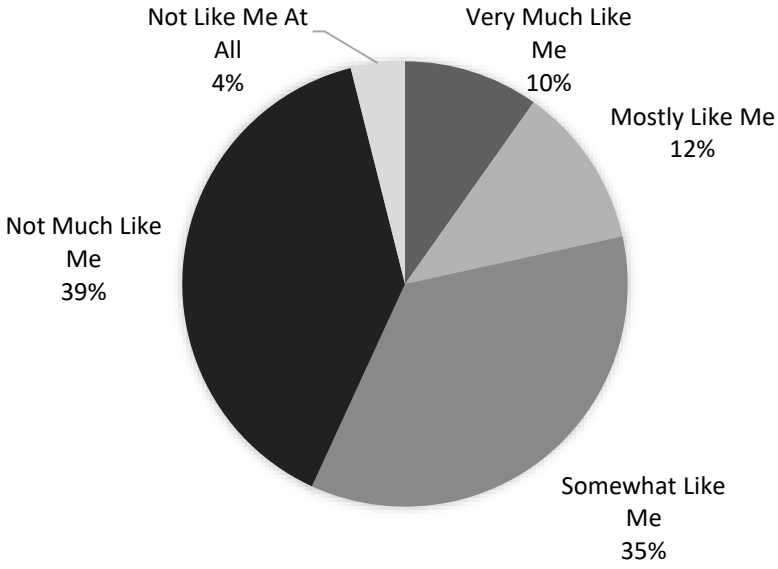

Figure 19. Student response to grit statement 7.

Figure 20 shows the participant responses to Grit Survey Item 8: *I have difficulty maintaining my focus on projects that take more than a few months to complete*. Most students selected very much like me (17%), mostly like me (29%), or somewhat like me (29%). However, 13% of students selected not much like me, while 12% selected not much like me at all.

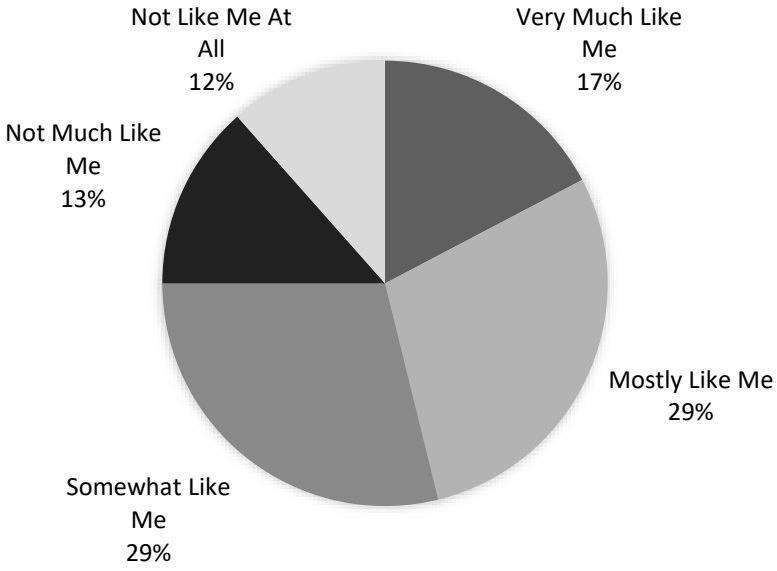

Figure 20. Student response to grit statement 8.

Figure 21 displays data resulting from Grit Survey Item 9: *I finish whatever I begin.* Students selected very much like me (29%), mostly like me (44%), somewhat like me (23%), or not much like me (4%).

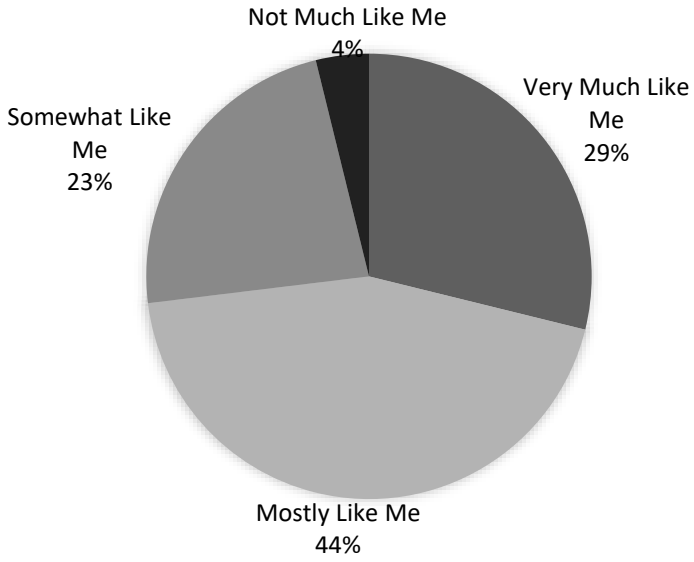

Figure 21. Student response to grit statement 9.

Figure 22 shows data from Grit Survey Item 10: *I have achieved a goal that took years of work.* Most students selected very much like me (10%), mostly like me (27%), or somewhat like me (26%). However, 29% of students selected not much like me, and 8% selected not much like me at all.

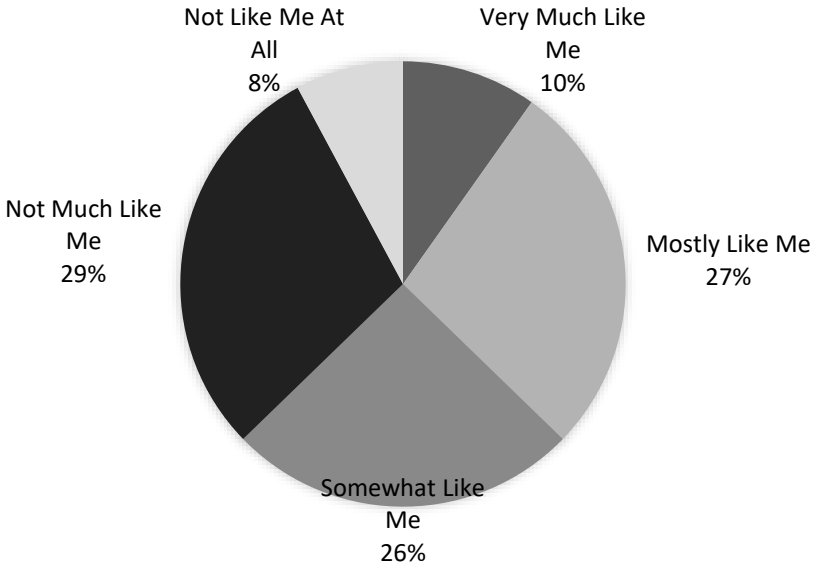

Figure 22. Student response to grit statement 10.

Figure 23 shows data from Grit Survey Item 11: *I become interested in new pursuits every few months*. Some students selected very much like me (8%), mostly like me (20%), or somewhat like me (35%). Other students selected not much like me (33%) or not like me at all (4%).

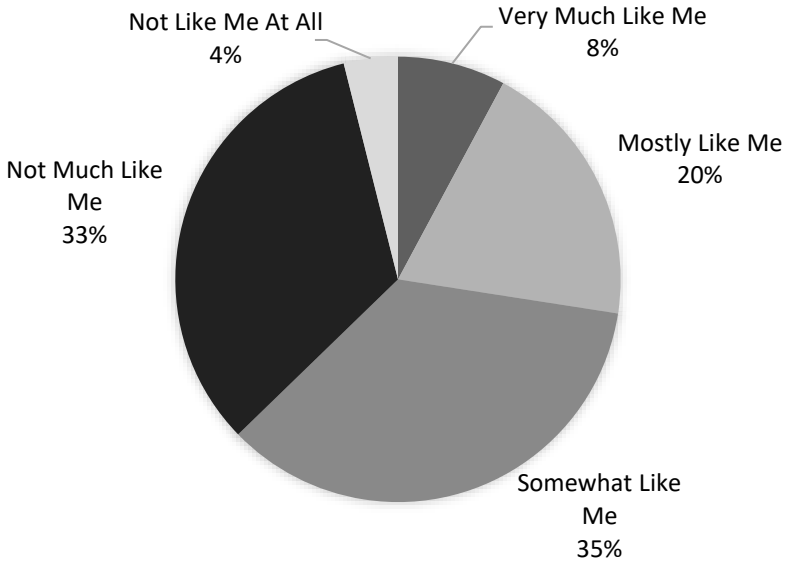

Figure 23. Student response to grit statement 11.

Figure 24 displays data from Grit Survey Item 12: *I am diligent.* Students selected very much like me (22%), mostly like me (34%), somewhat like me (38%), or not much like me (6%).

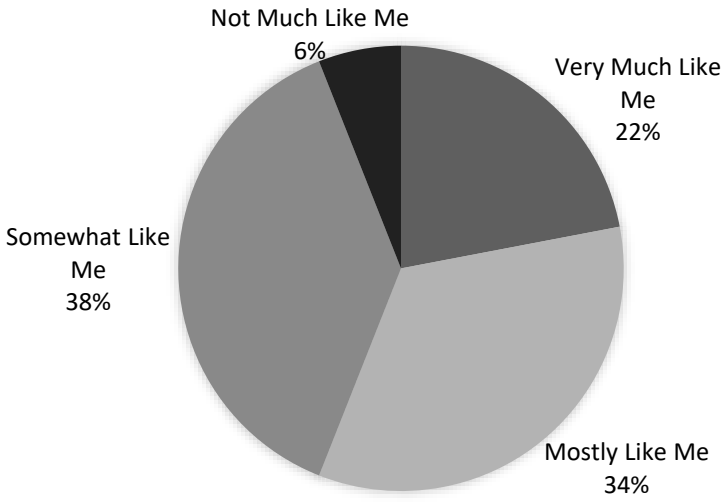

Figure 24. Student response to grit statement 12.

Summary

Presented in Chapter Four were the quantitative data collected at one school in southeast Missouri. Student samples were stratified based on participation in a free or reduced-price meal program or full-pay status. The sample was surveyed to determine if a difference in grit score or mindset types was present. The use of a *t*-test to find a difference in grit levels and mindset types revealed a significant difference in grit levels or mindset types did not exist between the two groups. The PPMCC was used to determine if a correlation existed between grit levels and mindset types. The data yielded a strong correlation between grit level and mindset types for both stratified groups.

Therefore, the null hypothesis to research question number one – *there is no difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals* – was not rejected. Also, the null hypothesis for research question number two – *there is no difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals* – was not rejected. The Null hypothesis for research question number three was not rejected, since the PPMCC yielded a significant correlation between the presence of high grit levels to growth mindsets and medium to low grit scores to mixed or fixed mindsets.

Chapter Five includes a review of the findings and responses to the three research questions. Also, conclusions are discussed, as well as a review of the literature. Implications for future practices are addressed. Finally, the recommendations for future research are presented.

Chapter Five: Summary and Conclusions

Schools looking for ways to improve academic outcomes may need to include noncognitive interventions (DeSilver, 2017). Noncognitive factors can improve academic outcomes and can temper the negative effects of lower socioeconomic backgrounds on academic performance (DeRadd, 1996; Destin et al., 2019; Dixson et al., 2016; Fletcher & Wolfe, 2016). However, the idea that low socioeconomic status decreases grit and changes mindset cannot be supported based on the findings of this study. The information gathered in this study contributed to the current discussion on grit and mindset and yielded important data the participating school can use to improve student lives and learning opportunities.

From a population of 107 students, 54 students in grades 9-12 participated in the study. The sample was stratified based on students receiving a free or reduced-price meal or full-pay meal status. The breakdown of the 54 participants into strata included 26 students who participated in the free or reduced-price meal program and 28 who were considered full-pay status. Grit levels and mindset types were collected using the 12-item Gris Survey and the Mindset Assessment Profile.

As presented in Chapter One, the purpose of this study was to determine if a significant difference existed between the grit levels and mindset types of students from different socioeconomic backgrounds. Another purpose of this study was to determine if a correlation existed between grit levels and mindset types. Finding ways to improve the noncognitive characteristics of all students is beneficial (Dixson et al., 2016), since an individual's perception of his or her abilities can determine how hard he or she works to accomplish certain goals (Ames & Archer, 1987). At the time of this study, few

researchers had examined how socioeconomic status impacts noncognitive characteristics.

The literature review in Chapter Two included a discussion of what noncognitive characteristics are and an in-depth exploration of how these characteristics can impact academic performance. Nine noncognitive characteristics were examined based on their relationship to grit and growth mindset (Au, 2015; Cvencek, et al., 2018; Dixson et al., 2016; Duckworth et al., 2019; Froiland & Oros, 2014; Roebers, 2017; Sahranavard, Miri, & Salehiniya, 2018; Scorza et al., 2016; Yeager & Dweck, 2012). Many of these noncognitive characteristics are perceptions of one's own ability (Dixson et al., 2016). The ability to control, achieve, grow, and motivate are shared indicators among the noncognitive factors related to grit and mindset (Duckworth et al., 2019; Dweck, Walton, &Cohen, 2014). How these noncognitive characteristics are impacted by low socioeconomic status was also examined.

The literature indicated students of lower socioeconomic status may have decreased noncognitive characteristics (Browman et al., 2017; Claro, 2016; Destin et al., 2019; Liu, 2019; Tough, 2016). The literature also revealed children may have the same perceptions of academic pursuits as their parents (Kim, 2014). Students may also have similar grit levels and mindset types as their household members (Khanam & Nghiem, 2016).

Grit and mindset were selected for this study based on the potential the two factors have for predicting academic success (Duckworth, 2009; Perkins-Gough & Duckworth, 2013). Grit has been used to predict success in the Scripps National Spelling Bee, graduation rates at West Point Military Academy, and success in business

(Duckworth, 2016). Grit can lead to differences in successful or failed attempts when pursuing a single interest for a length of time, when counting the number of times a person is distracted from these interests, and when challenging one to forego immediate gratification in exchange for long-term success (Von Culin et al., 2014). The power of grit to predict academic outcomes is most common among students who are at the higher and lower ends of the cognitive ability distribution (Light & Nencka, 2019).

The presence of a growth mindset also has the power to predict success in life (Dweck, 2007a). Students' perceptions of their ability are positively correlated with how hard they will try, how quickly they will give up, and their overall success at accomplishing goals (Dweck, 2010b). Students who possess a growth mindset view failure differently than those with a fixed mindset; those with a growth mindset believe their ability to learn is malleable (Cimpian et al., 2007). Students with growth mindsets will attempt more difficult challenges for a greater reward (Yeager et al., 2014).

Furthermore, this study consisted of an analysis of the noncognitive characteristics that make up grit and shape mindsets. The ways noncognitive traits shape academic performance were discussed, as well as how a low socioeconomic status background shapes noncognitive characteristics (Destin et al., 2019; Duckworth, 2016; Hanselman, & Walton, 2019; Liu, 2019). The makeup of grit includes factors like resilience, perseverance, and passion (Duckworth, 2016). The brain's ability for executive functioning can also shape factors like grit and mindset (Scorza et al., 2016).

When metacognition is strong and properly functioning, students can better understand the ways grit and growth mindset can be assisted by other neurological processes (Roebers, 2017). Specifically, grit levels are also directly impacted by self-

control, which helps students forego immediate gratification for long-term success (Duckworth & Gross, 2014). Mindset is impacted most by an internal locus of control, intrinsic motivation, and self-efficacy (Cavanagh et al., 2018).

Neuroscientific data were presented revealing lower levels of hippocampal regions charged with developing self-control (Luby et al., 2013). Noncognitive characteristics like grit and mindset have been shown to be hindered by low socioeconomic status (Claro et al., 2016; Destin et al., 2019), but when students from low socioeconomic status backgrounds develop these characteristics, they can counter the effects of poverty on academic outcomes (Claro et al., 2016).

Findings

In this study, the dependent variables were grit scores and mindset types. The independent variables were students who participation in a free or reduced-price meal program and students who were considered of full-pay status. A two-sample *t*-test was applied to compare the stratified samples scores from the 12-item Grit Survey and the Mindset Assessment Profile. An alpha (α) of .05 was selected; the confidence level was set at 95%.

Research question one. What is the difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals?

$H1_0$: There is no difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

$H1_a$: There is a difference in mindset scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

Results from the survey data showed no significant difference in mindset scores between the two sampled groups; therefore, the null hypothesis was not rejected. These data refute research showing socioeconomic status impacts the type of mindset a student may develop (Destin et al., 2019; Haimovitz & Dweck, 2016; Jury et al., 2015).

Research question two. What is the difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals?

$H2_0$: There is no difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

$H2_a$: There is a difference in grit scores between students who participate in the free and reduced-price meal program and students who pay full price for their meals.

The null hypothesis was not rejected since there was no significant difference in grit scores between students from different socioeconomic status backgrounds. Some researchers indicated students from low socioeconomic status backgrounds may not develop various noncognitive characteristics as thoroughly or as quickly as students from more privileged backgrounds (Destin et al., 2019; Kim, 2014; Lipina et al., 2013; Tough, 2016).

Research question three. What is the correlation between student grit and student mindset?

$H3_0$: There is no correlation between student grit and student mindset.

$H3_a$: There is a correlation between student grit and student mindset.

Both grit and mindset have been notably linked together as predictors of academic success (Dixson et al., 2016; Duckworth, 2016; Dweck, 2016; Eskreis-Winkler et al.,

2016; Haktanir et al., 2018; Martins, 2017). In this study, a strong correlation was found between grit and mindset types using the PPMCC, which yielded a correlation of 0.74 between the two factors among students who qualified for free and reduced-price meal plans. Students with a higher grit level were more likely to show the presence of a growth mindset. Similar findings were revealed for students considered of full-pay status. The correlation between the two samples was 0.73. Therefore, the alternative hypothesis was supported, and the null hypothesis was rejected.

Conclusions

This research was intended to find a difference in mindset and grit among two groups of students based on socioeconomic factors. The results of this research indicated grit and mindset are not impacted by socioeconomic status. Many researchers have illustrated how poverty impacts various noncognitive characteristics, but only a few directly pinpointed the relationship grit and mindset have with income and poverty (Dixson et al., 2016; Duckworth, 2016; Dweck, 2016; Eskreis-Winkler et al., 2016; Haktanir et al., 2018; Martins, 2017). Researchers and educators should continue to study this potential relationship and find ways to improve noncognitive characteristics among students.

Researchers have argued students who possess high grit levels and growth mindsets are likely to achieve higher academic outcomes (Duckworth, 2016; Dweck, 2016; Smithers et al., 2018). These results were not linked to socioeconomic status. The findings from this current study showed a correlation between grit and mindset. This connection indicated the two noncognitive characteristics share a commonality of some kind. Students who have a fixed mindset and believe their learning ability cannot be

improved may naturally lack grit, since an increase in effort would be perceived as useless to them.

Implications for Practice

The purpose of this study was to determine if a difference in grit levels and mindset types exists among students from different socioeconomic status backgrounds. Although the data indicated no significant difference exists, the body of literature indicates low socioeconomic status likely hinders the presence of many noncognitive characteristics (Duckworth, 2016; Topçu & Leana-Taşcılar, 2018; Tough, 2016). Traditional academic and cognitive interventions should be continued, and an increased focus on noncognitive characteristics should be implemented through data-driven methods to ensure the development of best practices.

The review of literature included research about ways to teach noncognitive characteristics (Dweck, 2010b; Hoerr, 2013). Elective classes that focus on a series of noncognitive characteristics are recommended. Professional development from research groups will help teachers develop the skills they need to increase the noncognitive characteristics of their students. School stakeholders could measure the presence of these characteristics and begin implementing interventions to improve them. Parents may want to focus more heavily on helping their children develop the important noncognitive characteristics needed to succeed in school and life. Parents and teachers may start familiarizing their students with relevant terminology and illustrate what noncognitive characteristics look like from a behavioral standpoint. Students should be taught why these factors are important and how self-analysis could encourage individual growth.

Recommendations for Future Research

Researchers and educators are encouraged to replicate this study with similar stratified sample groups. Although multiple researchers have cited low socioeconomic status as a hindrance to noncognitive characteristics, grit and mindset have not been the sole subject of these studies. A more definitive relationship between socioeconomic status and grit or mindset needs to be established. However, the age at which students would benefit most from these interventions is not clear and would be an excellent topic for future research. Also, best practices for parents should be a research focus, as most academic ventures begin at home during the ages of birth to four years old (Golding et al., 2017). Finally, how grit and mindset levels rise and fall during the school year should be a focal point of future research. The study of grit levels and growth mindset dissipation rates, and ways to limit the loss of these factors over the course of an academic year, would assist educators in developing and implementing specific interventions.

Summary

Traditional academic interventions have focused on cognitive-based individual behaviors (Bandura, 1982; Rotter, 1966; Shanker, 2016). Yet, the U.S. educational system remains average in science, math, and reading (DeSilver, 2017). Therefore, school districts may need to shift their focus to improving noncognitive characteristics such as grit and growth mindset. These noncognitive skills have been shown to be predictors of academic success (Duckworth, 2016; Dweck, 2010b). Other noncognitive characteristics have also been shown to improve academic outcomes, and researchers have revealed specific noncognitive factors can promote the growth of other noncognitive

factors (Smithers et al., 2018). Poverty may have deleterious effects on noncognitive characteristics, according to research findings (Krishnan & Kutikova, 2013; Luby et al., 2013; Weinger, 1998). However, no research showing how low socioeconomic status impacts grit or mindset was found.

Grit, the passionate pursuit of long-term goals, and growth mindset, the belief a person's ability to learn is malleable, have been the focus of school reform for many years (Duckworth & Yeager, 2015). Noncognitive characteristics were studied by the ancient Greeks, as well as up through the 17th and 18th centuries when the psychological and social sciences were in their infancy (Higgins, 1997). Now, in the 21st century, scholars are more precisely pinpointing how these factors lead to positive change in students' lives. The focus of this study was not to analyze how noncognitive characteristics can change academic outcomes; rather, the purpose was to determine if socioeconomic demographics may cause a change to noncognitive characteristics and to address the gap in existing research.

This study was limited in a few ways. The format of the survey required students to self-report their opinions and perceptions. Students may have been embarrassed to answer honestly despite the researcher's announcement their responses would be anonymous. Also, students may not have understood the language in the survey enough to answer truthfully. Furthermore, the original intention of this study was to survey a sample from three different schools. However, due to a lack of participation, the decision was made to survey students from one school where more than 50% of the 9th through 12th grade population was given parental permission or were otherwise willing to participate.

A review of the literature yielded an overwhelming database to study noncognitive characteristics and how they impact student performance in school. The term *noncognitive characteristic* is currently under debate, and various behaviors are being categorized to help researchers better understand how noncognitive behaviors may be improved upon or suppressed (Smithers et al., 2018). Many of the individual characteristics students use on a day-to-day basis were discussed in this study, and specific focus was given to those characteristics that contribute to grit and growth mindset.

Grit requires students to be resilient, diligent, and focused on their interests (Duckworth, 2016). Grit is shown when an individual can utilize many other psychological behaviors such as self-control and can resist the temptation to give in to short-term distractions (Duckworth, 2016). Similarly, a growth mindset is made up of noncognitive characteristics such as self-efficacy, self-confidence, and metacognition, which leads to an understanding of learning and thought processes (Dweck et al., 2014). These traits work in unison to shape and develop student behaviors (Roebers, 2017). Noncognitive interventions have been shown to improve grit levels and mindset types, and in some cases can even counter the impact of low socioeconomic status on student noncognitive characteristics.

This study contained information about how home environments and parental involvement can shape noncognitive characteristics in a child. Parents can pass on learned traits such as grit and growth mindset (Nikolaus et al., 2019). Academic expectations from parents are essential; also essential is how parents discuss academic achievements with their children (Kim, 2014). When parents praise effort, resilience, and

self-confidence, these characteristics are reinforced (Kim, 2014). However, simply praising a good grade without discussing the noncognitive traits that led to the good grade does not reinforce the development of noncognitive characteristics. Furthermore, food security, the presence of books in the home, and a peaceful, structured environment also encourage the growth of positive levels of noncognitive characteristics (Edwards et al., 2016).

A quantitative approach was selected for this study. Two Likert-type surveys were used to collect data. The population included 107 ninth through 12th graders from a school in southeast Missouri. The population was divided into strata based on each participant's inclusion in a free or reduced-price meal program or full-pay status. The stratified sample totaled 54 participants. One stratum consisted of 26 students who qualified for free or reduced-price meals, and the second stratum included 28 students who were considered full-pay status. The surveys were coded for anonymity to protect each student's name, grade, and demographic data.

The data from this study were analyzed, and no significant difference was found in grit levels or mindset types between students from different socioeconomic status backgrounds; therefore, the null hypotheses of research questions one and two were not rejected. A correlation between high grit levels and mixed or growth mindsets was found, and the alternative hypothesis to research question three was supported.

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Appendix A

12-Item Grit Scale

Directions for taking the Grit Scale: There are a number of statements that may or may not apply to you. For the most accurate score, when responding, think of how you compare to most people – not just the people you know well, but most people in the world. There are no right or wrong answers, so just answer honestly!

1. I have overcome setbacks to conquer an important challenge.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

2. New ideas and projects sometimes distract me from previous ones.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

3. My interests change from year to year.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

4. Setbacks don't discourage me.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

5. I have been obsessed with a certain idea or project for a short time but later lost interest.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

6. I am a hard worker.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

7. I often set a goal but later choose to pursue a different one.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

8. I have difficulty maintaining my focus on projects that take more than a few months to complete.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

9. I finish whatever I begin.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

10. I have achieved a goal that took years of work.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

11. I become interested in new pursuits every few months.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

12. I am diligent.

Very much like me Mostly like me Somewhat like me Not much like me Not like me at all

Scoring:

1. For questions 1, 4, 6, 9, 10 and 12, assign the following points:

5 = Very much like me

4 = Mostly like me

3 = Somewhat like me

2 = Not much like me

1 = Not like me at all

2. For questions 2, 3, 5, 7, 8 and 11, assign the following points:

1 = Very much like me

2 = Mostly like me

3 = Somewhat like me

4 = Not much like me

5 = Not like me at all

Add up all the points and divide by 12. The maximum score on this scale is 5 (extremely gritty), and the lowest scale on this scale is 1 (not at all gritty).

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Appendix B

Mindset Assessment Profile

1. No matter how much intelligence you have, you can always change it a good deal.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

2. You can learn new things, but you cannot really change your basic level of intelligence.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

3. I like my work best when it makes me think hard.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

4. I like my work best when I can do it really well without too much trouble.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

5. I like work that I'll learn from even if I make a lot of mistakes.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

6. I like my work best when I can do it perfectly without any mistakes.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

7. When something is hard, it just makes me want to work more on it, not less.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

8. To tell the truth, when I work hard, it makes me feel as though I'm not very smart.

   Disagree a Lot Disagree Disagree a Little Agree a Little Agree Agree a Lot

Appendix C

IRB Approval Letter

Dec 19, 2019 9:17 PM CST

RE:
IRB-20-103: Initial - Non-Cognitive Characteristics and Family Income: The Impact of Socioeconomic Status on Grit Levels and Mindset Types

Dear Joshua Teeter,

The study, Non-Cognitive Characteristics and Family Income: The Impact of Socioeconomic Status on Grit Levels and Mindset Types, has been Approved.

Category: 7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

The submission was approved on December 19, 2019.

The expiration date for this study is December 11, 2020.

Here are the findings:

Regulatory Determinations

- This study has been determined to be minimal risk because the research is not obtaining data considered sensitive information or performing interventions posing harm greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. The research design ensures minors participating in this study are not assigned to distinct arms based on potentially sensitive criteria, as all subjects will receive the same data collection instrument after consideration, assent, and parental consent.
- This study is approved in accord with 45 CFR 46.404, as the research presents no greater than minimal risk to the children and adequate provisions are made for soliciting the assent of the children and the permission of their parents or guardians. The signature from only one parent or legal guardian is required.
- Consent will be obtained and documented as per 45 CFR 46.116 and 45 CFR 46.117.

Sincerely,

Lindenwood University (lindenwood) Institutional Review Board

Appendix D

LINDENWOOD

Research Study Assent Form

What is research?

We are going to conduct a research study. A research study is when a researcher or doctor collects information to learn more about something. During this research study, we are going to learn more about how socioeconomic status impacts noncognitive characteristics among high school students. After we tell you more about this study, we would like to ask you about being part of it.

We also will be asking about 400 other people to be part of this study.

What will you ask me to do?

If you choose to be part of this study, you will take two surveys containing eight questions each. This study is going to last approximately 10 minutes and then it will be over.

Will I be harmed during this study?

There are no risks of harm in this study.

Will I benefit from being in this study?

You will not get anything special if you decide to be part of this study. We hope what we learn will help other children.

Do I have to be in this research?

No, you do not. If you do not want to be in this research study, just tell us. You can also tell us later if you do not want to be part of it anymore. No one will be mad at you and you can talk to us at any time if you are nervous.

What if I have questions?

You can ask us questions right now about the research study. You can ask questions later if you want to. You can also talk to someone else about the study if you want to. And you can change your mind at any time. Being in this research study is up to you.

If you want to be in this research study, just tell us. Or, you can sign your name in the blank below. We will give you a copy of this form to keep.

_____ _____

Minor Participant's Signature Date

_____

Minor Participant's Printed Name

_____ _____

Signature of Principal Investigator or Designee Date

_____

Investigator or Designee Printed Name

Appendix E

LINDENWOOD

Research Study Consent Form

Noncognitive Characteristics and Family Income: The Impact of Socioeconomic Status on Grit Levels and Mindset Types

Note: "You" in this form refers to the minor participant. If an activity or requirement refers to the parent or guardian consenting on behalf of the minor, this will be clearly indicated.

Before reading this consent form, please know:

- Your decision to participate is your choice
- You will have time to think about the study
- You will be able to withdraw from this study at any time
- You are free to ask questions about the study at any time

After reading this consent form, we hope that you will know:

- Why we are conducting this study
- What you will be required to do
- What are the possible risks and benefits of the study
- What alternatives are available, if the study involves treatment or therapy
- What to do if you have questions or concerns during the study

Basic information in this study:

- We are interested in learning about how socioeconomic status impacts noncognitive characteristics.
- You will take two surveys that contain eight questions each and will take about 10 minutes to complete.
- Risks to participants include: NONE

Appendix F

LINDENWOOD

Research Study Consent Form

Noncognitive Characteristics and Family Income: The Impact of Socioeconomic Status on Grit Levels and Mindset Types.

You are asked to participate in a research study being conducted by Joshua Teeter under the guidance of Dr. Sherry DeVore at Lindenwood University. Being in a research study is voluntary, and you are free to stop at any time. Before you choose to participate, you are free to discuss this research study with family, friends, or a physician. Do not feel like you must join this study until all of your questions or concerns are answered. If you decide to participate, you will be asked to sign this form.

Why is this research being conducted?

We are conducting this study to determine if socioeconomic status has any impact on noncognitive characteristics. We will be asking about 400 other people to answer these questions.

What am I being asked to do?

Each participant will be asked to take two surveys consisting of eight questions each.

How long will I be in this study?

Each survey will take approximately five minutes each.

What are the risks of this study?

Privacy and Confidentiality

We will be collecting data that could identify you, but each survey response will receive a code so that we will not know who answered each survey. The code connecting you and your data will be destroyed as soon as possible.

We are collecting data that could identify you, such as participation in the free or reduced-price meal programs. Every effort will be made to keep your information secure. Only members of the research team will be able to see any data that may identify you.

What are the benefits of this study?

You will receive no direct benefits for completing this survey. We hope what we learn may benefit other people in the future.

What if I do not choose to participate in this research?

It is always your choice to participate in this study. You may withdraw at any time. You may choose not to answer any questions or perform tasks that make you uncomfortable. If you decide to withdraw, you will not receive any penalty or loss of benefits. If you would like to withdraw from the study, please use the contact information found at the end of this form.

What if new information becomes available about the study?

During the course of this study, we may find information that could be important to you and your decision to participate in this research. We will notify you as soon as possible if such information becomes available.

How will you keep my information private?

We will do everything we can to protect your privacy. We do not intend to include information that could identify you in any publication or presentation. Any information we collect will be stored by the researcher in a secure location. The only people who will be able to see your data include members of the research team, qualified staff of Lindenwood University, and representatives of state or federal agencies.

How can I withdraw from this study?

Notify the research team immediately if you would like to withdraw from this research study.

Who can I contact with questions or concerns?

If you have any questions about your rights as a participant in this research or concerns about the study, or if you feel under any pressure to enroll or to continue to participate in this study, you may contact the Lindenwood University Institutional Review Board Director, Michael Leary, at (636) 949-4730 or mleary@lindenwood.edu. You can contact the researcher, Joshua Teeter, directly at xxxxxx@lindenwood.edu. You may also contact Dr. Sherry DeVore at sdevore@lindenwood.edu.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my participation in the research described above.

_____ _____

Parent or Legally Authorized Representative's Signature — Date

_____

Parent or Legally Authorized Representative's Printed Name

_____ _____

Signature of Principal Investigator or Designee — Date

_____

Printed Name of Principal Investigator or Designee

Appendix G

Prompt for Administrators

Re: Student Survey Directions

Hello. My name is Josh Teeter, and I am a Doctoral Candidate at Lindenwood University. I am conducting a study titled *Noncognitive Characteristics and Family Income: The Impact of Socioeconomic Status on Grit Levels and Mindset Types*. Since the superintendent has agreed for your school district to participate in the study, I ask for your assistance. Students will be asked to complete two surveys which will take approximately 10 minutes to complete. Participation in the survey is voluntary; student assent forms and parent consent forms will be distributed, signed, and collected before the survey is administered. There are no risks associated with participating in this study; there is no information gathered that may identify the students. As the proctor, your tasks are as follows:

1. The school administration will distribute and collect student assent forms and parent consent forms. It is imperative that only those students with permission are allowed to participate in the survey.
2. The survey will be proctored by the researcher.

Prompt: *I am here today to proctor two surveys you are asked to complete on behalf of my research study as a graduate student attending Lindenwood University. Please find the surveys in paper form in front of you. Your identity cannot be linked to your responses, so please be honest as you complete the two surveys. Thank you for your participation. You may begin taking the surveys.*

Appendix H

Letter of Introduction

Date:

As a doctoral candidate at Lindenwood University, I am extending an invitation to you to participate in a study.

I am conducting a research study titled *Noncognitive Characteristics and Family Income: The Impact of Socioeconomic Status on Grit Levels and Mindset Types* to fulfill part of the requirements for a doctoral degree in Educational Administration at Lindenwood University. The purpose of this study is to determine if students from different socioeconomic backgrounds have different levels of noncognitive characteristics such as effort, persistence, self-concept, and self-efficacy. Participation in this study is voluntary. The surveys will take approximately 10 minutes to complete. The identities of the participants will remain confidential and anonymous in the dissertation and any future publication of this study.

If you are interested in participating, please see the attached informed consent.

Please do not hesitate to contact me with any questions or concerns about participating in the research. I can be reached at xxx-xxx-xxxx. You may also contact the dissertation advisor for this research study, Dr. Sherry DeVore, at sdevore@lindenwood.edu or (636) 627-6673.

A copy of this letter should be retained for future reference. Thank you for your time.

Josh Teeter,
Doctoral Candidate

Vita

Josh Teeter graduated from Arkansas State University with a BSE in Social Science in 2007. He went on to receive a graduate degree in social science education from Arkansas State University in 2012. In 2013 he attended William Woods University and received a master's degree in educational leadership. Josh obtained an educational specialist degree in leadership from William Woods University in 2016.

Josh is a member of the Missouri Association of Elementary School Principals, and Kiwanis. In 2013, Josh presented an essay that he co-wrote titled, *Encampment Protest and the Occupation of Space: Examining the Zuccotti Park Eviction of Occupy Wall Street*, at the Society for the Study of Social Problems annual conference in New York, NY. Josh is currently an educational leader in southeast Missouri.