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Investigating the Predictive Role of Passion and Mindset on Grit and it's Facets: Perseverance of Effort and Consistency of Interest

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Preface

My five years at NTNU has come to an end. It's been an interesting and educational journey that I have valued highly. Although there have been ups and downs, the journey has been great and I've developed as a person.

The thesis is written by myself under the supervision of Hermundur Sigmundsson. I'd like to thank Hermundur for his feedback, patience, kindness, encouragement, inspiration and opportunities throughout my master studies. I'm grateful for his supervision.

The data used in the thesis was a part of a larger project under the supervision of Hermundur. However, I was the responsible for the data collection with two other students assistants. Therefore, me and Hermundur found it appropriate for me to use it in my thesis. Based on this, I would like to thank everyone that participated.

Moreover, I'd like to thank Svenn-Erik Mamelund for some external feedback on my thesis, it's always appreciated to get an externals perspective.

I would also like to thank my good friend Richard for the discussions and talks we've had throughout our studies. Furthermore, I would like to thank my psychology high school teacher, without her inspiration and encouragement I would not have found my strong interest in psychology. Lastly, I would like to thank my classmates for great talks, discussions and for being great friends. They're all great people and I hope they will go far in their lives.

A special thanks goes out to my mother, father and little sister whom have supported me unconditionally throughout my studies.

Abstract

Grit is a popular construct that have been widely studied and investigated in several scenarios. However, little research has investigated the motivational constructs that could contribute to individual differences in the personality trait grit. Grit is defined as the "Passion and perseverance for long-term goals" (Duckworth et al., 2007, p. 1087). The aim of the thesis was to investigate the predictive role of the motivational construct's passion and mindset on overall grit and it's two facets: perseverance of effort and consistency of interest. The sample consisted of 201 university students, where 49 were males and 152 were females. All participants were measured on the 8-item passion scale measuring passion for achievement (Sigmundsson et al., 2020a), grit-s which measured grit through its two facets: perseverance of effort and consistency (Duckworth & Quinn, 2009), and the theories of intelligence scale (TIS) measuring the individuals beliefs about their intelligence (Dweck, 1999). A correlational analysis found correlations between passion-grit, passion-perseverance of effort, passion-consistency of interest, and passion-mindset. Mindset was not related to grit, perseverance of effort or consistency of interest. Three separate hierarchical regression analyses were used to investigate the predictive role of passion and mindset on grit, perseverance of effort and consistency of interest. Passion was the only significant predictor of grit, perseverance of effort and consistency of interest. Mindset was not found to predict grit or it's facets. Empirical and theoretical explanations of the results, limitations, implications and future studies have been discussed. Future research could further investigate the beneficial effects of measuring grit separately when investigating the motivational framework surrounding passion, grit and mindset in performance.

Keywords: Passion, Mindset, Grit, Perseverance of Effort, Consistency of Interest, University Students, Motivation, Individual Differences

Sammendrag

Grit er et populært konstrukt som har blitt undersøkt av mange forskere og i mange ulike scenarioer. Samtidig er det få studier som ser på hvilke motivasjonelle variabler som kan bidra til individuelle forskjeller i grit. Grit er ofte definert som lidenskap og standhaftighet mot langsiktige mål (Duckworth et al., 2007, p. 1087). I denne avhandlingen var målet å undersøke den prediktive rollen til de motivasjonelle variablene lidenskap og tankesett på generell grit, og grit fasettene; vedvarende innsats og konsistent interesse. Utvalget besto av 201 universitetsstudenter, der 49 var menn, og 152 var kvinner. Alle deltagerne ble målt på lidenskap gjennom 8 spørsmåls passion-scale (Sigmundsson et al., 2020a), grit-s som måler grit og de to tilhørende fasettene; vedvarende innsats og konsistent interesse (Duckworth & Quinn, 2009), og til slutt tankesett undersøker individets oppfatning av intelligensen. Tankesett måles gjennom «theories of intelligence scale» (TIS; Dweck, 1999). En korrelasjonsanalyse viste at det var sammenheng mellom lidenskap-grit, lidenskap-vedvarende innsats, lidenskap-konsistent interesse og lidenskap-tankesett. Det var ingen sammenheng mellom tankesett-grit, tankesett-vedvarende innsats og tankesett-konsistent interesse. Til slutt ble det gjort tre hierarkiske regresjons analyser for å undersøke den prediktive rollen til lidenskap og tankesett på grit, vedvarende innsats og konsistent interesse. Lidenskap predikerte både grit, vedvarende innsats og konsistent interesse. I motsetning så predikerte ikke tankesett grit, vedvarende innsats eller konsistent interesse. Empiriske og teoretiske forklaringer av resultatene, begrensninger, implikasjoner og forslag til videre studier er diskutert. Videre studier bør undersøke grit med de to fasettene separat når det motivasjonelle rammeverket rundt passion, grit og tankesett undersøkes i prestasjons domener.

Nøkkelord: Lidenskap, Tankesett, Grit, Vedvarende Innsats, Konsistent Interesse, Universitetsstudenter, Motivasjon, Individuelle Forskjeller

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Each year thousands of new students start their higher education at universities. University opens the possibility of specialization within a specific area. Students have to be independent and practice towards their own academical development. However, what motivates the students to spend multiple hours at the library, in discussions, in lectures and other learning activities? Passion, grit and mindset are motivational and personality variables that have been investigated in academical domains (e.g; Hodge et al., 2018; Ommundsen et al., 2005; Stoeber et al., 2011). Passion is the individual's strong value/preference, that motivates expression of the value/preference in a specific domain (Jachimowicz et al., 2018). Secondly, grit is the individual tendency to have a consistent interest, and perseverant effort to consistently work through adversities and hardships (Duckworth et al., 2007). Lastly, mindset is the beliefs the individual holds about their own intelligence, whether it can develop, or if it is predetermined and fixed (Dweck & Leggett, 1988). Together passion, grit and mindset are argued to contribute to long-term motivation and perseverance in specific domains to accomplish achievements (Sigmundsson et al., 2020a; 2020b; 2020c). Among university students passion, grit and mindset can benefit the long-term commitment and interest that is required to deliberately practice their academical skills (Ericsson et al., 1993).

Moreover, since grit is the individual tendency to persevere with effort and have a consistent interest towards long-term goals it could be interesting to understand how passion and mindset motivates these tendencies. Few studies have investigated and discussed how passion and mindset could motivate such tendencies (e.g; Sigmundsson et al., 2020a; 2020b). As a result, the study aimed to investigate the predictive role of passion and mindset on the overall grit score, and the two grit tendencies measured by separate subscales: perseverance of effort and consistency of interest.

Theoretical and Empirical Background

Passion

Conceptually passion has a long history. Early philosophers stated that passion is a part of emotions and reason (Teigen, 2015). To explain, philosophers like Spinoza (1632-1677) argued that passion distort the individuals reasoning, unless it was controlled by rationality (Teigen, 2015; Marshall, 2012). As a result, passion has a dualistic tendency, if its' controlled by rationality it can be beneficial, if not it can distort the person to act out of affection and not rationality (Teigen, 2015). On the other hand, philosophers such as Hegel (1770-1831) argued that passion was important to accomplish achievements (Teigen, 2015). To illustrate, Hegel stated that "nothing great in the world has been accomplished without passions" (Hegel, 1861, p.24). Hence, passion distracts human reasoning and influence the individual to act out of affection instead of rationality. However, passion can also be a strong motivational force once it is controlled by rationality (Teigen, 2015).

Philosophical approaches are present in todays' research on passion. Vallerand and colleagues (2003) define passion as "a strong inclination toward an activity that people like, that they find important, and in which they invest time and energy" (Vallerand et al., 2003, p. 757). Namely, passion is an affective relationship with a specific activity that is important to the individual. Based on this definition Vallerand and colleagues (2003) created the dualistic model of passion. The theory is based on self-determination theory, where a passionate activity is integrated into the individual's identity through an autonomous or controlled relationship with the activity (Ryan & Deci, 2000; Mageau et al., 2009). Moreover, the nature of one's passion is influenced by the integrational process explained in the organismic integration theory (Curran et al., 2015; Ryan & Deci, 2000). Either the activity is fully integrated into the identity from an autonomous relationship and characterize an harmonious passion, or it is partially integrated through an controlled relationship and characterize an obsessive passion (Vallerand et al., 2003). Thus, integrational process dichotomize passion into either harmonious- or obsessive passion (Curran et al., 2015).

Harmonious passion is characterized by an autonomous relationship and complete integration of the activity into one's identity (Mageau et al., 2009). The individual decides for themselves when they want to engage in the activity, and when they do not want to engage in the activity (Vallerand et al., 2003). Hence, the passionate activity does not disturb other aspects of the individual's life, and is flexible (Curran et al., 2015). For example, a harmoniously passionate individual might be passionate about video games. However, the

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relationship with the activity is flexible (Mageau et al., 2009). Therefore, the individual stops playing video games for a few days to study for an important exam.

On the other hand, obsessive passion is defined by a controlled relationship and partial integration of the activity into the individual's identity (Vallerand, 2008). To explain, the passionate activity becomes dominant in the individuals life and identity (Mageau et al., 2009). Thus, an obsessive passion distracts the individual from other life aspects, because the individual has difficulties disengaging from the activity (Carbonneau et al., 2010). Therefore, the relationship with the activity is rigid and controlled (Vallerand et al., 2003; Chichekian & Vallerand, 2022). For example, an obsessively passionate individual could play football all day instead of reading for an important exam the next day. Hence, the dualistic model of passion characterizes the duality of passion where it can be beneficial, but also detrimental unless it is balanced.

The duality of passion is present in the empirical findings. Harmonious passion has been related to the experience of positive affect while engaging with the passionate activity, and obsessive passion has been related to negative affect while engaging with the passionate activity (Vallerand et al., 2003; Vallerand et al., 2007; Vallerand et al., 2008; Verner-Filion et al., 2017). Individuals with obsessive passion was found to experience increased burnout in work in general, and among principals (Vallerand et al., 2010; Horwood et al., 2021). Additionally, the experience of negative affect in obsessive passions have been related to procrastination among students (Rahimi & Vallerand, 2021; Peixoto et al., 2021). On the other hand, harmonious passion has shown to predict work satisfaction, and a decrease in burnout among teachers, football players and university students (Carbonneau et al., 2008; Curran et al., 2013; Stoeber et al., 2011). Furthermore, the positive affect from harmonious passion has shown to protect against procrastination among students (Rahimi & Vallerand, 2021; Peixoto et al., 2021). To explain, the positive affect experienced from a harmonious passion can work as a protector against burnout and procrastination. However, the negative affect experienced in obsessive passion can contribute to the development of burnout and procrastination.

Furthermore, the maladaptive or adaptive aspects of passion have been reflected in activity engagement during physical injuries, gambling and risk perception (Rip et al., 2006; Vallerand et al., 2003; Philippe et al., 2007). Obsessively passionate individuals have a tendency to persevere with an activity even when its decremental to health, while harmoniously passionate individuals does not (Vallerand et al., 2003; Phillipe et al., 2004; Rip et al., 2006). For example, obsessive passion has been found to increase activity engagement

among dancers when injured, while harmoniously passionate individuals resituate and seek medical advice (Rip et al., 2006). Additionally, the rigid perseverance in obsessive passion has also been related to health decremental aspects in health promoting activities such as yoga and leisure activities (Carbonneau et al., 2008; Stenseng et al., 2011). Namely, Stenseng and colleagues (2011) finds that obsessive passion is related to negative affection, escapism, interpersonal conflicts while engaging in leisure activities.

Moreover, the dualistic model of passion has been investigated in relation to adaptable outcomes such as well-being and purpose (Yukhymenko-Lescroart & Sharma, 2019). In fact, higher harmonious passion is related to higher cognitive reappraisal which is related to well-being (St-Louis et al., 2021). Additionally, harmonious passion has been related to positive affect while engaging with the passionate- and non-passionate activities (Mageau & Vallerand, 2007). Similarly, obsessive passion is also related to positive affect while engaging with the passionate activity. However, the positive affect decrease while engaging with other activities, because the experienced affect is contingent on passion activity engagement (Mageau & Vallerand, 2007; Mageau et al., 2009). As a result, individuals can identify with and love activities, but the relationship with the passion is characterized by either adaptability and well-being or controlled and negative affection.

The duality of passion is characterized in several pathways to performance, where harmonious passion is associated with performance through mastery, positive affect and need satisfaction (Verner-Fillion et al., 2017;Vallerand et al., 2007;2008; Bonneville-Roussy et al., 2011). Moreover, harmonious passion has shown to predict deliberate practice both directly, and through mastery goals (Vallerand et al., 2007). Namely, individuals with harmonious passion deliberately practice to improve and master the task (Vallerand et al., 2008). The mastery pathway has been related to optimal sport functioning among water polo players and synchronized swimmers (i.e; well-being, coach-athlete relationship, performance, retention; St-Cyr et al., 2021). To explain, the harmoniously passionate individual engages with an activity to learn and master the activity. Thus, the engagement is not contingent with external validation, but is driven by the goal of mastery and autonomy (e.g; Bonneville-Roussy et al., 2011; Vallerand et al., 2007; Mageau et al., 2009).

In contrast, obsessive passion predicted mastery goals, performance-approach goals and performance avoidance goals which can be both beneficial and detrimental to deliberate practice (Vallerand et al., 2007; 2008; Bonneville-Roussy et al., 2011). Obsessive passion has a performance pathway characterized by negative affect, performance goals and no need satisfaction (Verner-Fillion et al., 2017). That is, individuals with obsessive passion strive to

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perform better than others (Vallerand et al., 2007; Vallerand et al., 2008). The pursuit of performance goals characterizes the engagement from obsessive passion as contingent on external validation (Chichekian & Vallerand, 2022; Vallerand et al., 2008). Still, obsessive passion might predict deliberate practice and performance due to high levels of perseverant behaviour (Vallerand et al., 2008; Chichekian & Vallerand, 2022). Furthermore, findings indicate that failure feedback that negatively influence the individual increase performance among obsessively passionate individuals (Bélanger et al., 2013). However, failure feedback does not influence harmoniously passionate individuals performance (Bélanger et al., 2013). Hence, obsessive passionate individuals exert rigid perseverance as a result of external cues and external validation of their performance (Mageau et al., 2009; Bélanger et al., 2013).

The dualistic model of passion explains both decremental and positive sides of being passionate about a specific activity (Vallerand, 2012). However, Jachimowicz and colleagues (2018) have suggested another approach that focus on the engaging role of passion to express a value/preference. Their definition is a critique of the lacking passion conceptualization in the popular construct grit, defined as "Perseverence and passion for long-term goals" (Duckworth et al., 2007, p. 1087; Jachimowicz et al., 2018). Namely, passion is defined as "a strong feeling toward a personally important value/preference that motivates intentions and behaviours to express that value/preference" (Jachimowicz et al., 2018, p. 9981). This definition does not exclude the duality of passion, but differs from Vallerand et al. (2003) by not focusing on a specific activity and the duality of passion. Furthermore, Jachimowicz and colleagues (2018) found that the relationship between grit and performance was moderated by high passion attainment. Namely, more passionate individuals had a stronger relationship between persistent effort and performance. Thus, Jachimowicz and colleagues (2018) argues that grit is reliant on passion to predict performance.

In this study the conceptualization of passion for achievement have been used to measure passion (Sigmundsson et al., 2020a). Based on Jachimowicz and colleagues' (2018) definition of passion, Sigmundsson et al. (2020a) established the 8-item passion-scale. The passion-scale measures passion for achievement and focuses on the individual's strong preference and value for a specific theme/area/skill (Sigmundsson et al., 2020a). Moreover, passion for achievement characterize passion as a motivational construct that motivates hard work, engagement, commitment, time spent and expertise development in a passionate domain (Sigmundsson et al., 2020a; Ericsson et al., 1993). To explain, the passionate individual has a goal of becoming good within a specific theme/area/skill through spending time deliberately practicing and engaging with a specific passionate domain (Sigmundsson et

al., 2020a; Ericsson et al., 1993). As a consequence, it is argued that passion for achievement can motivate long-term deliberate practice through perseverant effort from grit, which can contribute to the development of expertise in the passionate achievement domain (e.g; Sigmundsson et al., 2020c; Ericsson & Charness, 1994).

Moreover, the dualistic model of passion (Vallerand et al., 2003) and passion for achievement (Sigmundsson et al., 2020a) have different theoretical conceptualizations and assumptions. Prior research suggest that passion for achievement is correlated with harmonious passion ($r = .62$) and not obsessive passion ($r = .19$) among football players (Loftesnes et al., 2021). Namely, passion for achievement and harmonious passion could share the similarity of capturing a strong interest towards something specific, while being empirically separate from each other. On the one hand, passion for achievement reflect the value/preference to become skilled in a skill/area/theme (e.g football; Sigmunsson et al., 2020c). On the other hand, harmonious passion reflects the autonomous relationship the individual has with their passionate activity (Vallerand et al., 2003). Consequently, harmonious passion differs from passion for achievement by focusing on the individual-activity relationship, while passion for achievement focus on a strong interest in improvement and becoming good in something specific (Vallerand et al., 2003; Sigmundsson et al., 2020a).

Mindset

The theory of mindset was originally named 'incremental theories of intelligence', and divided into the two theories of entity theory and incremental theory (Dweck & Leggett, 1988). In 2006, Dweck renamed the theory into mindsets and divided it into a growth mindset and a fixed mindset. Incremental theory was renamed to growth mindset, and entity theory was renamed to fixed mindset (Dweck & Yeager, 2019). A growth mindset characterizes the belief that human intelligence can develop as a result of effort and learning strategies (Dweck & Yeager, 2019). To explain, your intelligence is malleable and can change if the individual exerts effort and uses the correct learning strategies (Dweck, 2017). On the other hand, a fixed mindset is characterized by a belief that human intelligence cannot develop as a result of effort and learning strategies (Dweck & Leggett, 1988). Namely, it is the belief that human intelligence has a threshold, and once the threshold is reached the individual cannot develop further. Among the fixed mindset individuals, the threshold is reflected through task difficulties and failure feedback (Dweck & Yeager, 2019). Both growth- and fixed mindset have shown to influence cognition, behaviour and affective responses among individuals (Dweck & Leggett, 1988).

Growth- and fixed mindset are related to goal orientations (Dweck & Leggett, 1988; Elliot & Dweck, 1988). A growth mindset is related to having a mastery goal, which is characterized by wanting to master a specific task through learning (Elliot & Dweck, 1988). A fixed mindset is related to performance goals, where the individual tries to get external validation of their performance (Stipek & Gralinski, 1996; Robins & Pals, 2002). To explain, growth- and fixed mindsets are related to how the individual approaches challenges through learning or through external validation of performance. Furthermore, Hong and colleagues (1999) find that individuals with a growth mindset attribute their failures to lack of effort. On the other hand, fixed mindset individuals attribute failures to their lack of ability (Hong et al., 1999). That is, the growth mindset individual tries to correct the failure with the use of effort and learning strategies, while fixed mindset individuals give up due to the belief that their ability threshold was reached.

Findings suggest that parental praise of effort of children helps develop a growth mindset, while praise directed towards the individual's ability predicts the development of a fixed mindset (Mueller & Dweck, 1998). In educational practice, mindsets have shown to develop from teacher feedback. Teachers that comfort students by saying "maybe you're not a math person" attributes the failures to the individual's ability, which have shown to influence the development of a fixed mindset (Rattan et al., 2012, p.731). In addition, other findings indicate that mindset can develop from the mindset of other classmates (King, 2020). Thus, mindset can develop from external feedback directed towards process or ability, and from peer interactions.

The beneficial effects of mindset have been reflected in recent studies. Contemporary findings suggest that a growth mindset predicts higher learning engagement through perceived stress and perceived event severity during the covid-19 pandemic (Zhao et al., 2021). Namely, growth mindset individuals perceive less stress and less severity of the pandemic. As a result, growth mindset individuals are more engaged in learning due to less distractions (Zhao et al., 2021). Furthermore, neural findings have indicated that children with growth mindset allocate more attention to errors, and therefore have a higher accuracy on a task after the error (Schroder et al., 2017). Hence, growth mindset individuals do not give up due to errors, but they allocate more attention to mistakes so they can correct them.

Moreover, fixed and growth mindset have shown to be unrelated to big five personality traits and intelligence (Spinath et al., 2003). That is, mindset can be seen as separate from personality and intelligence, and as a separate construct that explains individual beliefs about personality and intelligence (Spinath et al., 2003). Other findings have shown

that fixed mindset individuals reported less reading comprehension when reading fluency decrease, while growth mindset individuals reported more comprehension when reading fluency decreased (Miele & Molden, 2010; Miele et al., 2013). Namely, when growth mindset individuals are exposed to difficulties, they might increase effort and learning strategies to improve, and therefore experience more comprehension (Miele et al., 2013). The fixed mindset individual experience the decreasing fluency as failure feedback and believes their ability threshold has been reached (Miele & Molden, 2010). Lastly, growth mindset is related to motivation and concentration, and fixed mindset is related to self-handicapping (Ommundsen et al., 2005). To explain, growth mindset individuals facilitate motivation and concentration to improve and overcome challenges. On the contrary, fixed mindset individuals facilitate self-handicapping processes to avoid failure (Ommundsen et al., 2005; Stipek & Gralinski, 1996).

Furthermore, mindsets are beliefs that can be changed, and individual's can hold both growth and fixed mindsets at the same time in different domains (Dweck, 2017). How mindsets change is studied through interventions, where students are presented with materials that contribute to the development of a growth mindset (e.g Yeager et al., 2019; Blackwell et al., 2007; Paunesku et al., 2015). Studies on interventions have shown that holding a growth mindset increased mathematical performance over a two-year period (Blackwell et al., 2007). Moreover, a short growth mindset intervention increased motivation among the students and increased their academical growth in math (Blackwell et al., 2007). Additionally, Yeager and colleagues (2019) found that a short growth mindset (less than an hour) intervention increase math performance among lower performing students. In addition, growth mindset intervention increased perseverance and math performance three weeks after the intervention (Bettinger et al., 2018). Additional findings indicate that mindset interventions are effective among lower performing students (Paunesku et al., 2015), and that dieting individuals have benefited from a growth mindset intervention during setbacks and weight gain (Burnette & Finkel, 2012). Hence, studies show that mindsets are not fixed, but have shown to be malleable through intervention studies.

The findings on growth mindset interventions indicate that interventions can increase growth mindset and performance among students (e.g Blackwell et al., 2007; Yeager et al., 2019; Bettinger et al., 2018). However, Burnette and colleagues (2020) finds that a growth mindset intervention in computer science influence the students' interest and not their performance. Additionally, a meta-analysis finds that mindsets are not related to performance directly (Sisk et al., 2018; Costa & Faria, 2018). Growth mindset interventions effect on

academical performance have shown to be moderated by socioeconomical status, academical risk, educational level, type of mindset measurement and cultural background (Sisk et al., 2018; Costa & Faria, 2018). Thus, findings suggest that mindset interventions are only effective in specific scenarios.

In 1988, Dweck & Leggett argued that mindsets influence the goal orientations that the individual holds. However, Dupeyrat and Mariné (2005) finds that goal orientations such as learning goals and performance goals are not predicted by type of mindsets. Additionally, findings indicate that positive and negative effort perception is a better predictor of motivation and goal achievement than mindsets (Tempelaar et al., 2015). Others have argued that mindset is a domain-specific construct (e.g; Hughes, 2015; Scott & Ghinea, 2013). Scott and Ghinea (2013) finds that a domain-specific measure of mindset is better at predicting deliberate practice in a specific domain. That is, mindset could benefit from domain-specific measures (Hughes, 2015; Hertel & Karlen, 2021). Lastly, mindset measures have been criticized to only measure beliefs about intelligence in general, and not what the individual believes about the malleability of their own intelligence (De Castella & Byrne, 2015). Measures of self-theories of intelligence have shown more predictive value above the belief about intelligence in general (De Castella & Byrne, 2015).

Grit

"Perseverance and passion for long-term goals" are the defining characteristics of the non-cognitive trait grit (Duckworth et al., 2007, p. 1087). To explain, grit is a non-cognitive personality trait that is argued to be a better predictor of performance than IQ (Duckworth et al., 2007). A gritty individual is characterized by a tendency to have consistent long-term effort toward a specific long-term goal (Duckworth & Gross, 2014). Namely, while two individuals have the same IQ, the one with more grit is argued to reach higher performance through persistent effort and a consistent interest that guides the individuals through plateaus, hardships, and failures (Duckworth et al., 2007).

Although the characteristics of grit sound familiar to self-control (e.g $r = .52$ and $r = .81$; Kannangara et al., 2018; Vazsonyi et al., 2019), Duckworth & Gross (2014) argue that the distinction lies in the hierarchy of goals. Self-control is the regulation of behaviour to complete lower-order immediate goals such as reading ten pages in a book (Duckworth & Gross, 2014). Grit on the other hand regulates behaviour to complete long-term goals, that are consistent of many lower-order immediate goals, such as getting a university degree (Duckworth & Gross, 2014). Additionally, findings suggest that grit is similar to

conscientiousness (i.e; r = .86; Rimfeld et al., 2016; Duckworth et al., 2007; Schmidt et al., 2018). However, Duckworth and colleagues (2007) argues that grit is different, since it deals with long-term persistent effort rather than short-term effort. As a result, grit is conceptualized as a unique construct separate from self-control and conscientiousness.

Psychometrically grit was originally measured with grit-o which consisted of 12 items (see; Duckworth et al., 2007). Later, Duckworth and Quinn (2009) revamped the scale into grit-s consisting of 8 items measuring grit through the two subscales; perseverance of effort, and consistency of interest. The scales differ in number of items, but grit-s have shown superior psychometric properties above grit-o and to be more efficient at measuring grit (Duckworth & Quinn, 2009). A confirmatory factor analysis found that grit-s had a better empirical fit to the theoretical model compared to the grit-o scale (Duckworth & Quinn, 2009). Additionally, studies regarding gender differences have been found to vary (Duckworth & Quinn, 2009; Sigmundsson et al., 2020b; Kannangara et al., 2018), although the majority indicate that there are no gender differences.

Empirical findings have shown that grit is a good predictor of deliberate practice among spelling bee contestants (Duckworth et al., 2011; Duckworth et al., 2007). Namely, the gritty contestants invested more time in self-study than less gritty participants (Duckworth et al., 2011). Furthermore, grit have shown to predict retention in military school, marriage and in jobs as a salesman (Eskreis-Winkler et al., 2014). In addition, higher grit is associated with less burnout among UK doctors (Halliday et al., 2017). Lastly, gritty teachers were found to have higher retention and efficiency in their jobs (Robertson-Kraft & Duckworth, 2014). To explain, individuals with higher grit are more likely to be consistent and persevere in their domains regardless of hardships and plateaus.

Normally, researchers have used a mean score of the scale to represent grit (as suggested by Duckworth et al., 2007), while others have questioned such practices and argues that each facet should be measured separately (Credé et al., 2017; Disabato et al., 2019; Usher et al., 2019; Muenks et al., 2017). That is, Credé (2018) have criticized the lack of evidence for treating grit as a higher order construct (i.e. composite mean grit score made from the two subscales perseverance of effort and consistency of interest), and that each facet should be used separately. However, Additionally, Duckworth et al. (2021) replied to the criticism by admitting to having wrongly interpreted the statistical dimensionality of grit. Furthermore, a meta-analysis on grit finds that perseverance of effort has better predictive validity above consistency of interest (Credé et al., 2017). Namely, perseverance of effort is better at predicting outcome variables compared to consistency of interest. Therefore, many authors

have decided to measure each facet separately (e.g; Usher et al., 2019; Verner-Fillion et al., 2021; Von Culin et al., 2014).

Findings on perseverance of effort and consistency of interest among expert football players have indicated that perseverance of effort is a good predictor of deliberate practice (Tedesqui & Young, 2017). Consistency of interest have shown to predict less threat towards sport commitment (Tedesqui & Young, 2017). Similarly, Tedesqui and Young (2018) finds that perseverance of effort predicts higher skill group membership, and consistency of interest predicts retainment in specific sports above facets of conscientiousness. Perseverance of effort has also been found to mediate the relationship between autonomous motivation and leisure-time physical activity among children (Hein et al., 2021). Moreover, perseverance of effort has shown to mediate the relationship between autonomous support and academical performance (Hernández et al., 2020). To explain, perseverance of effort might be driven by autonomous motivation and can benefit both academical performance and leisure-time physical activity by perseverant effort. Lastly, a global study finds that perseverance of effort is strongly related to well-being, perception of well-being and personal strengths (Disabato et al., 2019).

Although grit has many positive merits, grit has been criticized on several points (Credé et al., 2017; Credé, 2018). Firstly, findings indicate that the perseverance of effort facet shares 95% variation with proactive conscientiousness (Schmidt et al., 2018). Namely, there is further support that grit has been constructed under the "jangle" fallacy (i.e. same conceptualization as already existing concepts, but with a new label; Credé, 2018; Ponnock et al., 2020). In addition, numerous studies suggest that grit is not related to school specific outcomes while controlling for other school related predictors such as conscientiousness and emotional regulation ability (e.g; Ivcevic & Brackett, 2014; Steinmayr et al., 2018; Usher et al., 2019; Muenks et al., 2017). However, the facet consistency of interest has shown unique variation above what is explained by conscientiousness (Schmidt et al., 2018). Additionally, a prior study show that perseverance of effort has incremental value above trait-level conscientiousness, but not facet-level conscientiousness (Hagen & Solem, 2021).

Furthermore, other critique suggest that the consistency of interest facet does not capture the essence of passion, and that total grit only consist of perseverance of effort (e.g; Jachimowicz et al., 2018; Grohman et al., 2017). In addition, studies that investigate the predictive validity of grit finds that grit may be better conceptualized as a domain-specific construct (Cormier et al., 2019; Duckworth & Quinn, 2009). To explain, participants reported higher grit in sport-specific grit compared to academic- and general grit (Cormier et al., 2019;

Schmidt et al., 2017). This suggest that individuals can be more gritty in specific domains compared to others (Cormier et al., 2019).

Higher grit has also shown to be maladaptive in specific scenarios (e.g; Lucas et al., 2015; Wilson et al., 2021). Exerting perseverance of effort and consistency of interest can be decremental to goal achievement (Lucas et al., 2015). Findings show that high grit is associated with persistent effort on test tasks instead of skipping a task to increase overall performance (Lucas et al., 2015). Additionally, perseverant effort has been related to less help-seeking behaviour among student veterans (Wilson et al., 2021). To explain, higher perseverant effort can influence the flexibility of the individual's behaviour.

Recent critique of grit has also investigated whether grit is influenced by cultural orientation. Namely, grit is argued to be a western construct, and needs to be adjusted for cultural differences (Datu et al., 2016). Furthermore, Datu and colleagues (2016) finds that only perseverance of effort is present as a predictor and a correlate with higher order grit and psychological outcomes in a collectivistic culture.

On the Relationship Between Passion, Grit and Mindset

Recent research has investigated both the theoretical and empirical relationships between passion, grit and mindset (Sigmundsson et al., 2020a). Theoretically, Sigmundsson and colleagues (See figure 3; 2020a) argues that passion is the direction of the persistent effort from grit. Namely, passion guides and motivates the perseverant effort from grit into a specific achievement domain in which the individual is passionate (See figure 3; Sigmundsson et al., 2020a). Moreover, mindset is argued to be an underlying variable that explains whether the individual believes the effort exerted from grit can contribute to develop their ability or not in the specific passion domain (see figure 3; Sigmundsson et al., 2020a; Hong et al., 1999).

The findings from Sigmundsson and colleagues (2020a) indicate that passion is correlated with both grit and mindset. Findings suggest that passion-mindset have a low correlation of .26, and that grit-mindset have either a low correlation of .27 or non-significant correlations (Sigmundsson et al., 2020b; Frontini et al., 2021. Additionally, their findings show a moderate correlation between passion and grit ($r = .44$; Sigmundsson et al., 2020b).

Furthermore, passion for achievement and grit have shown different correlational patterns among males and females. That is, males had a higher passion-grit correlation ($r =.50$) compared to the females ($r = .38$), indicating gender differences in the interplay between passion and grit (Sigmundsson et al., 2020b; Sigmundsson et al., 2021). However,

the correlation between grit and mindset was weaker and non-significant among the males (r = .22) compared to the females (r = .36; Sigmundsson et al., 2020b). Thus, the correlational patterns between passion-grit and grit-mindset have shown to vary based on gender (Sigmundsson et al., 2020b). Passion for achievements' relationship with grit have also shown to vary with age (Sigmundsson, 2021). That is, younger individuals (14-53) have a stronger association between passion and grit compared to more elderly individuals (i.e 53+;Sigmundsson, 2021). Additionally, findings on passion for achievement have shown to have higher correlations with grit in junior-18 groups (r = .67) compared to elite groups in football (r = .47; Sigmundsson et al., 2020c; Loftesnes et al., 2021). Lastly, the findings on passion for achievement show an association with harmonious passion (Loftesnes et al., 2021). To explain, this indicate that passion for achievement is more related to a positive harmonious passion than a decremental obsessive passion.

Moreover, contemporary studies have investigated the difference between a fixed- and a growth belief about passions (Chen et al., 2015). A fixed passion is characterized by the belief that passion is found, nurtures endless motivation and instant enjoyment (O'Keefe et al., 2018). To explain, the passion has to be found and fit, if there are challenges and difficulties related to the passion, the individual believes it is not a correct fit (Chen et al., 2015). Furthermore, a fixed view of passion is characterized by the belief that the individual cannot hold several interests (Chen et al., 2015).

On the other hand, a growth passion is cultivated through consistent engagement with a domain that can develop into a passion (Chen et al., 2015). However, findings indicate that having a fixed passion is related to less engagement with the passionate activity when the activity becomes challenging. Namely, when the passion becomes difficult the individual believes it is not a correct fit, and therefore not a passion (O'keefe et al., 2018). A growth passion is associated with understanding and accepting the difficulties related to the passionate domain, and as a result the individual believes that passions have to be cultivated and developed over time (O'keefe et al., 2018; Chen et al., 2021). Thus, passion and mindsets might be theoretically intertwined by the belief of finding a passion or developing one.

On the Explanatory Side of Grit

The findings on the relationships between passion, grit and mindset have been exploratory (e.g; Sigmundsson et al., 2020a; 2020b; 2020c; Park et al., 2020). Few studies have investigated the motivational constructs that contribute to individual differences in the tendency to persevere with effort and have a consistent interest (Duckworth et al., 2007).

Recent findings has shown that grit correlate with happiness through engagement (Von Culin et al., 2014). The facets of grit, perseverance of effort correlated with happiness through engagement, while consistency of interest correlated negatively with happiness through pleasure (Von Culin et al., 2014). That is, individuals with high grit, or high perseverance of effort find happiness through engagement, while high consistency of interest individuals find happiness through avoiding immediate pleasure. Additionally, findings indicate that a growth mindset and task goal orientation predicted higher levels of grit (Albert et al., 2021). Namely, the belief in the malleability of abilities and focus on reaching goals was associated with being grittier. Moreover, the belief in malleability of abilities through effort was found to increase grit in an intervention study among elementary school students (Alan et al., 2019). In addition, Park and colleagues (2020) suggest that mindset and grit is reciprocal over time among adolescents. Furthermore, when investigating perseverance of effort and consistency of interest separately, growth mindset have shown to be positively correlated with higher perseverance of effort and consistency of interest among secondary school students (Karlen et al., 2019). Lastly, other findings show that grit is driven by a purpose for commitment and positive affect (Hill et al., 2016). Consequently, motivational variables contribute to individual differences in grit.

On the other hand, others have found that goal commitment is a better explanatory variable of grit than growth mindset (Tang et al., 2019). Furthermore, harmonious passion is related to perseverance of effort, while obsessive passion is negatively associated with both perseverance of effort and consistency of interest (Verner-Filion et al., 2020). Hence, exploring the motivational variables of overall grit and facets from grit can contribute to an explanation of what variables contributes to higher grit, perseverance of effort and consistency of interest.

The Purpose of the Study

To summarize, findings have shown that passion, grit and mindset are associated (Sigmundsson et al., 2020a; 2020b; 2020c). However, the studies have not investigated the predictive role of passion and mindset on grit, perseverance of effort and consistency of effort separately. Prior research has indicated that each level of grit might have different motivational patterns (e.g Albert et al., 2021; Karlen et al., 2019; Von-Culin et al., 2014; Verner-Filion et al., 2020). To explain, there have been indications that total grit score, perseverance of effort and consistency of interest could have different motivational correlates. Therefore, this study will investigate the following research question:

1. What is the predictive role of passion and mindset on overall grit, and the two grit facets: perseverance of effort and consistency of interest?

Methods

Participants

The sample consisted of 203 university students. Two respondents were left out due to empty responses, leaving 201 respondents for analysis. The age of the participants ranged from 18 to 44 years ($M = 22.78$, $SD = 3.86$). Furthermore, the sample had 49 males (24%) and 152 females (76%). The females reported a mean age of 22.8 ($SD = 4.17$) and the males reported a mean age of 22.8 ($SD = 2.74$). Among the participants 132 reported that their highest finished education was high school (66%), 64 reported having finished a bachelor's degree (32%) and 1 reported having finished a master's degree (2%).

Procedure

The data collection was connected to an ongoing project and administrated by the author of this thesis. The collection began the fall of 2020 and lasted until the fall of 2021. Only university students in Norway were asked to participate, and the collection was done through the online survey service; Nettskjema. Two students' assistants helped the author with the data collection. The sample is a convenience sample, thus collection happened through acquaintances, random sampling at the university campus, through lectures and e-mails sent to students through the faculty administrations at different disciplines. Participants were encouraged to share the link with their university acquaintances. The survey informed about the purpose of the study, voluntary participation, anonymity, and the right to withdraw their response (See Appendix A). Data about gender, grades, highest education, age and description was collected (See Appendix B). Since the combination of personal information is not enough to identify a specific individual there was no need to apply for NSD.

Measurements

Passion-Scale

There are different scales that measure passion. In this study passion scale by Sigmundsson and colleagues (2020a) was used (See Appendix B). The scale measures passion for achievement in different themes, skills or areas. Passion-scale consist of 8 questions, examples of questions are: '*I have passion enough to become very good in the area/theme/skill that I like*' and '*I have a burning passion for some areas/theme/skills*'. The questions are answered with a 5 point Likert-scale where 5 = *Very much like me*, and 1 = *Not like me at all.* A high passion score is 5, and a low passion score is 1. The scale has been used

in varied contexts ranging from elite football players, university students and different age groups (Sigmundsson et al., 2020a; Sigmundsson, 2020; Loftesnes et al., 2021). A former study on a Turkish sample have shown good dimensionality and confirmed an adequate factor structure (Taylan et al., 2020). Lastly, a reliability analysis showed a Cronbach's alpha value of .87 indicating good internal consistency in this study.

Short Grit Scale

Originally grit was measured with a 12-item scale called grit-o (Duckworth et al., 2007). However, in this study a Norwegian translation of grit-s (See Appendix B) was chosen because of its psychometrical properties (Sending, 2014; Duckworth & Quinn, 2009). The grit-s scale consists of 8 items measuring both perseverance of effort (PE) and consistency of interest (CI). There are 4 questions measuring PE, such as '*Setbacks don't discourage me*' and '*I finish whatever I begin*'. CI is measured by 4 questions such as '*New ideas and projects sometimes distract me from previous ones*' and '*I often set a goal but later choose to pursue a different one*'. The scale is measured with a 5-point likert-scale where 5 is *Very much like me* and 1 is *Not like me at all*. For CI the measurement scale is reversed meaning 1 is *Very much like me* and 5 is *Not like me at all*. The scale has been used in a ranged of studies and shown a good factor structure (Duckworth & Quinn, 2009). In this study PE had a Cronbach's alpha of .67, CI had a Cronbach's alpha of .74 and overall Grit had a Cronbach's alpha of .78. Showing adequate internal consistency.

Implicit Theories of Intelligence Scale (Mindset)

Mindset was measured by a Norwegian translation (See Appendix B) of the implicit theories of intelligence scale (TIS; Bråten & Strømsø, 2004; Dweck, 1999). The scale measures the individuals beliefs about intelligence (Dweck & Leggett, 1988). ITIS consist of 8 items measuring both fixed- and growth mindset (Dweck, 1999). There are 4 questions measuring fixed mindset, such as '*You have a certain amount of intelligence, and you can't really do much to change it*' and '*To be honest, you can't really change your intelligence*'. In addition, there are 4 questions measuring growth mindset, such as '*No matter who you are, you can significantly change your intelligence level*' and '*You can always substantially change your basic intelligence*'. The questions are answered with a 6-point likert-scale, where 6 = *Strongly disagree* and 1 = *Strongly agree*. Growth mindset items were reversed, where 6 = *Strongly agree,* and 1 = *Strongly disagree*. The growth items were reversed to make a high mean score represent increase in growth mindset. Former studies have shown Cronbach's

alphas from .86 (Bråten & Strømsø, 2004). In this study the scale had a Cronbach's alpha of .94 showing good internal consistency.

Data analysis

The data was downloaded from Nettskjema and screened in SPSS version 28 (SPSS, Inc., Chicago IL, USA). Missing values were replaced with the mean from their respective gender group. Assumptions of normality and linearity was visually checked and met. A few outliers were detected in visual inspections of boxplots, but not removed based on the results from a 5% trim procedure that did not indicate changes in the overall mean of the predictor- and outcome variables. An independent samples t-test was used together with the descriptive statistics as a descriptive measure to investigate if there were any gender differences in the predictors and outcome variables. Data was then imported into Rstudio for further analysis (RStudio Team, 2021). The assumptions of independent errors, multicollinearity and homoscedasticity were all screened and met. Firstly, a principal component analysis was used check the dimensionality of the passion-scale in a Norwegian sample (Sigmundsson et al., 2020a). After that, a bivariate Pearson correlation was used to investigate the relationships between passion, grit, perseverance of effort (hereafter abbreviated to PE), consistency of interest (hereafter abbreviated to CI) and mindset. Hierarchical linear regression was used to investigate the unique predictive value of mindset and passion on grit, PE and CI separately in three different hierarchical regression models. Age and gender were always entered first in the model as control variables, then mindset in the second model, and lastly passion in the third model based on theoretical assumptions and prior empirical findings. Findings were deemed significant if $p < .05$.

Results

Principal Component Analysis

Dimensionality of Passion

The dimensionality of the passion scale has only been investigated once in a Turkish sample (Taylan et al., 2020). Therefore, this study decided to investigate the dimensionality of the passion-scale (Sigmundsson et al., 2020a), in a Norwegian university student sample (See table 1). A principal component analysis was used to investigate the dimensionality of Sigmundsson and colleagues (2020a) passion-scale. The results suggest that the scale

consisted of one dimension reflecting passion for achievement (See table 1). Only one dimension was extracted based on inspection of scree-plot, parallel analysis and extracting dimensions with 1 eigenvalue and above. The extracted component had an eigenvalue of 4.27 and the component explained 53% variance of passion for achievement (See table 1). In addition, the factor loadings ranged from .41 to .81 indicating that the items correlated well with the latent construct (See table 1 for the factor loadings). The item '*I work hard enough to fulfil my goals*' had a factor loading of .41 and was almost excluded due to little shared variance with the latent construct (Field, 2018). The overall KMO was .86 indicating an adequate sample size to detect dimensionality.

Table 1

Exploratory Principal Component Analysis to Investigate the Dimensionality of the Passion-Scale (N = 201)

Items	Passion for Achievement	Communality
I have an area/theme/skill I am really passionate about.	**.76**	.58
I would like to use a lot of time to become good in that area/theme/skill.	**.77**	.60
I think I could be an expert in one area/theme/skill.	**.73**	.53
I have passion enough to become very good in the area/theme/skill I like.	**.81**	.66
I work hard enough to fulfil my goals.	**.41**	.17
I have a burning passion for some areas/theme/skills.	**.82**	.67
I use a lot of time on the projects I like.	**.66**	.44
My passion is important for me.	**.78**	.61
Explained variance	53.34%	
Cronbach's α	.87	
Average corrected item-total correlations	.45	

Note. *Factor loadings above .4 are in bold.*

Descriptive Statistics

The mean scores indicated that the sample had high passion-scores and a tendency towards growth mindset (See table 2). The average score for CI was somewhat low compared to its counterpart PE. Moreover, the results suggest that the females ($M = 3.24$) had significantly higher grit score compared to the males ($M = 2.97$). Additionally, the females ($M = 3.66$) scored higher in the grit facet PE than males ($M = 3.27$). Lastly, there were no gender differences in passion, mindset or the grit facet CI (see table 2).

Table 2

Mean and Standard Deviation on Each Variable for Whole Sample, Males and Females

Variables	Whole ($N = 201$) M (SD)	Males ($n = 49$) M (SD)	Females ($n = 152$) M (SD)	p*
Passion	3.84 (0.71)	3.92 (0.62)	3.82 (0.73)	.353
Grit	3.17 (0.65)	2.97 (0.61)	3.24 (0.66)	.011
PE	3.57 (0.68)	3.27 (0.67)	3.66 (0.65)	<.001
CI	2.78 (0.87)	2.67 (0.76)	2.81 (0.90)	.297
Mindset	4.04 (1.05)	4.10 (1.20)	4.03 (1.00)	.765

Note. *PE = Perseverance of effort, CI = Consistency of interest.*

P-values (two-tailed) derived from independent samples t-test.

Correlational Analysis

To investigate the relationships between the included constructs, a Pearson's bivariate correlation was used.

The results show that there is a significant positive correlation between passion and PE, $r = .46$, $p < .001$. In addition, passion had a significant positive correlation with the grit facet CI, $r = .28$, $p < .001$. A significant positive correlation was found between passion and overall grit score, $r = .42$, $p < .001$. The two facets of grit, PE and CI showed a significant positive correlation, $r = .43$, $p < .001$. PE had a significant positive correlation with total grit score, $r = .80$, $p < .001$. Furthermore, CI had a significant positive association with total grit score, $r = .88$, $p < .001$. Mindset had a positive significant correlation with passion, $r = .17$, $p = .018$ (See table 3). Lastly, mindset had a positive non-significant relationship with Grit, $r = .06$, $p = .428$ (See table 3). A non-significant correlation was also found between mindset and PE, $r = .11$ $p = .134$, and between mindset and CI, $r = .00$, $p = .977$ (See table 3).

Table 3

Pearson Bivariate Correlations Between Passion, Grit Total Score, PE, CI and Mindset (N = 201).

Variables	Passion	Grit	PE	CI	Mindset
Passion	1.00				
Grit	.42**	1.00			
PE	.46**	.80**	1.00		
CI	.28**	.88**	.43**	1.00	
Mindset	.17*	.06	.11	.00	1.00

Note. $p < .05*$, $p < .001**$ (two-tailed)

PE = Perseverance of effort, CI = Consistency of interest

Hierarchical Linear Regressions

Three separate hierarchical linear regressions was performed to investigate the predictive uniqueness of mindset and passion separately on overall grit, and the two facets: PE and CI while controlling for demographic variables (age and gender).

Hierarchical Linear Regression with Grit as Outcome

The first hierarchical linear regression (see table 4) investigated the predictive role of passion and mindset on overall grit showed that passion and gender was the only significant predictors of grit. Model 1 consisted of the demographical variables age and gender, and explained 3% variance in grit, $R^2 = .03$, $F(2, 198) = 3.29$, $p = .039$. Model 2 added the mean score of mindset, but was not a significant model, $R^2 = .04$, $F(3, 197) = 2.43$, $p = .067$. Adding mindset to the model did not significantly improve the model, $\Delta R^2 = .01$, $F(3, 197) = 0.71$, $p = .399$. Lastly, in model 3 passion was added to the model and explained 18% variance in grit over and above mindset, age and gender, $\Delta R^2 = .18$, $F(4, 196) = 46.46$, $p < .001$. The complete model 3 including passion explained 22% variance in grit and was a significant model, $R^2 = .22$, $F(4,196) = 13.86$, $p < .001$. The findings from model 3 indicate that gender and passion was the only significant predictors of grit. Passion was significantly and positively associated with grit while controlling for age, gender and mindset, $\beta = .44$, $p < .001$ (See table 4). That is, having higher scores in passion was associated with being more gritty. Additionally, females had higher mean grit score compared to males while controlling for age, mindset and

passion, $\beta = .20$, $p = .002$. Lastly, model 3 showed that age, $\beta = .03$, $p = .662$, and mindset, $\beta = -.01$, $p = .839$ were non-significant predictors of grit.

Table 4

Hierarchical Linear Regression Investigating the Predictors of overall Grit (N = 201)

Variables	b	SEb	β	R^2	R^2_{adj}	ΔR^2
Model 1				.03*	.02*	
Age	0.01	0.01	.03			
Gender	0.27*	0.11	.18*			
Model 2				.04	.02	.01
Age	0.01	0.01	.03			
Gender	0.27**	0.11	.18**			
Mindset	0.04	0.04	.06			
Model 3				.22***	.21***	.18***
Age	0.01	0.01	.03			
Gender	0.31**	0.10	.20**			
Mindset	-0.01	0.04	-.01			
Passion	0.40***	0.06	.44***			

Note. *** *p < .001 ,** p < .01, * p < .05. (two-tailed)*

For gender, male coded 0, and female coded 1.

Hierarchical Linear Regression with Perseverance of Effort as Outcome

A second hierarchical regression investigated the predictive role of passion and mindset on the facet PE. The results suggest that gender and passion are the only significant predictors. Model 1 including age and gender explained 7% variance in PE, $R^2 = .07$, $F(2, 198) = 7.48$, $p < .001$. In model 2 mindset was added to the model, but adding mindset did not significantly improve model 2, $\Delta R^2 = .01$, $F(3, 197) = 2.55$, $p = .112$. Model 2 was significant and explained 8% variance of PE, $R^2 = .08$, $F(3,197) = 5.88$, $p < .001$. The complete model 3 added passion and explained 30% variance in PE, $R^2 = .30$, $F(4,196) = 20.93$, $p < .001$. Additionally, adding passion to the model increased explained variance in the model with 22%, $\Delta R^2 = .22$, $F(4, 196) = 60.77$, $p < .001$ (See table 5). Results indicate that gender and passion was the only significant predictors in the complete model. Passion was a strongly associated with PE when age, gender and mindset was controlled for, $\beta = .47$, $p < .001$. That is, having more passion was related to increased perseverance of effort. Additionally, females

had higher PE scores compared to males while controlling for age, mindset and passion, β = .28, $p < .001$. The non-significant findings indicated that age was not related to PE, β = .07, p = .247, and that mindset was not related to PE, β = .03, p = .611.

Table 5

Hierarchical Linear Regression Investigating the Predictors of Perseverance of Effort (N = 201)

Variables	b	SEb	β	R^2	R^2_{adj}	ΔR^2
Model 1				.07***	.06***	
Age	0.01	0.01	.08			
Gender	0.40***	0.11	.25***			
Model 2				.08***	.07***	.01
Age	0.01	0.01	.07			
Gender	0.40***	0.11	.26***			
Mindset	0.07	0.04	.11			
Model 3				.30***	.29***	.22***
Age	0.01	0.01	.07			
Gender	0.45***	0.09	.28***			
Mindset	0.02	0.04	.03			
Passion	0.45***	0.06	.47***			

Note. *** $p < .001$, ** $p < .01$, * $p < .05$. *(two-tailed)*

For gender, male coded 0, and female coded 1.

Hierarchical Linear Regression with Consistency of Interest as Outcome

The last hierarchical regression was used to investigate the predictive role of mindset and passion on CI. Model 1, R^2 = .01, $F(2, 198)$ = 0.47, p = .624, and model 2, R^2 = .01, $F(3, 197)$ = 0.31, p = .815 was not significant. Adding mindset to model 2 showed no significant improvement in predicting CI, ΔR^2 = .00, $F(3, 197)$ = 0.00, p = .955. The complete model 3 which added passion explained 9% variance of CI , R^2 = .09, $F(4, 196)$ = 4.61, p = .001. Adding passion increased the explained variance by 8%, ΔR^2 = .08, $F(4, 196)$ = 17.43, $p <$ .001. Passion was the only significant predictor of CI, β = .29, $p < .001$. Namely, being more passionate was positively associated with more consistent interest in a specific area. These results indicate that passion was the only predictor that explained variance in CI (See table 6).

Lastly, gender, $\beta = .09$, $p = .218$, age, $\beta = -.01$, $p = .855$ and mindset, $\beta = -.04$, $p = .528$ was all found to be non-significant predictors of CI.

Table 6

Hierarchical Linear Regression Investigating the Predictors of Consistency of interest (N = 201)

Variables	b	SEb	β	R^2	R^2_{adj}	ΔR^2
Model 1				.01	-.01	
Age	-0.00	0.02	-.01			
Gender	0.14	0.14	.07			
Model 2				.01	-.01	.00
Age	-0.00	0.02	-.01			
Gender	0.14	0.14	.07			
Mindset	0.00	0.06	.00			
Model 3				.09**	.07**	.08***
Age	-0.00	0.02	-.01			
Gender	0.17	0.14	.09			
Mindset	-0.04	0.06	-.04			
Passion	0.35***	0.09	.29***			

Note. *** $p < .001$, ** $p < .01$, * $p < .05$. (two-tailed)

For gender, male coded 0, and female coded 1.

<center>**Discussion**</center>

The aim of this study was to investigate the predictive role of passion and mindset on overall grit and the facets of grit: PE and CI. The research question was investigated with the purpose of understanding the motivational and conceptual processes that could contribute to the combined individual tendencies of persevering with effort over a long period of time and the tendency to stay consistently interested towards the same goal. Moreover, this study aimed to investigate the tendencies separately to examine if the motivators had different predictive roles and values in each grit facet: PE and CI.

The correlational results indicate that there was a moderate relationship between passion and grit. Moreover, passion was associated with both facets from grit, a moderate relationship with PE and weak relationship with CI. In addition, mindset was weakly correlated to passion. However, mindset was not found to correlate with grit, PE or CI. Results from the three separate hierarchical regression analyses indicated that passion was the only significant predictor of overall grit, PE and CI. Thus, the result suggests that passion has a moderate role in predicting grit, PE and a weak role in predicting CI. Passion was also found to explain variance in grit, PE and CI above gender, age and mindset. Furthermore, the control variable gender did predict grit and PE, indicating gender differences while controlling for age, mindset and passion. In addition, the gender differences in overall grit and PE were supported by the independent samples t-test from the descriptive statistics. Mindset was found to not predict grit, PE or CI. In addition, mindset did not add any unique variance above age and gender.

On the Relationships Between Passion, Mindset, Grit, PE and CI

A correlational analysis indicated that passion was associated with overall grit ($r = .42$), PE ($r = .46$) and CI ($r = .28$). Similarly, Sigmundsson and colleagues (2020a; 2020c) have found similar correlations between passion and grit among football players ($r = .58$) and Icelandic students ($r = .39$). Thus, the results support prior research and indicate that higher passion is associated with higher grit among the Norwegian university students. In a similar manner as the Icelandic university students and Norwegian football players, it could be possible that passion reflect a motivational force that motivates grit in a specific achievement domain (Sigmundsson et al., 2020b; Loftesnes et al., 2021). However, their studies differentiate from this study by only looking at passion-grit and not the association between passion and the facets from grit; PE and CI.

The facets CI and PE might have different motivational correlates, since the

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correlation between PE and CI indicate that they are unique, but related constructs ($r = .43$). To explain, the unique variance could be explained through different motivators (e.g Von Culin et al., 2014). Existing literature suggest the total grit score and PE is closely related to conscientiousness which reflect hard-working and persistent individuals (e.g; Schmidt et al., 2018; Rimfeld et al., 2016; Ponnock et al., 2020). In contrast, CI reflected by commitment and interest towards the same projects and goals have unique variance outside of conscientiousness (Schmidt et al., 2018). Namely, the CI facet could explain unique variance that is not shared with PE and conscientiousness (Schmidt et al., 2018; Rimfeld et al., 2016). Hence, PE and CI might characterize different, but related individual tendencies that are beneficial towards performance (e.g; Duckworth et al., 2007; Duckworth et al., 2011).

Furthermore, the correlation between passion for achievement and PE ($r = .46$) might suggest that higher passion is associated with higher PE among university students. Likewise, prior research suggest that harmonious passion is correlated with PE among college students ($r = .16$; Verner-Filion et al., 2020). Compared to harmonious passion, passion for achievement seems to have a stronger relationship with PE than harmonious passion (Verner-Fillion et al., 2020). A possible explanation could be that passion for achievement specifies a strong interest in skill/theme/area development that could require extensive PE to engage in activities such as deliberate practice to improve (Sigmundsson et al., 2020a; Ericsson et al., 1993). Harmonious passion might not inherently characterize an achievement domain, instead harmonious passion could reflect a flexible relationship with a specific activity (Curran et al., 2015). Thus, it could be possible that passion for achievement is a better motivator of PE compared to harmonious passion since it reflects achievement domains that require PE for development.

Moreover, the correlation between passion for achievement and CI ($r = .28$) was weaker compared to passion-PE ($r = .46$), still, passion was significantly associated with CI. Duckworth et al. (2007) conceptualized CI as a passion construct. Namely, the association between passion for achievement and CI might indicate a similarity of the constructs. However, the correlational size of .28 indicate a shared variance of 8% ($.28^2 = 0.078$). Thus, the results suggest passion for achievement and CI might be distinct, but related constructs (Credé, 2018). The findings empirically support Jachimowicz and colleagues (2018) who argue that CI does not capture the essence of passion. Similar findings have also been illustrated by Verner-Fillion et al. (2020) who found no correlation between harmonious passion and CI ($r = .00$).

The difference between passion for achievement and CI is also reflected in their respective questionnaires (e.g Sigmundsson et al., 2020a; Duckworth & Quinn, 2009). Passion for achievement is reflected by items such as '*I have an area/theme/skill I am really passionate about*' and '*I have passion enough to become very good in the area/theme/skill I like*' (Sigmundsson et al., 2020a, p. 3). To explain, passion for achievement reflects a construct that motivates engagement in hard work, and effort into specific domains where the individual has a desire to become very good (Sigmundsson et al., 2020a). In comparison, CI is reflected by items such as '*I often set goals but later choose to pursue a different one*' and '*I have difficulty maintaining my focus on projects that take more than a few months to complete*' (Duckworth & Quinn, 2009, p. 167). Namely, CI reflects the individual tendency to stay consistently interested towards the goals and projects that they pursue but might not capture motivation and engagement like passion (Duckworth et al., 2007; Sigmundsson et al., 2020a). Therefore, passion for achievement and CI seem to be conceptually different constructs that are weakly correlated to each other. Consequently, it could be possible that an individual with more passion for achievement could have a tendency to stay consistent towards the goals and projects that the individual pursues (Duckworth et al., 2011).

Similarly to existing literature, passion was also related to mindset (e.g; Sigmundsson et al., 2020b; 2020c). Moreover, prior research finds small associations between passion and mindset ($r = .20$ and $r = .26$; Sigmundsson et al., 2020b; Frontini et al., 2021). The association between passion and mindset have shown to vary in correlational effect size between gender, age groups and among ranking of football players (Sigmundsson et al., 2020b; 2020c; Sigmundsson, 2021). A possible explanation of the correlation could be that individuals with more growth mindset are also more passionate from developing their passion (Chen et al., 2015). To explain, the belief in the ability to grow in their passionate domain could motive the individual to consist through difficulties and challenges in their passion (Chen et al., 2015). Therefore, university students that hold a growth mindset about their passion could experience more motivation from passion for achievement, when they believe their theme/area/skill are subject to development.

Lastly, there was weak non-significant correlations between mindset-grit ($r = .06$), mindset-PE ($r = .11$) and mindset-CI ($r = .00$). Nevertheless, prior research has suggested that mindset is related to grit, PE and CI (e.g; Karlen et al., 2019; Sigmundsson et al., 2020b; Albert et al., 2021). Sigmundsson and colleagues (2020b) find a weak but significant correlation between grit and mindset ($r = .27$) among Icelandic university students. Moreover, Karlen and colleagues (2019) results suggest that mindset was related to PE ($\beta = .14$) and CI

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(β = .09) in a structural equation model. In contrast, in this study the correlational results suggest that higher mindset is not associated with higher grit, PE or CI. Likewise, higher grit, PE or CI is not associated with higher mindset. A possible explanation of the non-significant result in this study could lie in the conceptualizations of the constructs and its predictive relationships. Another possibility is that the Norwegian university sample differs from the former samples in the existing literature. That is, the relationships between mindset, grit and the facets: PE and CI could vary on an educational level.

The Predictive Role of Passion on Grit, PE and CI

Passion for achievement was found to be a significant predictor of overall grit, while controlling for age, gender and mindset. In addition, passion explained 18% unique variance in overall grit above age, gender and mindset. The results indicate that the predictive role of passion could consists of passion guiding grit, which is consistent with Sigmundsson et al. theoretical model (see fig.3; 2020a). Although the theoretical model is explanatory of the predictive role of passion on grit, both Jachimowicz et al (2018) and Sigmundsson et al. (2020a) investigates the composite mean score of grit under the theoretical assumption that grit mainly characterize perseverance of effort. However, grit is operationalized as a summarized mean score of the items measuring both the PE and CI facets (i.e composite score; Credé et al., 2017; Duckworth & Quinn, 2009). Therefore, the predictive role of passion and mindset on the grit composite could benefit from reflecting both the theoretical and empirical combination of the two grit facets: PE and CI (Duckworth & Quinn, 2009).

An explanation that might considers both PE and CI are that passion could specify the domain where perseverance is exerted and the domain where the individual stays consistently interested (i.e domain-specification; Cormier et al., 2019; Sigmundsson et al., 2020a; Duckworth & Quinn, 2009). To explain, passion for achievement could specify an achievement domain, characterized by a theme/area/skill in which the individual exerts both the tendency of PE and CI to achieve the passionate goal of becoming good (i.e expert; Sigmundsson et al., 2020c; Ericsson et al., 1993). If the university students have a passion for achievement in their studies, it could motivate PE and CI towards their studies. Therefore, the predictive role of passion for achievement on grit could be to motivate the individual's tendency to persevere and stay consistently interested for long-periods of time by specifying a passionate domain with goals they work to achieve.

However, investigating grit as a composite mean score of PE and CI might make it difficult to interpret the predictor's role on the grit facets: PE and CI separately (e.g; Von

Culin et al., 2014; Verner-Filion et al., 2020; Karlen et al., 2019). The findings indicate that an increase passion is associated with an increase in grit, which consist of both higher PE and CI (Duckworth & Quinn, 2009). The findings do not reflect whether passion is more influential at predicting PE or CI among the university students (Credé, 2018). Prior research has supported the notion that each grit facet can have different motivational correlates (e.g pleasure, engagement; Von Culin et al., 2014). To explain, Von Culin and colleagues (2014) suggest that each facet of grit can be influenced differently from motivational predictors such as pleasure and engagement.

Accordingly, the results in this study indicated that passion both predicted PE and explained variance (22%) above what the control variables (i.e. age and gender) and mindset did. In comparison to the predictive role of passion on grit ($\beta = .44$), the predictive role of passion on PE was marginally stronger ($\beta = .47$). The main difference is that the predictive role of passion on PE does not include the CI subscale.

Prior studies indicate that harmonious passion might be a predictor of PE among college students (Verner-Filion et al., 2020). Moreover, Loftesnes and colleagues (2021) find that passion for achievement is associated with harmonious passion among football players ($r = .62$). However, harmonious passion and passion for achievement differ conceptually (e.g; Loftesnes et al., 2021). That is, they both share the aspect of a strong interest, but harmonious passion characterize the individual's flexible and autonomous relationship with a specific activity the individual is passionate about (Curran et al., 2015; Vallerand et al., 2007). Hence, harmonious passion could motivate PE by specifying a specific activity the individual is passionate about, and have an autonomous relationship with (Verner-Filion et al., 2020).

In contrast, passion for achievement characterize the individual's goal or desire to improve and become good in a specific theme/area/skill the individual is passionate about (Sigmundsson et al., 2020a). Namely, passion for achievement could guide PE towards a specific domain in which the individual has a passionate goal of improving or becoming good (Sigmundsson et al., 2020c). On the contrary to harmonious passion, passion for achievement could reflect a domain and a goal directionality the individual might exert PE towards (See figure 3; Sigmundsson et al., 2020a). Among Norwegian university students' passion for achievement could motivate PE directed towards the passionate goal of becoming good or improving in their studies (Frontini et al., 2021).

Moreover, the predictive role of passion for achievement on PE might share motivational processes with the constructs purpose and engagement orientation to happiness, which both have been related to being gritty and the tendency of PE in former studies (Hill et

al., 2016; Von Culin et al., 2014). Having a specific theme/skill/activity through passion for achievement could give the individual a sense of purpose or goal-direction for improvement and achieving their goals. Similarly, Hill and colleagues (2016) suggested that experiencing purpose gives the individual an direction in which grit is exerted. Likewise, engagement orientation to happiness specifies that the engagement is exerted as a mean to achieve happiness (Von Culin et al., 2014). Thus, goal directionality created by passion for achievement could motivate the amount of effort that the individual perseveres with to reach their long-term passion goals (Sigmundsson et al., 2020a). As a result, it might be possible that passion for achievements predictive role on PE is to motivate PE by specifying a specific passionate domain and a passionate goal-direction the individual exerts PE towards to achieve.

On the other hand of being gritty, motivating perseverant effort among university students does not explain if passion motivates a consistent interest in a specific theme/area/skill (Sigmundsson et al., 2020a; Tedesqui & Young, 2018; Duckworth et al., 2007). In comparison to the predictive role of passion for achievement in grit ($\beta = .44$) and PE ($\beta = .47$), the predictive role of passion for achievement on CI was weaker ($\beta = .28$). Namely, passion has a predictive role in each part of grit but is most influential in overall grit and specifically the grit facet PE. Moreover, the results suggest that the association between passion and grit might be mostly driven by the association between passion and PE. Passion only added 9% variance above what age, gender and mindset did in CI. Hence, the findings suggest that passion for achievement explains more unique variance in the perseverance of effort facet compared to the consistency of interest facet and overall grit. However, the results suggested that passion for achievement contributed weakly to more consistent interest among university students.

Existing research has suggested that CI is negatively predicted by obsessive passion and pursuing happiness through pleasure (See; Verner-Filion et al., 2020; Von Culin et al., 2014). Namely, prior research suggests that having an obsessive passion characterized by a controlled relationship with a specific activity is associated with lower levels of consistent interest. Moreover, having a pleasure orientation towards happiness have been associated with weaker tendencies of consistent interests (See; Verner-Filion et al., 2020; Von Culin et al., 2014). Both pleasure and obsessive passion characterize the maladaptive aspects contingencies attached with a specific interest (e.g Von Culin et al., 2014; Vallerand et al., 2007). To explain, if the individual seeks happiness through pleasure the individual might swap interests once it is no longer pleasurable. Similarly, obsessive passionate individuals are

motivated to engage with specific activities and interests based on external validation and performance goals (e.g; Bonneville-Roussy et al., 2011; Verner-Filion et al., 2017; Bélanger et al., 2013).

In contrast, passion for achievement might not reflect contingencies such as experiencing pleasure for happiness, external validation (Sigmundsson et al., 2020a). Instead, passion for achievement could characterize a domain specifying goal of becoming good through mastery and hard work in a skill/area/theme (Sigmundsson et al., 2020a; Loftesnes et al., 2021). Similarly, to passion for achievements role in PE, the results might suggest that passion for achievement could motivate university students to stay consistently interested towards their studies, because they are driven by a passionate goal of becoming good (Sigmundsson et al., 2020c). It might be possible that the passionate desire of becoming good is achieved when you have a tendency to consistently work on your same interest in a theme/area/skill over a long period of time (e.g; Duckworth et al., 2011). To illustrate, the individual deliberately practice within the same domain, instead of swapping between several domains (Ericsson et al., 1993; Tedesqui & Young, 2017). Therefore, passion for achievement might positively contribute to CI since it is free from external contingencies and specifies the domain where the individual can stay consistently interested.

The Predictive Role of Mindset on Grit, PE and CI

The predictive role of mindset on grit, PE and CI could explain how the individuals beliefs about intelligence motivate effort and consistent interests in academical domains (e.g Karlen et al., 2019; Albert et al., 2021; Tang et al., 2019; Park et al., 2020). A growth mindset reflects the belief of development through effort and learning strategies, and therefore a growth mindset might motivate perseverant effort to further improve intelligence or abilities (Park et al.,2020; Dweck & Yeager, 2019; Alan et al., 2019). Similarly, a growth mindset could motivate CI since the individual does not see failure as a lack of interest, but as a reason to continue with the interest to further develop it (Chen et al., 2015). Moreover, existing empirical research has found weak associations between mindset-grit, PE and CI among Icelandic university students, football players, and high school students CI (e.g; Albert et al., 2021; Sigmundsson et al., 2020b; Karlen et al., 2019; Frontini et al., 2021; Park et al., 2020). Although the predictive role of mindset could be theoretically and empirically plausible, mindset was not found to predict or explain unique variance in grit, PE or CI among the Norwegian university students in this study.

A possible explanation might be reflected by the conceptualization of former grit, PE

and CI predictors. Existing literature and findings from this study suggest that grit, PE and CI might be predicted by constructs that characterize goal directionality (e.g purpose, commitment, goal commitment, engagement, pleasure and passion; Hill et al., 2016; Von Culin et al., 2014; Tang et al., 2019; Verner-Filion et al., 2020). To illustrate, former findings find that mindset does not predict PE when goal commitment is controlled for (Tang et al., 2019). In addition, the association between passion-grit is stronger compared to mindset-grit ($r = .44$ vs. $r = .27$; Sigmundsson et al., 2020b). Hence, it is possible that goal commitment and passion might be better predictors of grit, PE and CI since they specify a goal or domain for the domain-general construct grit (Cormier et al., 2019). Namely, grit does not characterize the tendency to have PE and CI in a specific domain or towards something in particular, instead it reflects a tendency of PE and CI in general (e.g; Duckworth & Quinn, 2009; Cormier al., 2019). Consequently, individuals could be more motivated to exert PE and CI in domains that they are passionate or have a goal commitment to, compared to other domains (Duckworth & Quinn, 2009; Cormier et al., 2019).

The difference between mindset, passion and goal commitment, could be that growth mindset does not direct a specific goal or domain (Dweck & Yeager, 2019; Hughes, 2015). That is, the mindset measurement measures whether the individual believes ability and intelligence can develop (Dweck, 1999). Although, prior research suggest that mindset predict learning goals (Stipek & Gralinski, 1996; Elliot & Dweck, 1988), mindset itself is not characterized by goal directionality. Moreover, it might be possible that the mismatch between the belief about the malleability of intelligence does not correspond to the domain-general aspects of grit (as suggested by Park et al., 2020). Namely, believing that intelligence can develop might not necessarily motivate grit, PE and CI, because it might not reflect a specific goal or through what processes the individual develops as a result of their mindset (Park et al., 2020). To illustrate, the individual could hold a growth mindset, but to improve something through the processes of PE and CI the individual might need a specific goal in which they take upon challenges to improve. Consequently, the lack of directionality and domain-specificity might explain why mindset does not predict grit, PE or CI among university students (i.e importance of domain-specific measure; Cormier et al., 2019; Schmidt et al., 2017).

Moreover, it might be possible that the non-significant relationship between mindset-grit, PE and CI could be explained by the educational level reflected by the sample. To illustrate, Karlen and colleagues (2019) investigated growth mindset' relationship with PE and CI among secondary school students. The secondary school students have numerous

courses where a specific goal might not be present at their age. Among secondary school students growth mindset might motivate PE and CI, because the student have to exert effort and consistent interest to improve in several subjects where a specific goal might not be present (Karlen et al., 2019).

On the other hand, university students could gain from a goal specific predictor, since they are studying a specific domain that they could choose for themselves (Frontini et al., 2021; Sigmundsson et al., 2020b). For example, the choice of a specific study might be based on the passionate goal (e.g; Sigmundsson et al., 2020b). Consequently, the predictive role of mindset could be contingent on educational level and the characteristics of the domain (i.e goals directionality in secondary school vs. university; Karlen et al., 2019; Sigmundsson et al., 2020b). Furthermore, it could be possible that goal directionality and domain-specification is important for motivational constructs that predict grit, PE and CI among university students.

Gender Differences in Grit, PE and CI

The results suggested that there are gender differences in both overall grit-score and the grit facet: PE. However, there was no gender differences in CI (see table 6 and table 2). These findings could suggest that females have a tendency to be more gritty and have more PE compared to males. Prior research has suggested that grit does not vary with gender (e.g; Duckworth & Quinn, 2009; Sigmundsson et al., 2020b; Hodge et al., 2018). Still, the findings seem to be circumstantial since some studies does suggest gender differences in grit (Kannangara et al., 2018). A possible explanation might be that females use PE and grit as a strategy to overcome stereotypical hardships and adversities in academia more than males do (Nosek et al., 2009). Namely, females might experience grit and PE as a successful strategy to reach their long-term in academia while facing adversity (Duckworth et al., 2007). In addition, the lack of gender differences in CI could indicate that both males and females are equally consistent in their interests. However, the gender differences in grit and PE could be a result of a skewed sample, or the specific scenario of Norwegian university students, where females could have a tendency to exert more grit and perseverant effort in their studies, compared to males.

Limitations

There were several limitations in this study. Firstly, a survey-method was used to measure constructs that are socially desirable. Participants might respond on the higher end of

the scales to appear more passionate about their achievement domains, more grittier and that they believe having a growth mindset is more desirable compared to a fixed mindset (Schwarz et al., 2008).

Secondly, the PE facet had a low Cronbach's alpha ($\alpha = .67$). This indicates that the internal consistency was lower than the accepted .70 (Field, 2018). The lack of reliability could influence the stability of the results found in this study. Therefore the results reflecting PE as a outcome variable should be interpreted with this in mind, and be investigated in future studies.

Thirdly, there are limitations towards the gender distribution and generalizability. In this study, there was 49 males and 152 females which suggest a skewed gender distribution. Thus, the mean gender difference in grit and PE score should be interpreted with caution. Furthermore, future studies investigate the same effect with a gender balanced sample. In addition, the sample consisted of Norwegian university students. There is not any information about where in Norway they were studying or what they were studying. Accordingly, the results cannot be generalized across gender and different universities.

Lastly, the study is correlational in nature. Therefore, the results should be interpreted accordingly. In addition, the use of the terms predict, and prediction were only used as a measure to suggest and investigate a specific directionality of the relationships between the constructs. The findings do not yield any causal interpretation, only the associations between the constructs are reflected in this study. As a result, passion seems to be associated with higher PE, CI and grit scores, but the findings cannot reflect a causal relationship.

Implications and Future Research

The findings could indicate that passion might be an important predictor of grit, PE and CI. University students' grit, perseverant effort and consistent interest seems to be partially motivated by their strong interest towards a specific achievement domain (Sigmundsson et al., 2020a). Thus, supervising graduating high school students into domains that they are passionate about might be beneficial in terms of academical performance and academical growth among university students (Verner-Fillion et al., 2021; Hodge et al., 2018). To explain, passion for achievement in academical domains could motivate long-term PE (Duckworth et al., 2011). The PE in a passionate domain might influence the time spent practicing and improving upon one's knowledge in that area/theme/skill through domain specific training (Tedesqui & Young, 2017). Namely, the process of deliberate practice (Ericsson & Charness, 1994). Therefore, students that are about to start university might gain

the required motivation to persevere in deliberate practice if they choose a study they are passionate about.

Developing a passion towards a specific domain could also motivate the university students stay committed to their long-term goals (Eskreis-Winkler et al., 2014; Verner-Fillion et al., 2020; Tedesqui & Young, 2018). Staying committed to the same university program might contribute to the individual's achievement by maintaining consistent deliberate practice within the same course (Tedesqui & Young, 2017; Eskreis-Winkler et al., 2014). For example, helping university students nurture a passion within a specific study might benefit commitment and retention (Eskreis-Winkler et al., 2014). On other hand, failing to help students develop a passion for a specific study could result in frequent swapping between studies and might influence the amount of time available for consistent deliberate practice (Ericsson & Charness, 1994). Therefore, an possible implication of passion' predictive role on CI is to nurture retention in domains the individual wants to become good (Eskreis-Winkler et al., 2014). As a result, future studies could investigate passion' predictive role of deliberate practice while mediated by PE and CI since each facet separately reflects both exerted effort and retention in specific domains (e.g; Tedesqui & Young, 2017; Tedesqui & Young, 2018; Eskreis-Winkler et al., 2014).

In addition, future research could benefit from investigating the maladaptive effects the relationship between passion-PE and passion-CI. Using passion to motivate consistent interest and perseverant to the same long-term goal could be maladaptive (Lucas et al., 2015; Wilson et al., 2021). Existing literature suggest that grit is related to not seeking mental health help during a mental health crisis (Wilson et al., 2021), and not skipping tasks during tests to increase the overall test-score (Lucas et al., 2015). To explain, motivating CI and PE by being more passionate can reflect a rigid consistency and perseverance that has been related to burnout and negative affect (Vallerand et al., 2007; Stoeber et al., 2011; Curran et al., 2013). As a result, fostering passion to motivate grit, PE and CI might motivate activity engagement that is close to addiction and decremental to the individuals health. Since passion for achievements relationship with PE and CI does not reflect the dualistic tendencies of passion empirically (e.g; Vallerand et al., 2008; Curran et al., 2015), future studies could investigate passion for achievements relationship with harmonious- and obsessive passion. Such studies can contribute to a dualistic perspective on passion for achievements role in grit, PE and CI (Loftesnes et al., 2021).

The predictive role of mindset was found to be non-significant on each level of grit. Although Sigmundsson and colleagues (2020b;2020c) have found correlations between grit

and mindset before, the effect seem to be circumstantial or a result of mindsets motivational nature (Tang et al., 2019). Nonetheless, existing literature have suggested that mindset could be underlying or external to the relationship between passion and grit (See figure 3; Sigmundsson et al., 2020a). The correlational results between passion and mindset ($r = .17$) could indicate that mindset work as a moderator between passion and grit. That is, when the individual experiences more growth mindset, the relationship between passion and grit is strengthened (e.g Chen et al., 2015; O'Keefe et al., 2018). Therefore, future research could investigate the moderating role of mindset on the relationship between passion-grit, passion-PE and passion-CI. Moreover, future studies of mindset should measure mindset as a domain-specific measure to fit the context in which the study is conducted (e.g Chen et al., 2015; Hughes, 2015; Scott & Ghinea, 2013).

Lastly, there are a few psychometrical implications regarding grit measurement. Firstly, the moderate correlation between PE and CI indicated related, but separate constructs (Credé, 2018; Duckworth et al., 2007). Therefore, using a composite grit score could make it difficult to interpret whether predictive effects of passion-grit ($\beta = .44$) is equal in both PE or CI, or if they are substantially different like this study ($\beta = .47$ vs. $\beta = .28$). Measuring the facets separately might allow the researcher to investigate which part of grit that is best predicted by the motivational constructs (Duckworth & Quinn, 2009; Karlen et al., 2019). In addition, when measuring the facets separately the predictive validity of PE and CI should be taken into consideration (Credé et al., 2017). To explain, research indicate that PE is better at predicting performance outcomes compared to CI (Credé et al., 2017). Moreover, PE can work as a cost-efficient measure of proactive conscientiousness (Schimidt et al., 2018). Consequently, subsequent research should investigate the mediating role of passion on PE and CI separately. Moreover, the gender differences in grit and PE should be investigated in a dedicated gender difference study that investigate gender differences with a balanced sample.

Conclusion

The study investigated the predictive role of passion and mindset on grit, PE and CI. The findings indicated that passion was the only significant predictor of grit, PE and CI, and explained variance above gender, age and mindset. Furthermore, mindset did not predict grit, PE, CI. The results partially supported passion's role in directing effort from grit, and mainly the facet of PE (see fig.3; Sigmundsson et al., 2020a). That is, the predictive role of passion on grit, PE and CI might be to direct and motivate the consistent interest and perseverant effort into a specific passion achievement domain. Passion might create a long-term goal directionality and strong interest in an achievement domain, and as a result motivate PE in that specific domain. Similarly, CI could be motivated by the goal directionality and the domain-specificity of passion for achievement, which might not be contingent on external variables such as pleasure and social validation. However, the results suggested that passion for achievement might be mostly influential on the tendency to persevere with effort.

The predictive role of mindset was non-significant and did not explain any variance in the outcome variables above gender and age. A possible explanation reflected the lack of goal directionality and domain mismatch. Namely, mindset is the belief about the malleability of intelligence but might not motivate since it might not inherently characterize a specific goal or the processes the individual uses to improve their abilities and intelligence. In addition, it could be possible that the predictive role of mindset on grit, PE and CI is contingent on the samples educational levels and the goals reflected among the students.

Moreover, future research could investigate whether PE and CI mediate the relationship between passion and deliberate practice. In addition, further studies could investigate if the relationship between passion-PE and passion-CI is related to flexible- or rigid engagement. Lastly, future studies could investigate the moderating role of mindset on the relationship between passion-grit, passion-PE and passion-CI.

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Appendix A

Information About the Study and Consent to Participation

Venligst besvar alle spørsmålene i én økt. Bryter du underveis, vil du ikke kunne komme tilbake til dine svar. Du samtykker å delta i undersøkelsen ved å svare på spørsmålene og sende dem inn ved å klikke på «Ferdig» på siste side.

Formålet med spørreundersøkelsen er å studere sammenhengen mellom Passion (Lidenskap til ulike aktiviteter og temaer), Grit (Evnen til å fortsette i motstand) og Mindset (Måten man tenker på egne ferdigheter og intelligens).

Spørreundersøkelsen er frivillig og anonym. Dataen vil bli benyttet i en større undersøkelse, og senere benyttet i artikler.

Har du spørsmål om undersøkelsen kan disse rettes til Hermundur Sigmundsson:
hermundur.sigmundsson@ntnu.no

Appendix B

Norwegian Version of the Questionnaires Used in This Study.

Kjønn:

   ◯ Mann

   ◯ Kvinne

Alder:

   [   ]

Hva beskriver deg best:

   ◯ Ungdomsskoleelev

   ◯ VGS-elev

   ◯ Student

   ◯ Forelder

   ◯ Annet

Hvilken høyeste utdanning har du fullført:

   ◯ Grunnskole

   ◯ Videregående skole/ Yrkesfag

   ◯ Bachelorgrad

   ◯ Mastergrad

   ◯ Doktorgrad

Hvis du har vitnemål fra VGS: Hvilken gjennomsnittskarakter har du på vitnemålet?

- ○ Under 4.0
- ○ 4.0-4.49
- ○ 4.5-4.99
- ○ 5.0 eller bedre

Hvis du har studert på universitet: Hvilken gjennomsnittskarakter har du fått på de eksamner du har tatt?

- ○ A-B
- ○ B-C
- ○ C-D
- ○ D-E

I hvilken grad er hver av de følgende setningene typiske for deg?

	Veldig typisk meg	Ganske typisk meg	Litt typisk meg	Ikke typisk meg	Ikke meg i det hele tatt
Jeg har et område/tema/ferdighet som jeg virkelig brenner for	○	○	○	○	○
Jeg kunne tenkt meg å bruke mye tid til å bli god innen et område/emne/ferdighet	○	○	○	○	○
Jeg tror jeg kan bli ekspert i et område/emne/ferdighet	○	○	○	○	○
Jeg har lidenskap nok til å bli ekspert i det området/temaet/ferdigheten jeg liker	○	○	○	○	○
Jeg er arbeidsom nok til å oppfylle mine mål	○	○	○	○	○
Jeg har brennende lidenskap for noen områder/tema/ferdigheter	○	○	○	○	○
Jeg bruker mye tid på de prosjekter jeg liker	○	○	○	○	○
Min lidenskap er viktig for meg	○	○	○	○	○

I hvilken grad er hver av de følgende setningene typiske for deg?

	Veldig typisk meg	Ganske typisk meg	Litt typisk meg	Ikke typisk meg	Ikke meg i det hele tatt
Noen ganger distraherer nye ideer og prosjekter meg fra tidligere prosjekter	○	○	○	○	○
Jeg mister ikke motet ved tilbakegang/motgang	○	○	○	○	○
Jeg har vært besatt av en bestemt ide eller prosjekt i en kort periode, men har senere mistet interessen	○	○	○	○	○
Jeg er arbeidsom	○	○	○	○	○
Jeg setter meg ofte et mål, men bestemmer meg så for et annet istedet	○	○	○	○	○
Jeg har vansker med å beholde fokus på prosjekter som tar mer enn et par måneder å fullføre	○	○	○	○	○
Jeg fullfører alt jeg påbegynner	○	○	○	○	○
Jeg er flittig	○	○	○	○	○

I hvilken grad er du enig i de følgende setningene?

	Svært enig	Enig	Stort sett enig	Stort sett uenig	Uenig	Svært uenig
Du har en bestemt mengde intelligens, og du kan egentlig ikke gjøre så mye for å endre den	◯	◯	◯	◯	◯	◯
Intelligensen din er noe ved deg som du ikke kan endre særlig mye	◯	◯	◯	◯	◯	◯
Uansett hvem du er, så kan du endre intelligensnivået ditt i betydelig grad	◯	◯	◯	◯	◯	◯
For å være ærlig, så kan du egentlig ikke endre hvor intelligent du er	◯	◯	◯	◯	◯	◯
Hvor intelligent du er, er noe du alltid kan endre betraktelig	◯	◯	◯	◯	◯	◯
Du kan lære nye ting, men du kan egentlig ikke endre din grunnleggende intelligens	◯	◯	◯	◯	◯	◯
Uansett hvor mye intelligens du har, så kan du alltid endre en hel del	◯	◯	◯	◯	◯	◯
Selv ditt grunnleggende intelligensnivå kan du endre betraktelig	◯	◯	◯	◯	◯	◯

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