

COLLEGIATE STUDENT-ATHLETES' SUBJECTIVE WELL-BEING RELATED TO  
MINDSET AND GRIT

by

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A thesis submitted to the Graduate Council of  
Texas State University in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
with a Major in Psychological Research  
May 2022

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## **ACKNOWLEDGEMENTS**

I first and foremost I want to extend my gratitude to my committee chair and mentor, Dr. Randall Osborne, for providing the guidance and encouragement I needed to complete this paper. He has been my instrumental in my growth throughout this program, I have no idea where I would be without him. I also wish to thank my other committee members, Drs. Jennifer Clegg and Darcy Downey for their guidance throughout this process. To all of the Coaches, Athletic Training Staff, Athletic Administrators, and professors who made data collection possible, thank you, this would not have been possible without your help.

I would like to extend my gratitude to Dr. Jamie Pennebaker and his students: Kate Blackburn, Sarah Seraj, Alexi Martel, Serena Brandler, Miti Shah, Katie Williams, and Pelin Cunningham-Erdogdu. I am deeply appreciative of your insight and encouragement throughout this process, it has made all the difference. Additionally, to Dr. Larry Price, thank you for pushing me to extend my knowledge of quantitative methodologies and theory, I am a better student and researcher because of it. Thank you to Dr. Angela Duckworth for the endless encouragement of my development as a young scholar and for helping me to ground my findings in existing theory. Lastly, I would like to extend my deepest gratitude to my friends and family, thank you for your unending support and encouragement throughout this process.

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## ABSTRACT

There are a number of factors that contribute an individual's level of subjective well-being (SWB) during their college or athletic career. Researchers agree that two integral predictors of SWB are an individual's level of grit and their ability to utilize a growth mindset (Hou et al., 2021; Albert et al., 2019). However, work regarding student-athletes' subjective well-being related to their grit and mindset is limited. This thesis examines the role that established self-regulatory processes (i.e., grit, counterfactual thinking, and mindset) contributing to student-athletes' levels of subjective well-being within their present environment. The present study explored the relationship between these constructs in Division 1, 2, and 3 student-athletes ( $N = 75$ ) across Central Texas using simple ordinary least squares multiple regression and indirect effects analyses. Findings showed that grit alone was the sole positive predictor of well-being in student-athletes, accounting for approximately 30% of the variance in SWB scores. Collectively, these results suggest that grit may serve student-athletes well, as they pursue long-term goals both within and outside their athletic domains.

*Keywords:* grit, mindset, satisfaction, student-athlete, growth-mindset, fixed-mindset, college, subjective well-being

## I. INTRODUCTION

“If you want to change the world, don’t be afraid of the circus” (William McRaven, 2017, p. 44).

The notable quote from Admiral William McRaven’s “Make your bed: Little things that can change your life... and maybe the world” posits that if one is to be successful, and more importantly happy in life, they cannot be afraid of failure. The Admiral goes on to argue that the lessons learned from the remediation of failure benefit the individual if framed appropriately, as they increase motivation to persevere and the ability to adapt. Social sciences have long sought accurate predictors of achievement and satisfaction or subjective well-being (SWB). Qualities such as high levels of intelligence, conscientiousness, self-efficacy, and natural ability have long been thought of as accurate predictors (e.g., Kuncel et al., 2004; Ackerman & Heggestad, 1997; Bandura, 1977; Ericsson & Charness, 1994). However, these qualities do little to explain why people with perceived lesser ability, experience the same or more success—and SWB—than their more talented peers. Recent research postulates that perseverance of effort and interest, as well as the willingness or desire to be adaptable may be quintessential factors in the explanation of this phenomenon (e.g., Duckworth & Seligman, 2005; Duckworth et al., 2007; Dweck & Yeager, 2019; Hou et al., 2021).

In their study of adolescents, Duckworth and Seligman (2005) found that sustained effort and self-control were better predictors of academic achievement than intelligence quotient. Building on this, Duckworth et al. (2007) suggests that an individual's dogged-persistence or *grit*, defined as “perseverance and passion for long-term goals” (Duckworth et al., 2007, p. 1087), is a strong predictor of success. Indeed, an

individual's levels of achievement and or ability have long been thought of as excellent predictors of well-being (Jin & Kim 2017). In the event of a failure or setback some individuals' levels of well-being and effort drop (Dweck & Yeager, 2019). Dweck et al. (1995) suggests that *mindset*—a set of behavior-guiding beliefs forged from an individual's experiences—better predicts levels of SWB and ultimately success. Together, the constructs of grit and mindset (often referred to as implicit theories in the literature) may offer robust explanations for why higher SWB is still experienced even in the presence of deficiencies of talent or success.

This thesis identifies gaps in the literature related to applying grit and mindset research to student-athletes. Further, it addresses these limitations by examining the influence grit and mindset have on student-athletes' SWB within their athletic and academic domains. Therefore, studying the effects of grit and mindset on student-athletes SWB is a potentially fruitful endeavor, which may have substantial implications for the SWB of collegiate student-athletes.

### **Subjective Well-being**

SWB may be defined as how individuals appraise their current state, coupled with their overall state of self-reported satisfaction or wellness (Diener, 1984). Further, research (e.g., Diener, 1984; Diener et al., 1999) argues that the concept of SWB may be broken down into two distinct dimensions: cognitive well-being and affective well-being. Cognitive well-being may be characterized to the cognitive appraisal of one's overall life (i.e., life satisfaction), as well as within the boundaries of specific domains (e.g., job satisfaction, school satisfaction, etc.). Alternatively, affective well-being refers to the experience of positive affect (e.g., joy) coupled with the absence of negative affect (e.g.,

sadness). Based on these two distinct facets and prior studies (e.g., Diener, 1984, Diener et al., 1999; Steel et al., 2008; Luhman et al., 2012; Renshaw & Bolognino, 2016), the generic term “SWB” is used to capture the facets of positive affect, happiness, negative affect, and environment satisfaction throughout this thesis.

### **Specific Considerations of Student-Athlete Demands**

Transitioning into a new environment may be especially challenging for any individual. Selecting and transitioning into a college is no exception, as students are adjusting to novel social and academic environments (Storch et al., 2005). This transition may lead to an increase in students’ distress, possibly resulting in an increase in psychopathology, as well as decreases in social support and SWB (Storch et al., 2005). However, Gayles and Baker (2015) suggest that participation in athletics may facilitate the transition to college, as many student-athletes base their college decision on the continuation of their athletic career.

A student-athlete is an individual who competes in a National Collegiate Athletic Association (NCAA) or National Association of Intercollegiate Athletic-sanctioned sport, and is also a full-time student. Student-athletes are expected to meet a multitude of expectations throughout their college careers, which includes strong athletic performances in addition to maintaining academic eligibility (Gayles & Baker, 2015). Additionally, student-athletes are expected—by coaches and academics—to demonstrate interpersonal and academic growth throughout college (Gayles & Baker, 2015). The onset of these lofty expectations coupled with the potential for injury, poor academics, or subpar athletic performances may lead to an increase in distress and a decrease in overall satisfaction, self-efficacy, and well-being (Storch et al., 2005; Baker & Gayles 2015).

Regardless of these stressors, many student-athletes display higher levels of academic and social adjustment than their non-athlete peers. In their study of student-athletes, Melendez (2007) observed the benefits associated with athletic participation. Student-athletes who were active in their athletic participation (e.g., engaged in organized team activities) experienced increased level of academic adjustment relative to their non-athlete peers. The formation of healthier relationships and higher levels of academic adjustment could be facilitated through mentoring programs (Melendez, 2007). Despite this, higher levels of adjustment and success athletically and academically do not guarantee SWB in these dimensions. The overt reasons for these differences in SWB are largely unknown. However, research into grit and mindset suggests that there may be certain psychological mechanisms, which facilitate the success and increase SWB in student-athletes in these demanding environments (e.g., Hou et al., 2021, Yeager & Dweck, 2019; Duckworth et al., 2007; O'Sullivan et al., 2019; Sheridan et al., 2015).

### **Grit and Mindset as Adjustment and Subjective Well-being Factors**

An individual's mindset and grit have been found to be strong predictors of achievement and SWB (Yeager & Dweck, 2019; Duckworth et al., 2007; Hou et al., 2021). The examination of these predictors' effects on student-athletes' SWB may permit for insight into trait-level mechanisms (e.g., consistency of interest, perseverance of effort, viewing setbacks as temporary; Duckworth et al., 2007; Dweck et al., 1995) that permit the negotiation of obstacles. Additionally, the study of these factors may open avenues for understanding and promoting student-athlete academic and athletic success, and critically overall well-being.

## **Grit**

There are certain aspects of an individual's personality that may be beneficial to their level of academic, social, and athletic adjustment, and ultimately SWB. One of these quintessential mechanisms is grit. Duckworth et al. (2007) operationalizes grit as an individual's levels of passion and perseverance for completing trying tasks over long periods of time. Furthermore, they distinguish between two lower order terms that comprise grit: perseverance of effort and consistency of interest. Perseverance of effort refers to persisting in spite of failure, adversity, or setbacks, whereas consistency of interest is consistent with a propensity to maintain interest and passion for long-term goals. Through a series of studies, Duckworth and her colleagues (e.g., Duckworth et al., 2007, 2011; Duckworth & Quinn, 2009) suggest that grit has stronger associations with an individual's success and achievement than its two lower-order terms alone and therefore should be viewed as a singular construct.

Extending grit research to SWB, past studies have observed that grittier individuals self-reported higher levels of well-being (e.g., Akbağ & Ümme, 2017; Jiang, Jiang, et al., 2019; Jin & Kim, 2017). For example, in their correlational study of young adults, Akbağ & Ümme, (2017) found that grit, gender and the satisfaction of three basic psychological needs (autonomy, competence, and inter-relatedness) strongly positively predicted SWB scores, with grit alone having a moderate effect on participants' SWB scores. Additionally, research by Jiang, Jiang et al. (2019) supports this finding, as grit acted as a significant predictor of SWB in young adults. Therefore, there is substantial evidence which suggests that grit plays an integral role in predicting SWB.

Broadening grit and SWB research to college students, Bowman et al. (2015) found that levels of conscientiousness, a trait associated with grit, positively predicted levels of satisfaction in undergraduate students. Higher levels of conscientiousness may allow students to realize and therefore use the multitude of resources that are offered (e.g., tutoring) increasing their levels satisfaction (Ackerman & Heggstad, 1997). Additionally, grit has been found to be positively associated with higher levels of factors associated with college satisfaction and SWB (Bowman et al., 2015), such as possessing a greater sense of belonging, higher levels of social engagement, and consistent class attendance (West et al., 2006). Boerma and Neill (2020) also observed that grit was a better predictor of SWB and academic performance (i.e., higher GPA) in college students than self-control and conscientiousness. This was consistent with Duckworth et al. (2007), who found grit incrementally accounted for increased levels of education and achievement when controlling for things like SAT scores, GPA, and class rank.

Advancing the application of grit research to minorities, Vela et al., (2017) surveyed Mexican-American undergraduate students. Utilizing the Grit Short Scale (Grit-s), Vela et al. (2017) discovered that grit, an individual's level of gratitude, and optimism (defined as foresight to taking-action) were significant positive predictors of life satisfaction. In addition to Vela et al., (2017), Martin et al. (2015) found in their observation of wheelchair basketball players, that athletes with the highest levels of grit and resilience experiences better quality of life. Athletes who were grittier were more engaged with their present community, sport, and self-reported higher levels of overall well-being.

There are additional benefits for *grittier* individuals. That is, grittier individuals are more likely to pursue and attain higher levels of education, as well as academically outperform more intellectually gifted individuals (Bowman et al., 2015; Duckworth et al., 2007). Higher levels of grit result in *perseverance of effort* (a lower order term of grit that explains an individual's desire to continue a task; Duckworth et al., 2011; Hou et al., 2021), which was found to be an excellent predictor of success alongside class rank and grade point average (Duckworth et al., 2007). Deliberate, sustained practice and effort aids in the explanation of elevated success, and therefore SWB in grittier individuals (Duckworth et al., 2011; Hou et al., 2021; O'Sullivan et al., 2019; Sheridan et al., 2015). This may suggest that grittier individuals possess a more positive outlook on life and experience higher levels of SWB, aligning with telic/goal theory, which posits that people are consciously seeking goals and achieving those goals increases well-being (Emmons, 1986; Michalos, 1980). Specifically, grit may facilitate the process of goal pursuit by reducing the adverse effects of failure, grittier individuals may persist even when they experience the negative effects of obstacles (Duckworth et al., 2007, 2011). Indeed, it is appropriate to assume that individuals who are gritter may be better equipped to achieve their goals and therefore experience elevated levels of SWB compared to their less gritty peers (Hou et al., 2021).

### **Implications of Counterfactual Thinking on Grit**

In lieu of these benefits, the supporting mechanisms that connect grit to success and well-being are largely understudied. Kwok et al. (2013) suggests that counterfactual thinking, defined as “the tendency to think of alternatives to reality” (Kwok et al., 2013, p. 4) may offer an avenue of explanation. Further, an existing body of literature has

established the influence counterfactual thinking may have on motivation and persistence (Smallman & Summerville 2018), two key components of grit. For example, in studying the effects of counterfactual thinking on cognitive task performance, Markman et al. (2008) observed that individuals who employed upward comparisons in (i.e., where alternatives that improve upon reality are imagined; Markman & McMullen, 2003) experienced both increased persistence of effort and performance relative to when they made downward comparisons (i.e., where alternatives worse than reality are imagined).

In extending existing counterfactual work to self-regulation and motivation research, Kwok et al. (2013) found that West Point cadets who made downward comparisons (believed that they were better off in their current situation or could not imagine an alternative) were grittier and had retention rates than those who made upward comparisons (were better off in their alternative situation). The grit of these individuals may be attributed to the stronger salience of their goals, as well as a reduction in perceived distractions (Kwok et al., 2013). Indeed, the benefits associated with higher levels of grit such as, higher levels of scholastic and academic achievement and higher goal salience may aid in the explanation of the disparity in satisfaction levels in student-athletes.

### **Mindset**

Another important psychological construct to understand in the context of well-being is mindset (implicit theories). Mindset is one aspect of an individual's personality that influences levels of satisfaction. Through their systematic review of the literature, Dweck and Yeager (2019) determined that mindsets may be broken down into two distinct categories: *fixed mindset* (entity theory) and *growth mindset* (incremental theory).

Dweck and Yeager (2019) concluded that individuals with a fixed mindset attribute failure to their self-perceived low ability, viewing their inability as a permanent, unchangeable issue. Inversely, individuals who possess a growth mindset view failure as a lack of aptitude, which presents an opportunity for growth and improvement (Dweck & Yeager, 2019). The benefits of a growth mindset extend to many settings. Recent findings suggest that mindset also influences an individual's desire to take on challenging tasks even in the event of failure (e.g., Dweck & Yeager, 2019; Claro et al., 2016; Yeager et al., 2016). Therefore, the benefits of a growth mindset render individuals more capable of dealing with challenging tasks, as they may adapt their strategies and therefore overcome their obstacle.

Advancing mindset research, Claro et al. (2016) found that the employment of a growth mindset may facilitate the negotiation of societal obstacles such as, low socio-economic status (SES). At a lower SES level, mindset is a strong predictor of success in school. The lowest SES level students were found to be twice as likely to possess a fixed mindset, and experienced lower levels of academic performance, relative to those students who possessed a growth mindset (Claro et al., 2016). Further, Yeager et al., (2016) found that individuals who were shown how to utilize a growth mindset experienced greater academic success and SWB. Vela et al. (2017) also observed that Mexican-American college students who had a growth mindset reported higher levels of life satisfaction. Therefore, established research suggests the utilization of a growth mindset by student-athletes may aid in their acquisition of higher levels of achievement and SWB in a variety of settings including athletics (e.g., Albert et al., 2019; Bernecker et al., 2017; Romero et al., 2014).

### **Links between grit and mindset**

Despite the well-established qualities of grit and mindset, limited work has examined the linkages between the two constructs. These linkages suggest that both constructs are in fact related and may help to better explain one another. For example, work by Karlen et al. (2019) found that implicit theories positively predicted perseverance of effort and consistency of interest (lower order terms associated with grit; Hou et al., 2021) in high school students, as well as their academic achievement. Extending research on the relationship between grit and implicit theories, Vela et al. (2017) discovered that students who reported elevated levels of SWB were also grittier and employed more of a growth mindset. Additionally, Albert et al. (2019) found the presence of relationship between grit and mindset. Specifically, they observed that male high school soccer players who utilized a growth mindset regarding their athletic ability reported being grittier and experience elevated levels of SWB within their environments. These findings may extend to life beyond sports, as athletes who define success as *personal progress* on the field may also utilize hard work and sustained effort for other tasks throughout life. Indeed, the implications of these findings may suggest that grit and a growth mindset may predict one another

### **Limitations of previous studies of grit and mindset**

Despite the known benefits of grit and a growth mindset, there are many factors that may also influence the outcomes that are studied with these constructs. For example, Duckworth et al. (2007) observed the influence grit in Ivy-league and Service Academy undergraduate students. These samples are known to be rather homogenous, as these students generally hail from families with an elevated SES level. These elevated levels of

SES may reduce the number of societal obstacles these individuals must navigate compared to minorities, limiting the generalizability of grit. Additionally, Yeager et al. (2016) observed the benefits of a growth mindset in high school students. This is problematic, as these individuals may differ greatly in the levels of support that they receive at home and at school. This discrepancy in support may lead to a great degree of variability in the number of stressors these individuals experience. Further, in examining the relationship between grit and implicit theories, Tang et al. (2019) failed to observe a significant relationship between the two variables, when controlling for variables like conscientiousness, prior achievement, and academic persistence. Therefore, the systematic study of both grit and growth mindset on SWB in collegiate athletes would be a fruitful endeavor, to better determine what trait-level mechanism contribute to well-being in this dynamic environment.

## II. PURPOSE AND HYPOTHESES

Collegiate athletics offers a unique, yet opportune setting to study the psychological constructs of grit and mindset. Rarely, have grit and mindset been studied in settings that offer a such a high degree of regulation of confounding variables, like college athletics. Unlike previous settings where grit and mindset have been studied (e.g., a high school classroom; Duckworth et al., 2007; Yeager et al., 2016), the regimented nature of collegiate athletic programs allows for a higher degree of regulation of potential confounding variables. For example, college athletic programs require their student-athletes to inhabit the same living spaces, utilize the same academic and social support resources, and adhere to the very similar daily schedules. This higher degree of regulation will increase the external validity of this research by controlling for confounding variables, and may one day lead broader implications for social and educational policy.

Despite the current limitations, the benefits of grit and a growth mindset have begun to be research in athletic settings. High school student-athletes who employed a growth mindset and were grittier have reported higher degrees of SWB, as well as, satisfaction with their athletic performance (Albert et al., 2019). Additionally, college student-athletes who reported higher levels of SWB were also found to be gritty (Boerma & Neill, 2020). These preliminary findings have begun to shed light on the benefits of grit and a growth mindset in the population of student-athletes. However, this research should be furthered to understanding the mechanisms that lead to increased SWB, as this may have broader impacts for education and social policy.

Though researchers have begun to uncover the implications of these constructs in sports, there still remain significant gaps. Specifically, much of the literature fails to be

inclusive of athletes across divisions of competition and sports (Albert et al., 2019; Melendez, 2007; Storch et al., 2005). That is, participants tended to be from one level of play and sport, rather than various levels or sports. Indeed, no study examined the relationship between the utilization of a growth mindset and grit by a student athlete and their relation to their levels of SWB. Therefore, surprisingly little has been learned about the internal mechanisms that are associated with increased SWB in student-athletes, which may allow for the identification of student-athletes who may benefit from additional guidance or resources.

The present study aims to determine the effect a student-athlete's level of grit and counterfactual thinking has on their self-reported levels of SWB and whether implicit theories helps to explain the relationship between grit and satisfaction. Further, it poses the question: do gritty student-athletes experience increased levels of SWB? Additionally, a gap in the literature is addressed through surveying student-athletes across multiple sports and each of the three NCAA-sanctioned divisions. To explore this research question, three hypotheses are presented. The first is that student-athletes who are grittier will display higher levels of SWB regarding their present academic and social environment. Secondly, downward comparisons in counterfactual thinking will positively predict levels of SWB. Lastly, the indirect effect of implicit theories will help to explain the relationship between grit and SWB.

### **III. METHOD**

#### **Participants**

Data for the present study was convenience sampled from 75 full-time student-athletes (37 females) enrolled in NCAA-sanctioned institutions across Central Texas. Participants ranged from 18 to 26 years in age ( $M = 19.05$ ,  $SD = 5.11$ ). Of the student-athletes in this sample, the majority were juniors (28%), 25.3% seniors, 21.3% sophomores, 17.3% first-years, and 8.0% graduate students. Additionally, 66.7% of student-athletes identified as White, 20.0% as Hispanic, 5.3% as Black, 4.0% as Asian, and 4.0% as Other. See Table 1 for all detailed athletic information. In addition to the 75 participants detailed above, five participants who completed only some or most of the survey from analyses were excluded. Full study materials and deidentified data are available on the Open Science Framework ([https://osf.io/28gbw/?view\\_only=3885af2a33414159867b8e9f101cc2d1](https://osf.io/28gbw/?view_only=3885af2a33414159867b8e9f101cc2d1)).

**Table 1***Participant Athletic Information.*

Variable	<i>N</i>	%
Gender		
Male	38	50.7%
Female	37	49.3%
Division		
D1	11	14.7%
D2	3	4.0%
D3	61	81.3%
Sport		
Lacrosse	25	33.3%
Track and Field	8	10.7%
Soccer	8	10.7%
Volleyball	5	6.7%
Swimming	5	6.7%
Basketball	6	8.0%
Tennis	4	5.3%
Golf	3	4.0%
Football	3	4.0%
Softball	2	2.7%
Baseball	1	1.3%
Cross-country	1	1.3%
Other	4	5.3%

*Note.* D1 = Division 1, D2 = Division 2, D3 = Division 3.

## Measures

### *Overview of measures*

In the presence of current adequate measures, student-athletes' levels of overall well-being is assessed using *College Student Subjective Wellbeing Questionnaire*

(CSSWQ; Renshaw & Bolognino, 2014). The present study also utilizes the original 12-item version of the Grit scale (Duckworth et al., 2007), as recent research has established that 12-item version of the Grit scale possesses greater validity than the Grit-s when predicting perseverance of effort and consistency of interest (e.g., Gonzalez et al., 2019; Duckworth et al., 2021). Further, a counterfactual question asked participants to think of an alternate scenario where things were different than their current situation, and then rate their opinion over the imagined alternative in comparison to their present situation (Kwok et al., 2013). The type of mindset the student-athletes employ is assessed using the *Implicit Theories Measure* assessing the participants' outlook on themselves, the world, and others (Dweck et al., 1995).

### ***Grit***

The participants' levels of grit were assessed using the Grit scale, a 12-item self-report questionnaire that assesses the participant's self-perception of grit (Duckworth et al., 2007). Participants endorsed items such as "I often set a goal but later choose to pursue a different one" [reverse-scored] and "Setbacks don't discourage me" using a 5-point scale (1 = *Not like me at all*, 5 = *Very much like me*). Higher scores on this measure indicated higher levels of grit. The alpha coefficient for the present sample was 0.74, demonstrating acceptable internal consistency (Tabachnick et al., 2019).

### ***Implicit Theories***

The participant's type of mindset (referred to as implicit theories in analyses) was assessed using the implicit theories measures, which is a nine-item self-report scale that is worded to assess a fixed-mindset (e.g., you have a certain amount of ability and you cannot do much to alter it; Dweck et al., 1995). Higher scores on this measure indicated a

greater endorsement of entity theory (a fixed mindset). Participants responded to each item using a Likert-type scale ranging from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. The alpha coefficient for this sample was 0.76.

### ***Subjective Well-being***

The student-athlete's levels of SWB were assessed the CSSWQ, a 16-item self-report questionnaire that assesses the participant's levels of satisfaction and well-being (Renshaw & Bolognino, 2016). "I really enjoy my school, I prepare well for my course work." Participants endorsed items similar to using a seven-point Likert-type scale (1 = *Strongly Disagree* to 7 = *Strongly Agree*). Higher scores on this measure indicated higher levels of well-being with student-athletes' present academic and social environment. The alpha coefficient for this scale was 0.91, indicating strong internal consistency.

### ***Counterfactual thinking***

To assess salience of alternatives via counterfactual thinking, participants were asked to respond to the following open-ended prompt: "Think for a moment about the events that led to your being here at your current institution. Now consider how things might have turned out differently. Vividly imagine one alternative possibility and write a few sentences describing this alternative." (Kwok et al., 2013). After completing this prompt, participants were asked to compare their imagined alternative to their current state at their respective institutions. Participants then indicated if they were better off at their current institution (*downward comparison*), no better or worse off at their current institution (*upward comparison*), worse off at their current institution (*upward comparison*), or that they were unable to imagine an alternative (*downward comparison*).

### **Procedure and Power Analyses**

The Institutional Review Board at Texas State University approved the study procedures and arrangements were made with athletic departments for distribution of the online via Qualtrics to student-athletes through their institution email. Additionally, arrangements were made with professors for similar administration of questionnaires to student-athletes in their class sections. Participants who were full-time students and participated in a NCAA-sanctioned sport were eligible to participate. The majority of classes surveyed included of courses in kinesiology, business, psychology, foreign language, communication studies, and education. Participants were informed that they were participating in a study examining the relations of positive psychology factors to satisfaction in student-athletes. Participation in the student was voluntary and students received no compensation for their involvement, per NCAA by-laws at the time of this study. Participants were allowed as much time as needed to complete the survey. All identifying information, such as IP addresses or University names, was deleted from questionnaires upon completion.

Additionally, an a priori power analysis was also conducted to ensure the proposed study possessed adequate power. Based on an assumption of an effect size of  $R^2 = 0.15$ , an alpha of 0.05, and a power of 0.80 (Cohen, 1988), it was determined that analyses would require sample size of  $N = 72$  to detect a significant effect in a model that possessed three variables (two predictor and one outcome variable).

### **Statistical Analyses**

Upon completion of collection, data were screened using descriptive statistics to determine the distribution of responses and Cronbach's alpha analyses were conducted and internal consistency of the measures used in the study. Simple Pearson's correlations

were used to assess the individual relationships between the continuous variables and inform regression analyses. As a result of the limited statistical power of the present study ( $N = 75$ ), two separate models were constructed to test the hypotheses. First, a simple ordinary least squares (OLS) regression model was used to test whether the grit and counterfactual thinking predicted satisfaction scores in student-athletes was constructed. Next, the bootstrapping-based analytic approach of Hayes (2017) with 10,000 resamples was used ascertain whether the indirect effect of implicit theories helped to explain the relationship between grit and academic satisfaction in student athletes. This was motivated by existing work that postulates that implicit theories possesses a predictive relationship with grit (Albert et al., 2019). Further, according to Mackinnon (2008), to test an indirect effect the model must meet the assumptions of the General Linear Model in addition to: the independent variable (X) affecting the dependent variable (Y), the independent variable (X) affecting the mediator (M), and the mediator (M) affecting the dependent variable (Y) when the independent variable (X) is controlled for.

## IV. RESULTS

### Preliminary Analyses

See Table 2 for all detailed numeric information for variables. Five excluded 5 participants from analysis due to nonresponses or missing data via listwise deletion. In preliminary analyses, simple Pearson's correlations were performed to examine the relationship continuous variables (See Table 3). It was observed that grit was strongly positively correlated with academic satisfaction, and negatively correlated with implicit theories. That is, higher levels of grit are associated with possessing more of a growth mindset. Additionally, it was observed that age possessed a moderate, negative correlation with satisfaction, and was negatively correlated with grit scores.

**Table 2**

*Descriptives Statistics for Variable Measures.*

Continuous variable	Range	<i>M(SD)</i>
Predictor Variables		
Grit	2.08-4.58	3.58(0.55)
Implicit Theories	1.40-3.50	2.30(0.52)
Outcome		
Subjective Well-being	41.00-80.00	64.57(9.89)
Dichotomous variable	<i>n</i>	%
Counterfactual Thinking		
Downward Comparison	41	54.7
Upward Comparison	34	45.3

*Note.*  $N = 75$ . Lower scores on the implicit theories measure align with the endorsement of more of a growth mindset.

**Table 3***Zero-order Correlations of Predictor and Outcome Variables.*

Variables	1	2	3	4
1. Grit	-			
2. Implicit Theories	-.285*	-		
3. Subjective Well-being	.548**	-.343**	-	
4. Age	-.159	-.003	-.247*	-

*Note.*  $N = 75$ . \* $p < .05$ . \*\* $p < .01$ .

Next, independent samples t-tests were conducted to test for differences in grit scores and academic satisfactions scores between the two counterfactual comparison groups (see Table 4 for all detailed information). It was observed that student-athlete grit scores were not significantly different. Specifically, grit scores for student-athletes who made downward counterfactual comparisons (viewed their present environment better than the alternative;  $M = 3.67$ ,  $SD = 0.50$ ) were found to be higher than those who made upward counterfactual comparison (viewed their present environment as less favorable than the alternative;  $M = 3.47$ ,  $SD = 0.59$ ). Further, SWB scores were found to differ between the counterfactual comparison groups, when the  $p$ -value threshold is relaxed to  $p < .10$  (Lambdin, 2012). That is, student-athletes who made downward comparisons ( $M = 66.37$ ,  $SD = 8.85$ ) reporting higher levels of SWB than those who made upward comparisons ( $M = 62.41$ ,  $SD = 10.76$ ).

Finally, an independent samples t-test was conducted to ascertain whether there were gender differences in grit scores and SWB scores. Results indicated the absence of significant gender differences ( $t(73) = -0.32$ ,  $p = 0.62$ ,  $d = 0.55$ ) despite female participants ( $M = 3.61$ ,  $SD = 0.54$ ) possessing higher grit scores than males ( $M = 3.55$ ,  $SD = 0.56$ ). Further, there were no significant gender differences in SWB scores ( $t(73) =$

-1.70,  $p = 0.09$ ,  $d = 9.77$ ), despite female participants ( $M = 66.51$ ,  $SD = 9.88$ ) possessing higher SWB than males ( $M = 62.68$ ,  $SD = 9.66$ ). However, these differences became significant when the  $p$ -value threshold is relaxed to  $p < .10$ .

**Table 4**

*T-tests Between Grit and Satisfaction Scores by Counterfactual Groups.*

	Upward	Downward	<i>df</i>	<i>t</i>	<i>p</i>	<i>Cohen's d</i>
	Comparison	Comparison				
	<i>M(SD)</i>	<i>M(SD)</i>				
Grit	3.47(0.59)	3.67(0.50)	73	1.62 <sup>†</sup>	.109	0.38
Subjective Well-being	62.41(10.76)	66.37(8.85)	63.85 <sup>a</sup>	1.72	.091 <sup>†</sup>	0.41

*Note.* <sup>a</sup> Degrees of Freedom used were equal variances not assumed due to a violation of Levene's Test for Equality of Variances. <sup>†</sup> $p < .10$ .

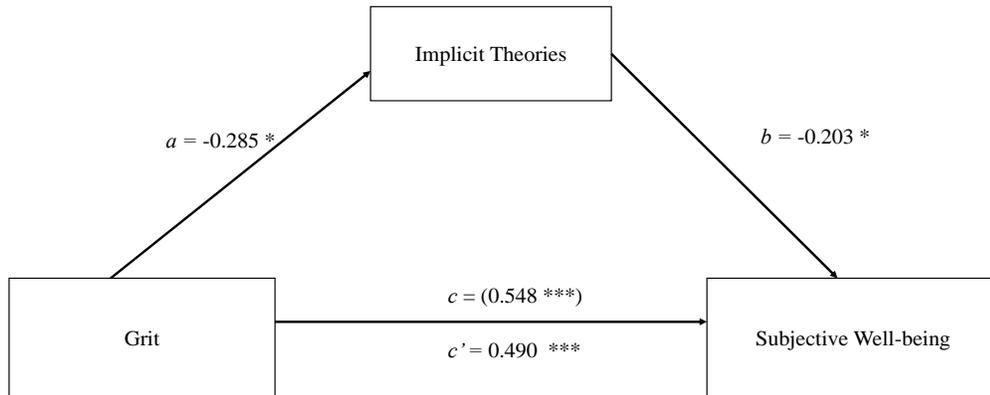
### Primary Analyses

#### Simple Multiple Regression

In order to test the first and second hypotheses, an OLS multiple regression model was used to test if grit and downward comparisons in counterfactual thinking predicted SWB scores. After assumptions of the general linear model were checked and satisfied, results indicated that the model was indeed significant,  $F(2,72) = 16.19$ ,  $p < .001$  and explained 31% of the variance in academic satisfaction scores and ( $R^2 = .311$ ). It was observed that grit was a significant positive predictor of SWB ( $b = 9.51$ ,  $SE = 1.79$ ,  $\beta = 0.529$ ,  $t(72) = 5.31$ ,  $p < .001$ ). That is, for every one unit increase in grit scores, well-being scores increased 9.51 units. However, it was observed that counterfactual thinking was not a significant predictor of SWB ( $b = -2.00$ ,  $SE = 1.97$ ,  $\beta = -0.102$ ,  $t(72) = -1.02$ ,  $p = .311$ ).

### Indirect Effects Analysis

Next, regression analyses were used to test the third hypothesis, that grit predicts life satisfaction through the indirect effect of implicit theories (see Figure 1). A diagnostic model indicated that the all assumptions of the general linear model were met. Results indicated that grit was a significant negative predictor of implicit theories,  $b = -0.271$ ,  $SE = 0.107$ ,  $\beta = -0.285$ ,  $t(73) = -2.54$ ,  $95\% CI[-0.484, -0.058]$ ,  $p = .013$ . Implicit theories was found to be significant negative predictor of SWB in student-athletes,  $b = -3.841$ ,  $SE = 1.889$ ,  $\beta = -0.203$ ,  $t(72) = -2.033$ ,  $95\% CI[-7.609, -0.074]$ ,  $p = .046$ . The total effect of grit was found to be a significant positive predictor,  $b = 9.851$ ,  $SE = 1.760$ ,  $\beta = 0.548$ ,  $t(73) = 5.596$ ,  $95\% CI[6.342, 13.358]$ ,  $p < .001$ . Grit alone accounted for 30% of the variance ( $R^2 = 0.300$ ) in SWB scores. Moreover, grit maintained its role as a significant positive predictor through the indirect effect of implicit theories,  $b = 8.808$ ,  $SE = 1.798$ ,  $\beta = 0.490$ ,  $t(72) = 4.899$ ,  $95\% CI[5.224, 12.393]$ ,  $p < .001$ . The indirect effect of implicit theories was tested with a percentile bootstrap estimation approach using 10,000 samples with replacement, through the use of PROCESS Model 4 (Hayes, 2009; Hayes, 2017) in R Studio (R Studio Team, 2020). A nonsignificant indirect effect of implicit theories on grit and SWB was observed,  $b = 1.041$ ,  $SE = 0.828$ ,  $95\% CI[-0.161, 3.048]$ , fully standardized  $\beta = 0.058$ , as the confidence interval index did not exclude zero (Mackinnon, 2008).



**Figure 1:** *Model Testing Relationship Between Grit and Subjective Well-being Indirectly Through Implicit Theories.*

*Note.* Parameter Estimates presented are fully standardized betas.  $*p < .05$ ,  $***p < .001$ .

## V. DISCUSSION

### Discussion of Analyses and Links to Existing Theory

Although there is an emerging body of literature that has begun to extend both mindsets and grit research to well-being in scholastic and athletic settings, few researchers have expanded this work to college athletes. Considering extant research on these self-regulatory processes, the present study used an observational approach to explore whether previous findings from this work extended to the complex environment of collegiate athletics. Additionally, it explored whether the pathway between grit and SWB was better explained by the indirect effect of implicit theories.

Existing research has established the linkage between grit, mindsets, and SWB in young adult athletics, academics, and social environments (e.g., Albert et al., 2019, Boerma & Neill, 2020, Duckworth et al., 2009; Hou et al., 2021). This study aimed to reduce a significant gap in the literature by examining the effects that grit, mindset, and counterfactual thinking have in predicting levels of SWB in collegiate student-athletes. The results from simple multiple regression analysis supported the first hypothesis, as grit was indeed a significant predictor of SWB in student-athletes, accounting for a moderate amount of variance in SWB scores. This finding was consistent with Vela et al. (2019) and Martin et al. (2015), who both observed that grit acted as a significant positive predictor of well-being and role engagement (i.e., active, meaningful participation in academics and athletics) in both minorities and adolescent athletes.

In testing the second hypothesis, results did not support the second prediction. Specifically, downward comparisons in counterfactual thinking did not act as a significant predictor of SWB in student-athletes. This result was inconsistent with Kwok

et al. (2013) who observed that differences in counterfactual thinking helped to predict retention in first-year West Point cadets. The discrepancy in findings may be due to the present study consisting of participants from various grades and levels of competition, whereas participants from Kwok et al. (2013) consisted of exclusively first-year cadets. That is, first-year cadets at the United States Military Academy may have very different demands than a third-year student-athlete at a division two college (i.e., discrepancies in academic and social responsibilities). Further, results suggest that trait-level, self-regulation mechanisms—like grit—may have a stronger influence on their well-being than their ability to generate alternatives to their present situation. These findings that are inconsistent with existing work that suggests that counterfactual thinking improves self-efficacy, task achievement, and well-being (i.e., Markman et al., 2008; Smallman & Summerville, 2018; Markman and McMullen, 2003).

In regards to the indirect effects analysis, partial support for the third hypothesis was observed. That is, athletes who possessed higher levels of grit reported higher levels of well-being regarding their academic and social environments at their present institution, consistent with work by Vela et al. (2017). Within the context of the model, grit had an effect on SWB scores, accounting for a moderate amount of variability in SWB scores. However, inconsistent with the hypothesis and past research (i.e., Albert et al., 2019; Larkin et al., 2016; Martin et al., 2015), results failed to support the prediction that there would be a significant indirect effect of implicit theories on the relationship between grit and SWB. This suggests that despite the established relationship between grit and implicit theories (Yeager & Dweck, 2012; Albert et al., 2019), implicit theories contributing to the grit-SWB pathway may not extend to demanding environment of

NCAA-sanctioned athletics (Gayles & Baker, 2015). As discussed in the introduction section, collegiate athletes are required to meet a multitude of expectations throughout the duration of the careers such as, strong athletic performances, high levels of academic achievement, as well as demonstrate interpersonal and academic growth (Gayles & Baker, 2015). Instead, collegiate student athletes' SWB may indeed be tied to their ability to persevere over extended periods of time, paired with their consistency of interest to accomplish their goals—even in the face of failure or setbacks. These findings align with telic/goal theory (Emmons, 1986; Michalos, 1980) showing that grit may play a significant role in the development of human well-being. Further, this is congruent with work by Hou et al. (2021), who found in their meta-analysis that grit, and its lower order term perseverance of effort, were positive predictors of SWB.

### **Limitations and Future Directions**

Regardless of the extensions that the present study has made mapping self-regulation research to collegiate athletics, it is important to acknowledge its limitations. Of note, is that the models accounted for only moderate amounts of the variance in SWB scores, indicating there may be other factors contributing to well-being. Further, it is very likely that SWB is a multidimensional construct (e.g., Diener et al., 1999), despite that it is frequently viewed as a uniform construct (e.g., Kwon et al., 2021; Renshaw & Bolognino, 2016). Therefore, researchers should be cautious when interpreting these findings as to not overstate the role that grit has in contributing to SWB, especially within the complex environment of collegiate sports.

Despite the extension of grit and mindset research to the environment of collegiate athletics there are several main limitations with this work that warrant

discussion. First, the present sample is rather homogeneous across NCAA division, as two-thirds self-identified as white, division 3 student-athletes. This lack of heterogeneity may suppress the generalizability of these findings to diverse student-athlete populations (Watson, 2009), as previous research has established the benefits mindset and grit have in minorities across scholastic settings (Vela et al., 2017, Yeager et al., 2016). Additionally, there are known differences in resources available to division 1, 2, and 3 student-athletes, with division 1 programs receiving larger amounts of funding. Therefore, future research would benefit from the exploration of similar research questions in more diverse samples to vet the applicability of these findings to underrepresented minority student-athletes, while also examining the effect of level of competition on SWB.

In addition to a lack of diversity in the sample, a second limitation is that the present study lacked sufficient power to conduct more complex analyses. This was the result of the inability to conduct in-person recruitment due to COVID-19 restrictions at the time of data collection. The presence of a smaller sample size prevented the use of larger models in order to ensure the models possessed adequate power. In the future, researchers should partner with athletic departments and coaches to conduct in-person recruitment, ensuring a higher quality of data. This would permit the use of larger models to examine other variables that may help to explain SWB in student-athletes such as, measures of perceived stress, first-gen status, and satisfaction of basic psychological needs (Akbağ & Ümmet, 2017; Jiang, Jiang et al. 2019). Further, as society emerges from the pandemic, replicating this study has merit to ascertain the effect the COVID-19 pandemic might have had on student-athlete SWB throughout the “COVID season”.

The third limitation of the current study, is that it does not shed light on how grit may relate to other predictors of SWB in student-athletes, such as self-efficacy (e.g., Bandura 1977; Duckworth & Gross, 2014; Duckworth & Seligman, 2005), academic achievement (Bowman et al., 2015), and stress (Gayles & Baker, 2015). As previously discussed, the models accounted for only moderate amounts of the variance in SWB scores, indicating that be factors may also contribute to SWB in student-athletes. Further research is necessary to explore the impact that these factors may have on predicting SWB in student-athletes through grit. One explanation is that a student-athlete’s satisfaction with their present environment may be determined by their beliefs regarding their capabilities, ability to persistence for long periods of time, and cope with injury. Future works would benefit from the exploration of these specific behaviors or processes associated with well-being in collegiate student-athletes, through methods like Expressive Writing (Pennebaker, 2018) or the Experience Sampling Method (Larson & Csikszentmihalyi, 2014). These methods would allow for a deeper insight into how student-athletes use these self-regulatory processes to cope with stressful events *in the wild*.

### **Conclusion**

Coupled with existing research, this work not only helps to support the validity of grit as a predictor of SWB, but also extends this grit’s application to an important population—collegiate student-athletes. Being especially “gritty” may serve collegiate student-athletes well, as they pursue long-term goals both within and outside their athletic domains—helping them to realize the payoff of sustained effort. Moreover, understanding the implications that persistence of effort and consistency of interest over

long periods of time has on SWB and achievement in collegiate student-athletes has merit. Specifically, this may one day help to provide parents, coaches, and academics with the tools necessary to employ practices that foster the use of grit-based, wise interventions (e.g., Indhira et al., 2021; Cohen & Steele, 2002) on the field, in the classroom (Alan et al., 2019), and at home. A society populated by grittier individuals, equipped with a growth mindset promises to have positive implications for the overall well-being of individuals in society.

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