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# The role of psychological factors in sports: Passion, grit and mindset in American football

Master's thesis in Psychology, specialization in learning – brain, behaviour, environment

Supervisor: Hermundur Sigmundsson

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Norwegian University of Science and Technology  
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## Preface

I want to thank my supervisor Hermundur Sigmundsson for piquing my interest on the topic of passion, grit and mindset in sports. Combined with my interest for American football this made perfect sense to me as the subject for my master thesis – in such a way that I could combine a hobby of mine with something academic that I find highly interesting, and at the same time be one of the first in this field to do so. Data collection, theoretical framework, analyses and layout were all performed by me, with some input and proof-reading from Hermundur Sigmundsson during the last part of the process.

I also want to thank my girlfriend, Inga, who has been encouraging me and helped me stay on course to finish my thesis in time – which at times might have stressed her out more than it stressed me. I thank you for being my biggest supporter. I also want to thank my family and friends who have shown interest and expressed their good wishes – and last but not least, I want to dedicate this master thesis to my mother who recently passed away. I know that she would have been the world's proudest mother – and therefore I am proud of myself. Mom, this one is for you.

## Abstract

This study aimed to investigate the relationship of the psychological factor's passion, grit and mindset in American football players in Norway, and if these were correlated to the skill levels of the athletes. Data was collected through an online questionnaire which was distributed to the teams. The study had a total of 60 participants, 59 males and one female, mean age of 22.14 (SD = 7.24), from four different groups related to skill and age: Eliteserien (N = 13) (Elite), D1 Senior Herrer (N = 20) (Division 1), D2 Senior Herrer (N = 17) (Division 2), and U-16 (N = 10) (Junior-16).

An eight-item passion scale was used to assess the level of passion. Grit-S scale with eight items was used to measure grit. Theories of Intelligence Scale (TIS) with eight items was used to measure mindset. Results showed that the Elite team scored highest in passion and grit, while Division 2 scored highest in mindset. Significant differences between Elite and Junior-16 were shown in passion. Significant correlations for the whole group were only found for passion-grit ( $r = .462$ ,  $p < .001$ ), and not for any of the other factors. Elite: Significant correlation only for passion-grit ( $r = .796$ ,  $p < .001$ ), and not for passion-mindset ( $r = .287$ ) or grit-mindset ( $r = .378$ ). Division 1: Significant correlation only for passion-mindset ( $r = .497$ ,  $p < .05$ ), and not for passion-grit ( $r = .109$ ) or grit-mindset ( $r = .071$ ). Division 2: No significant correlations for either passion-grit ( $r = .284$ ), passion-mindset ( $r = .074$ ), or grit-mindset ( $r = -.152$ ). Junior-16: No significant correlations, but both passion-grit ( $r = .604$ ,  $p = .064$ ) and grit-mindset ( $r = .626$ ,  $p = .053$ ) were strong. Passion-mindset ( $r = .200$ ) was much smaller and also not significant.

Results showed significant and strong correlations mainly between passion-grit for the group as a whole and within some groups, but only passion was significantly different between some of the groups.

*Keywords: Passion, Grit, Mindset, American Football, Achievement, Performance, Elite, Junior.*

## Sammendrag

Denne studien hadde som formål å undersøke sammenhengene mellom de ulike psykologiske faktorene lidenskap (passion), viljestyrke (grit) og tankesett (mindset) hos amerikansk fotball spillere i Norge, og om disse viste korrelasjoner til atletens ferdighetsnivå. Innsamling av data skjedde gjennom nettbasert spørreskjema som ble sendt til de ulike lagene. Studien hadde totalt 60 deltakere, 59 menn og én kvinne, der gjennomsnittsalder var 22.14 år (SD = 7.24), fra fire ulike grupper delt ut fra ferdighetsnivå og alder: Eliteserien (N = 13) (Elite), D1 Senior Herrer (N = 20) (Division 1), D2 Senior Herrer (N = 17) (Division 2), og U-16 (N = 10) (Junior-16).

En «Passion-scale» med åtte spørsmål ble brukt for å måle lidenskap. Grit-S med åtte spørsmål ble brukt for å måle viljestyrke. «Theories of Intelligence Scale» (TIS) med åtte spørsmål ble brukt for å måle tankesett. Resultatene viste at Elite skåret høyest i lidenskap og viljestyrke, og Division 2 skåret høyest på tankesett. Signifikante forskjeller i lidenskap ble funnet mellom Elite og Junior-16. Signifikante forskjeller for hele gruppen samlet ble kun funnet for lidenskap-viljestyrke ( $r = .462$ ,  $p < .001$ ), og ikke for noen av de andre faktorene. Elite: Signifikant korrelasjon kun for lidenskap-viljestyrke ( $r = .796$ ,  $p < .001$ ), og ikke for lidenskap-tankesett ( $r = .287$ ) eller viljestyrke-tankesett ( $r = .378$ ). Division 1: Signifikant korrelasjon kun for lidenskap-tankesett ( $r = .497$ ,  $p < .05$ ), og ikke for lidenskap-viljestyrke ( $r = .109$ ) eller viljestyrke-tankesett ( $r = .071$ ). Division 2: Ingen signifikante korrelasjoner for noen av faktorene lidenskap-viljestyrke ( $r = .284$ ), lidenskap-tankesett ( $r = .074$ ), eller viljestyrke-tankesett ( $r = -.152$ ). Junior-16: Ingen signifikante korrelasjoner, men bade lidenskap-viljestyrke ( $r = .604$ ,  $p = .064$ ) og viljestyrke-tankesett ( $r = .626$ ,  $p = .053$ ) viste sterke korrelasjoner. Lidenskap-tankesett ( $r = .200$ ) var mye svakere og heller ikke signifikant.

Resultatene viste sterke og signifikante korrelasjoner i hovedsak mellom lidenskap-viljestyrke for hele gruppen samlet og innad i noen av gruppene, men kun lidenskap viste en signifikant forskjell mellom noen av gruppene.

*Nøkkelord: Lidenskap, Viljestyrke, Tankesett, Amerikansk fotball, Prestasjon, Ytelse, Elite, Junior.*

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## Introduction

American football has gone from being only popular in the US to becoming one of the most viewed sports in the world with over 200 million people watching the Super Bowl – the sports main attraction – in 2022 (NFL, 2022). The sport is expanding rapidly across US borders into different corners of the earth, likely because of the globalization of today's society which offers the chance to follow different teams and players – and the sport itself – through television, computers, smartphones, and entertainment in social media from anywhere you might desire. This is how the NFL (National Football League) sells their product – American football – to eager viewers across the world, and with the rising interest comes a growing amount of money, which then again attracts more athletes who want to earn this money by putting their skills on display. The skills of an athlete are in many ways a measure of their worth, and even though the game operates as a team game – the individual element of the sport emphasizes the importance of a player's personal skill set. This raises the questions as to why some athletes are better than others, how they achieved their current level of skill, and how it is possible for some of the best athletes in the world to remain at the highest level over vast amounts of time.

Some factors that appear to be important in the sport include grit (Duckworth et al., 2007), passion (Sigmundsson et al., 2020a; Vallerand et al., 2008; Vallerand, 2010), and mindset (Dweck, 1995; Dweck, 2016). These factors are therefore of great interest when studying athletes at a high skill level, and thereby trying to figure out what separates them from others that never reach the same peaks. By acquiring more extensive knowledge on this matter we can form an understanding of how to help develop younger athletes in such a way that they will be able to excel in their sport. These questions about psychological factors and their involvement in top-level athletes have sparked the interest of researchers, but studies on American football have been scarce – which is why this study aims to examine some of these factors and the role they play in many of the most successful and skilled athletes in American football in Norway.

This study will examine the potential differences between four separate divisions in the Norwegian American football league when it comes to passion, grit and mindset. The focus will be on the roles of passion, grit and mindset in the sport, and possible correlations between these factors and the athletes' skill level/division.

## Theory

### Passion

Having passion in life, as well as while doing sports, is important and can contribute to happiness in what we do and be a guidance in finding activities that we enjoy (Vallerand et al., 2003). Passion can be defined as an activity that people have a strong inclination towards, which they find important, and something in which they would like to invest their time and energy (Vallerand et al., 2003). Becoming an expert in something is although not only dependent on passion. There also needs to be a deliberate practice present. Deliberate practice was by Ericsson et al. (1993) described as a highly structured activity which is motivated by one's desire of improvement, which is a prerequisite for being able to reach top levels of performance in a desired area. The optimal foundation for skill acquisition can be obtained with a mix of deliberate practice, getting to know the relevance of your results, immediate feedback, and mentorship (Vallerand et al., 2008). Passion plays its part by being one of the reasons why some people end up spending vast amounts of time, blood, sweat and tears in an area or activity (Sigmundsson et al., 2020b). This passion will oftentimes be visible for those around you, and therefore can also work as a motivator for them as well as yourself. A prime example of this can be through team sports where it traditionally is associated with leadership, often in form of a captain role where the captain needs to keep their head cool, stay emotionally stable, and encourage the rest of the team (Kim et al., 2018). Their responsibility is being able to make sure that every player does their job, but at the same time also making sure that teammates get back up after mistakes and do not lose faith. This illustrates the importance of passionate individuals, especially in team sports (Kim et al., 2018).

Sense of immersion is also something that relates to real passion (Jachimowicz et al., 2018), which furthermore also ties into Vallerand's Dualistic Model of Passion (Vallerand et al., 2003). The model describes two types of passion: Obsessive passion (OP) and harmonious passion (HP). Obsessive passion is described as an internal pressure – an uncontrollable desire for an activity – where the person is incapable of seeing the potential consequences of their actions. In this case the passion is the controller of the person, instead of the person controlling their passion. This can therefore often turn activities driven by OP to cause negative emotions, health problems, frustration, or rigid persistence (Vallerand et al., 2003; Curran et al., 2015). On the other hand, harmonious passion is by Vallerand et al. (2003) portrayed as a significant, motivational, and controllable action that occurs with an

autonomous internalization. Harmonious passion has a positive aspect because it's experienced in a setting that harmonizes with life (Vallerand, 2010). Perks of harmonious passion include multiple in-task benefits such as cognitive-emotional management, flow, vitality, deliberate practice, and performance (Curran et al., 2015). HP was positively associated with self-realization and life-satisfaction, while OP was negatively related to self-realization and unrelated to life-satisfaction (Lafrenière et al., 2009). Curran et al. (2015) also showed that HP seemed to correlate with vitality and life-satisfaction in collectivistic cultures, whereas it showed negative or no correlations to these factors in individualistic cultures.

Both HP and OP play an important positive role in the relationship between passion and performance (Vallerand et al., 2008). A person's performance was found to be impacted by both types of passion together with deliberate practice. HP and OP are both to be considered as driving forces behind motivating positive outcomes in performance, but they play different roles (Vallerand et al., 2008). The predictor for mastering goals – and in essence deliberate practice – was HP, and while OP also predicted this, the prediction of subjective well-being (SWB) was negatively associated with OP, while it was positively associated with HP. Both OP and HP are therefore considered to be sources for motivation when it comes to positive results in performance (Vallerand et al., 2008), but things can go sour if the obsessive part ends up being self-defeating.

Furthermore Vallerand et al. (2008) suggested two paths towards performance attainment in sports – one through HP and one through OP. Path number one is through HP and focuses purely on mastering a skill. Through their work on skill improvement – by utilizing deliberate practice – the athlete should eventually get to a higher level of skill than what they previously had (Ericsson et al., 1993). This process – because it was tied to HP – would also cause the athletes subjective well-being to stay good throughout the whole process. When doing something for a longer period of time this can be an important factor. Path number two through OP shows a more dualistic result, where both skill mastery but also maladaptive performance-avoidance behaviours could be the result. Obsessive passion brings a poor subjective well-being, which in other words shows a lack of enjoyment from doing the activity (Vallerand et al., 2008). This does not mean that skill mastery is unattainable through OP, but the athlete would suffer from the cascade of effects poor well-being has on other life pursuits. This is why harmonious passion is encouraged when it comes to passion in sports, enabling both a happy life and successful endeavours in sports (Vallerand et al., 2008).

This study will use a passion scale introduced by Sigmundsson et al. (2020b) which focuses on passion for achievement – excelling in different skills or activities. The definition of passion used for this scale comes from Jachimowicz et al. (2018) where passion is defined as “a strong feeling toward a personally important value or preference that motivates intentions and behaviours to express that value or preference”. Research concerning development and learning suggest that to become skilful in something one should put emphasis on practice, experience and specificity (Edelman, 1993; Ericsson et al., 2007; Gottlieb, 1998). Hours upon hours of commitment, deliberate practice, and blood sweat and tears are therefore often some of the things required to be able to become an expert in something (Ericsson et al., 2007). Some of the test items in the scale are therefore designed in such a way that they show the effort, commitment and involvement that the subject expresses towards something they deem important (Sigmundsson et al., 2020b). The scale also measures some mental and psychological perspectives such as positive attitude, positive self-perception, and underlying motivation, because science has shown these to be of importance when it comes to learning and developing skill and competence (Ericsson et al., 2007). The passion scale is in other words relatively new but has shown great validity and reliability, and already been applied in studies such as Sigmundsson et al. (2020a) which examines passion, grit and mindset in football/soccer players, which therefore makes it suitable when examining these factors in American football as well.

When it comes to passion in American Football, there are many different great players that could be mentioned. One of them is Cam Newton (Former Quarterback for New England Patriots & Carolina Panthers), who starts his days at 4 AM with a workout, and after a full day of practice, meetings, and other things related to the sport, goes to bed at 11 PM – just to repeat this process over and over each day (Patriots Wire, 2020). The famous Tom Brady (Quarterback for Tampa Bay Buccaneers) on the other hand has played in the NFL for 22 years after being drafted as the 199<sup>th</sup> player, won more Super Bowls than any other player, retired once from the sport just to un-retire a few months later, and still manages to play at the highest level the sport has to offer. It is therefore obvious that passion is one of the similarities that the top players in the NFL (National Football League) share, whether it be obsessive or harmonious. This passion might even be a necessity to even make it into the NFL, seeing as only 1.6% of collegiate players end up being drafted by an NFL team (NCAA, 2020), and many of these usually won't even be on the team the next year. An NFL career is on average roughly 3.3 years (Statista, 2019), with different playing positions experiencing different

levels of physical taxation on their bodies. Kickers usually experience the least taxation and therefore have an average NFL career expectancy of 5 years, while one of the more strenuous positions is the Running Back with an average NFL lifespan of 2.5 years (Statista, 2019). Being able to maintain an NFL career longer than this shows that you either have an above average skill level, you manage to stay healthy by avoiding injuries for most of the time, or you possess this inner drive to keep going no matter what. In this area passion might resemble something we know as grit (Vallerand et al., 2008; Duckworth et al., 2007). This paints a picture of the close relationship between passion and grit – especially in sports.

## **Grit**

Grit differentiates from passion by stretching across all activities, while passion usually revolves around specific activities (Curran et al., 2015). The term sparked the interest after being introduced by Angela L. Duckworth (Duckworth et al., 2007), especially with people involved in sports and education, where it has turned into a hot topic. Duckworth defines grit as the passion and perseverance for long-term goals, maintaining an effort and interest to work towards a challenge and to persist in the face of adversities and plateaus in progress (Duckworth et al., 2007). Grit – just like passion – is often made up of two underlying factors: consistency of interest (CI); the individual's tendency to maintain the interest in the same goal-pursuit over time, and perseverance of effort (PE); one's ability to handle adversity through and effort (Duckworth et al., 2007). In situations where people get disappointed from failures or start losing interest in large amounts of deliberate practice, the grittier individuals are the ones who push through and manage to keep going. Duckworth even argues that grit plays as big of a role as talent does when it comes to being successful in your field, both in academics and sports. One of the characteristics of grit is that it focuses on long-term goals and achievements, rather than short-term success. Grit has been compared and overlaps in some ways to one of the traits of Costa & McCrae's (Costa & McCrae, 1999) Big Five model – Conscientiousness – which has shown great predictive power when it comes to positive academic achievements, although often in shorter time periods compared to grit (Duckworth et al., 2007). The correlation between grit and conscientiousness was by Credé et al. (2016) shown to be strong. In other instances where the need for positive feedback and deliberate practice would be of importance, as seen in passion, a gritty individual who strives for a long-term goal would not steer off their path just from the lack of this form of feedback. Gritty individuals do not require constant positive feedback, which is another area where they

differ from others chasing success and accomplishments (Duckworth et al., 2007). These individuals are often more hardworking and determined than people scoring lower on grit, and therefore also less likely to lose track of the goal they are pursuing. This gritty behaviour should in other words be preferred in both academics and with competitive athletes (Tadesqui & Young, 2017). Grit's relationship with performance was by Jachimowicz et al. (2018) shown to be important. The importance of passion in predicting performance was after the arrival of grit slightly overshadowed, but Jachimowicz et al. (2018) pointed to the role of passion in grit as being of such an importance that it is crucial that both be remembered and taken into consideration when viewing performance as a whole. Credé et al (2016) on the other hand argued that the construct validity of grit showed that its use should lie in predicting perseverance rather than performance.

Science has shown strong relationships between passion and grit in age groups from 14 to 53 years (Sigmundsson, 2021), which further advocates for the importance of both passion and grit when it comes to high level performance and achievement. Another sign of grit playing an important part is the amount of grit seeming to increase with age, until a certain threshold (Duckworth et al., 2007; Duckworth & Quinn, 2009; Sigmundsson, 2021). This furthermore helps promoting the essence of the concept's long-term view. Other results have shown differences between groups of CrossFit athletes, where novices scored lower on grit than their intermediate counterparts (Cazayoux & DeBeliso, 2019). Tadesqui & Young (2017) also portrayed this sentiment with their findings in deliberate practice where athletes on an Expert/Advanced level scored much higher on grit than Basic/Intermediate athletes.

Oftentimes resilience is used interchangeably with grit when we think of individuals returning from adversity and struggles (Beck & DeBeliso, 2020). The concept of empowerment is also in ways connected to resilience, and together they represent the work of an individual in overcoming something or staying true to their course (Riemer et al., 2020). In situations where empowerment is the goal, resilience is needed as well (Brodsky & Catteano, 2013), which is how Brodsky and Catteano's TMER (Transconceptual model of Empowerment and Resilience) came to life. This model shows the close connection and dependence between empowerment and resilience, and because resilience is so closely connected to grit the model can arguably prove beneficial in work with athletes (Gupta & Sudhesh, 2019; Beck & DeBeliso, 2020).

To be able to play American football at a high level – such as the NFL – Beck, a former NFL Quarterback, and DeBeliso make the argument that you would need to possess



high amounts of grit (Beck & DeBeliso, 2020). Playing the position of a Quarterback (QB) requires an athlete to have extensive knowledge of the game, possessing a peak physical skill set, while also having cognitive capacities and split-second decision making on a very high level. When it comes to this exact measure of split-second decision making, a study by Larkin et al. (2015) showed that soccer players who scored higher on grit would make better choices in situations where split-second decisions were required, as well as having a better situational analysing awareness overall. Hours upon hours of deliberate practice will have to have been conducted by athletes to reach this level of skill, and together with their elite mental and emotional capabilities, and understanding of the game, the individuals that have shown great resilience and grit at the ones that stand out from the rest (Beck & DeBeliso, 2020). The Quarterback is often the player to stand out on a team, and one could make the argument that a QB possibly has the most complex job of any athlete in professional sports.

Beck and DeBeliso have been studying players in American football for a long time, and most recently with their “Flippen Profile” (Beck & DeBeliso, 2020) measuring tool. This tool is used to measure a QB’s beliefs of themselves, and with the help of the measuring tool determine scores on some 5 grit-like constructs: Urgency and intensity, endurance, self-confidence, need for encouragement, and self-criticality. High scores on urgency and intensity, self-confidence, and endurance were deemed to be ideal, while low scores on need for encouragement and self-criticality were desirable (Beck & DeBeliso, 2020). Self-confidence has, as the only of the positive loaded constructs, shown a very consistent positive correlation with successful performance for athletes in sports (Feltz, 2007), and more specifically also in American football (Ekmekçi & Miçooğulları, 2018). This might not come as a surprise, as most people would assume that a person playing sports at a high level needs to have high sense of self-confidence to be able to believe in themselves and thrive in such a setting. Furthermore, some of the constructs with preferred lower scores – need for encouragement and self-criticality – showed to have possible negative effects on athletes. Players who score high and exhibit issues with self-criticality could perceive critique from others as personal attacks, which again can lead to overthinking and having problems letting go of previous mistakes (Beck & DeBeliso, 2020). Such a behaviour only fosters further problems, and in the long term could be the root of decreasing performance levels and poor confidence. To portray the opposite – a player scoring low on self-criticality would end up not being negative and too judgemental of themselves, while also not doubting their own ability to perform at a high level (Beck & DeBeliso, 2020). When it comes to the need for

encouragement a player scoring high would require constant reassurance and help, ultimately leading to a self-defeating and disappointment-avoiding behaviour. By not taking risks and setting yourself up for situations with possible failure, you deprive yourself of a potentially higher skill ceiling and the opportunity of bigger achievements. This need for encouragement, a form of instant feedback, could in excessive forms therefore be seen as a hinderance for an athlete. Seeing as instant feedback is not a necessity in grit as a trait, Beck and DeBeliso (2020) argued that low scores on the need for encouragement should be advantageous when trying to predict grit in a Quarterback.

Through their study Beck and DeBeliso (2020) showed that NFL Quarterbacks displayed remarkably high levels of grit. They grouped the QB's into three groups, divided by age of experience in the NFL: 1-2 years, 3-7 years, and 8+ years. The grit scores showed increase with number of years of experience, which supports findings from other studies that show the importance of age in grit (Duckworth et al., 2007; Sigmundsson, 2021). Age did also seem to have an effect when it came to endurance, where the veteran group scored the highest – not unexpected seeing as they had the most years of experience (Beck & DeBeliso, 2020). Both the youngest and oldest groups scored high when it came to urgency and intensity, which could perhaps be contributed to the need to win big before finishing their career for the veterans, while the younger players had a need to prove their worth to their team. The next construct – self-confidence – showed eerily similar results between the older and younger group, which by the authors was argued could come from the younger players taking the test after being one of the better players on their college teams, and therefore soaring high on confidence – while veteran players already were aware of their skillset and prior accomplishments in the league, therefore also having good self-confidence (Beck & DeBeliso, 2020). Need for encouragement showed negative correlations with years of experience, which makes sense seeing as a player would need less reassurance if they were a veteran and knew how things worked. A rookie QB on the other hand would need to learn the ways of the league and get adapted to the higher level of play (Beck & DeBeliso, 2020). Lastly, self-criticality did not show any strong correlations with years of experience, beside some somewhat lower scores with the youngest QB's – which again could be attested to their recent exit from a solid college career. Another construct that has shown scientific correlation with grit in college players is self-regulation (Gupta & Sudhesh, 2019), which also turned out to be a source for resilience. This also helps reinforce the connection between resilience and grit.

In the end, through the fact that only a handful of all college players who declare eligible for the draft actually end up reaching the NFL, there certainly must be something different about the ones who manage to do so. Beck and DeBeliso's (2020) results, explicitly concerning Quarterbacks, show us that players with the higher amounts of experience in years played (veterans) tend to demonstrate the highest scores when it comes to grit. Starting development of grit-like qualities in early stages does therefore seem to be an advantageous choice for any athlete – particularly if you are hoping to become an NFL Quarterback (Beck & DeBeliso, 2020).

### **Mindset**

Once students start attending college or begin taking part in high level sports, many of them start feeling the weight of the challenges and occasional hardships that come with these endeavours. Some end up dropping out of their studies or quitting their sport, which might be caused by a lack of support or simply other experiences that make persevering difficult for the individual (Hochanadel & Finamore, 2015). Because grit is the passion and perseverance for long term goals (Duckworth et al., 2007), society would benefit from putting more emphasis on helping students and athletes learn about grit and its benefits. A way of doing this can be to teach them about a growth mindset (Dweck, 2016; Dweck et al., 1995). Through her research, Carol Dweck concluded that there are two types of mindsets a person can have regarding their talents and abilities. People who possess a fixed mindset believe that no matter what there is no way of changing their talent and abilities for the better – they believe their intellect is fixed and beyond their control (Dweck, 2006; Dweck, 2016). A person possessing a growth mindset has the belief that there is a way for them to alter their talents and abilities for the better by working hard and deliberate, getting help from others, and being patient. Humans do not inherently have the same potential, as we are bound to a biological framework, but as long as you try to make progress and have a desire to improve on your talent you will be able to positively keep building on what you are given (Dweck, 2016).

The presence of a growth mindset can be observed by looking at countless of the world's greatest athletes. Many strive for constant improvement and keep trying to better themselves in any way possible, just to get the slightest edge over their competition. These thoughts and actions prove the existence of a growth mindset in these individuals (Dweck, 2016). Furthermore, the impact of a fixed mindset versus a growth mindset can very easily be shown through many different lifestyle choices. Imagine you are given two tasks, a fairly easy

and doable task, and a challenging one that provides a learning experience. A person who possesses a fixed mindset would preferably choose the easy task – because they know they would be able to execute it, while also making it look easy. The individual with a growth mindset would attempt the challenging task knowing it could prove to be harder, but in the end the potential of learning something new would also be a reward in itself (Dweck, 2016).

This brings us to Dweck's three proposed rules for mindset (Dweck, 2016). Number 1: The difference between a growth mindset and a fixed mindset comes from the fixed mindset wanting to show its talent, by doing something it knows how to do – while the growth mindset focuses on learning, learning, and learning. Number 2: A fixed mindset does not want to work too hard and too much – it believes that the talent is given to them, and therefore working for it is unnecessary. If you had to work hard you were arguably not that talented to begin with. A growth mindset on the other hand argues that you should work with a dedicated passion towards what you are doing, because effort is key. For talents and abilities to evolve you need to work hard, put in the effort, and reap the benefits of the journey. With a growth mindset the journey can be hard, but it is something you enjoy doing (Dweck, 2016). Number 3: The shortcomings and inadequacies in a fixed mindset are disguised and justified as being out of your control, instead of using them as learning experiences such as in a growth mindset. Therefore, it comes easy for people with a fixed mindset to make up excuses about how they were not good enough to do something, instead of admitting that they would have to work harder to get it done. After all, your talent is the best it can be, and therefore you surely cannot be the reason that things did not go the way you planned. Looking down on others that did worse than yourself, and not being able to learn from failure can often be a characteristic of a fixed mindset (Dweck, 2016). This is where a growth mindset pushes you to learn from your mistakes, acquire knowledge, and use this newfound knowledge to motivate and push yourself forward.

Teaching others about a growth mindset can be especially useful when working as a coach or mentor for others, be it athletes or just students in general. These are people, especially in early phases of their journeys, are particularly prone to faltering in challenging situations and thereby losing faith in their ability to achieve what they desire. Therefore, having a person to teach them about personal growth through perseverance and passion is particularly important, and through this we can help a person develop grit – which then again can help alter their perception about their potential, and in such a way promote a growth mindset. When it comes to development of grit, creativity and grit have been shown to be held

back – specifically in academics – by extensive focus on testing (Hochanadel & Finamore, 2015). Learning about growth mindset and the ability of further personal growth for just a short amount of time has, by Dweck and her colleagues, been shown to be sufficient in improving grades of students (Yeager et al., 2019; Yeager & Dweck, 2012). Seeing as development in humans is not just dependent on learning theory, but also applicable through practice, the argument could be made that the same also goes for athletics. This tells us that coaches' lessons thought to athletes may prove to be of significant importance when it comes to the development of the athlete, specifically concerning the development of a growth mindset. In their doctoral dissertation on American football players in college – Sproull (2016) concluded that the NCAA (National Collegiate Athletic Association) should focus on playing a bigger role in the encouragement and aiding of collegiate athletes when it comes to fostering a growth mindset. This would likely not only help them in their athletic endeavours, but also impact their academic and mental strength, which in turn bolsters the life outlook of many student athletes who do not end up making a living out of their athletic journey.

This once again shows that coaches play a vital role when it comes to teaching the importance of mindset to athletes, and preferably as early in the process as possible. If a player entering the NFL has not learned about these concepts already, it should be of utter importance to make sure they are thought as quickly as possible. This teaches them to learn from their mistakes, take feedback as constructive, adapt to situations, and most importantly keep evolving in their journey of playing American football at the highest level. Athletes who possess this growth mindset will also more likely be able to understand their coaches and adapt to any given feedback in a more beneficial way (Dweck, 2016). By praising the effort put in through an athlete's performance – rather than the achievement itself – you can help them towards a growth mindset. Through placing focus on the learning process and the possibility for improvement, and less on the talent of the athlete, the athlete can be kept from going into a state of fixed mindset (Dweck, 2016). This can also further be done by tutoring young students and athletes about the neural plasticity of the brain, especially when it comes to the process of learning something. These teachings have proven to be useful when aiming to pursue a growth mindset and bolster the individual's motivation and hunger for achievements (Dweck, 2016). Believing in the idea of a growth mindset is an important sidenote when considering a coach's teachings to their athletes. It would probably be less than ideal if a coach who possessed a fixed mindset tried to teach something they did not believe in themselves. After all, there is a difference when it comes to being a mentor and being a talent

evaluator, which often times can appear as a blurred line. A solid team spirit and teamwork is more likely to come as a result of a coach with a growth mindset teaching the importance of working together, than by a fixed mindset coach believing in individual talent. After all, working together as a team is more advantageous compared to individual talent (Dweck, 2016), in particular when playing a team sport such as American football.

### **The aim of the current study**

Previous research shows the presence of various psychological factors in both academics and athletics. Passion, grit and mindset have all been argued to play an important role in a person's journey to achieve greatness and success (Duckworth et al., 2007; Sigmundsson et al., 2020a; Vallerand, 2010; Dweck, 2016). This raises further questions about the usefulness of these factors in different fields and activities, and the importance of each of them on their own and combined together. Observing correlations and checking for differences in athlete's skill when it comes to these factors is therefore of great interest. The study's research questions therefore are as follows:

1. Are the factors passion, grit and mindset different for each of the groups?
2. What is the relationship between these factors, for the group as a whole and for every group on their own?

## **Method**

### **Participants**

The data sample consists of 60 players from different American football clubs in Norway. Out of these 60 there were 59 males and one female, ranging from age 14 to 51, with a mean age of 22.14 (SD = 7.24). The four divisions that are included are the only four divisions in the official Norwegian league, and therefore Eliteserien (Elite) would be considered the highest level of play followed by D1 Senior Herrer (Division 1), D2 Senior Herrer (Division 2), and ultimately U-16 (Junior-16). During the 2021 league year there were 4 teams represented in each of the top three levels: Elite, Division 1, Division 2. A total of 5 teams were participation in Junior-16. All data was collected over a two-month period after the conclusion of the league year.

**Inclusion criteria**

Any player that had competed in one of the four Norwegian divisions during the previous season (2021) would qualify for participation. The participants reported affiliation with one of four divisions in the Norwegian American football league; Elite, mean age 25.36 (SD = 9.17); Division 1, mean age 23.41 (SD = 4.98); Division 2, mean age 23.33 (SD = 7.73); or Junior-16, mean age 15.00 (SD = 0.67). To be included in the sample the participants had to complete the whole online self-reporting questionnaire.

**Exclusion criteria**

Answering all the required questions was a necessity to make use of the data, and by not answering sufficient questions from the questionnaire a total of 9 participants were excluded.

**Procedure**

By looking at which teams played in the four leagues during the 2021 season the researcher was able to contact some of the relevant teams via e-mail and some through connections directly with former coaches and players. The club-representatives were informed about the study and approached with questions regarding the availability of participation from their player base. Some teams expressed interest in participation and were sent the link to the online questionnaire to distribute it among their players. The data was collected through a self-reporting online questionnaire (Nettskjema, 2022) (see Appendix 1.1) containing some basic information in addition to a passion scale, grit scale, and mindset scale. The questionnaire was in Norwegian, and players could complete it in their own time and place. During the introduction of the questionnaire, players were informed about confidentiality, the anonymity of answering the questionnaire, and the possibility of withdrawing at any point. Knowing which teams had players filling out the questionnaire is impossible due to the anonymity and voluntary participation of the subjects. The participants did not receive any compensation for their participation, but the club-representatives that agreed to distribute the link to their players were promised a written conclusion of the study's results once they were published. Since the study was completely anonymous and did not collect any data that warranted special approval, there was no need to apply for permission from REK or NSD – and therefore also no ethical issues or extensive participant care to report.

## Variables and analyses

### Passion scale

To assess participants' level of passion related to achievement Sigmundsson, Haga and Hermundsdottir (2020b) 8-item passion for achievement scale was used. The participants rated the items based on a 5-point Likert scale ranging from "Ikke meg i det hele tatt" (Not me at all) to "Veldig typisk meg" (Very much like me). The scale contains items such as "Jeg er arbeidsom nok til å oppfylle mine mål" (I work hard enough to fulfil my goals) and "Min lidenskap er viktig for meg" (My passion is important to me). The maximum score of 5 indicates being extremely passionate, whereas the lowest score of 1 indicates not being passionate at all. This scale showed a good internal consistency with a Cronbach's alpha of .86, good test-retest correlation with a total score of .92 between them, and Sigmundsson et al. (2020b) also noted correlations with the total score in the range of .51 - .69.

### Grit-S scale

The participants level of grit was measured using the Grit-S (short grit scale) developed by Duckworth and Quinn (2009). This scale also contains 8 items, with two subscales measuring 4 items each on Perseverance of Effort (POE) and 4 items on Consistency of Interest (COI). An item from POE: "Jeg fullfører alt jeg påbegynner" (I finish everything I start), and from COI: "Noen ganger distraherer nye ideer og prosjekter meg fra tidligere prosjekter" (Sometimes new ideas and projects distract me from previous ones). Participants used a 5-point Likert scale ranging from "Ikke meg i det hele tatt" (Not me at all) to "Veldig typisk meg" (Very much like me) to rate how true each item is for them. Scores from COI-items would be reversed to cause an order where obtaining higher total scores equals higher amounts of grit. The Grit-S scale has been shown to have good internal consistency with Cronbach's alpha values of .84 and .82, in addition to solid test-retest stability, and predictive and consensual validity (Duckworth & Quinn, 2009).

The Norwegian edition of Grit-S stems from Sending (2014) which showed strong correlations of .89 between the Norwegian and English translations when answered by bilingual respondents.



## **Mindset scale**

The scale used to measure mindset is a Norwegian version (Bråten & Strømsø, 2004) of Dweck's (1999) Theories of intelligence scale, TIS for short. It focuses on the idea that the respondent should focus on thoughts about their own intelligence rather than the general consensus around what intelligence is how it works. The scale consists of 8 items, which are rated on a 6-point Likert scale from 1 - "Svært enig" (Strongly Agree) to 6 - "Svært uenig" (Strongly Disagree). The scale is divided into items that concern either incremental theory (growth mindset) or entity theory (fixed mindset). An example of an entity item from the scale: "Intelligensen din er noe ved deg som du ikke kan endre særlig mye" (Your intelligence is something about you that you can't change very much), and an incremental example: "Selv ditt grunnleggende intelligensnivå kan du endre betraktelig" (You can change even your basic intelligence level considerably). The items from incremental theory are reversed to create a system where a higher total score shows a participants' belief in a growth mindset, in other words the possibility of altering your intelligence in a positive way.

The internal consistency (Cronbach's alpha = .85) of the scale comes from Dweck, Chiu & Hong (1995). Good construct validity and test-retest reliability were also shown. The Norwegian version by Bråten & Strømsø (2004) showed a Cronbach's alpha for incremental items (.88) and entity items (.86), and also proved to be reliable.

## **Statistical analysis and assumptions**

IBM SPSS Statistics 28.0 for Windows (IBM Corp., Armonk, N. Y., USA) was used to conduct the different statistical analyses. To verify the validity and reliability of the questionnaire items used in each variable a reliability analysis was conducted, and Cronbach alpha values were extracted. Descriptive statistics were used to give a clear overview of the variable means (passion, grit and mindset), standard deviations in the sample as a whole, and within the different groups. To check for relationships between the variables several bivariate correlations were performed. Lastly a One-Way ANOVA in addition to an independent t-test was used to determine if there were any significant group differences in the mean levels of the variables.

A test of normality (Kolmogorov-Smirnov & Shapiro-Wilk) with histograms and Q-Q plots was performed to check the normal distribution of the variable's passion, grit and mindset. The results of the K-S & S-W were significant for all variables,  $p < .05$ , and

therefore normal distribution cannot be assumed solely by the results from this test. From looking at the Q-Q plots for passion and grit it was apparent that the datapoints were relatively close to the expected value line with a few mild outliers, and boxplots also showed a few outliers beyond the standard deviation. The Q-Q plot and boxplot for mindset showed an extreme outlier with the lowest possible total mindset score. The decision was made to remove this outlier from the dataset based on recommendations from Pallant (2020), although an argument could be made for normalizing its value. This would require us to potentially interfere with an already small and sensitive dataset, which was therefore avoided.

Passion had a skewness z-score of -2.85 and kurtotic z-score of 1.37. Grit had a skewness z-score of -3.18 and kurtotic z-score of 2.32. Mindset had a skewness z-score of -1.40 and kurtotic z-score of -1.28. The skewness scores from passion and grit suggest that the data is slightly tilted towards higher scores, and not so much lower ones like the score from mindset. The information gathered from the kurtotic values also suggests a relatively peaked distribution (Pallant, 2020) for passion and grit, rather than a flatter one for mindset, which is also what is shown in the histograms. These numbers can in large part be attributed to the small sample size in this study, and therefore show the importance of a larger sample size for future research (Field, 2013; Pallant, 2020). Seeing as all of the variables are measured with a Likert scale (either 5-point or 6-point), their respective datapoints are not straying too far from the expected value, and by looking at the histograms; there can be made an argument that there is a slightly skewed normal distribution, but within reasonable measures considering our sample size (Field, 2013; Pallant, 2020). The study therefore continues with the assumption of a normal distribution, but for the sake of this study the researcher chose to additionally compute a set of Kruskal Wallis and Mann-Whitney tests (non-parametric counterparts to One-Way ANOVA and independent t-test) because of our small sample size and excessive presence of skewness and kurtosis – which might cause slight disturbance in our original analyses. The non-parametric analyses showed same results as the parametric ones and will therefore only be addressed during the section for limitations.

Correlation magnitudes are described using the following thresholds: 0.0-0.1, trivial; 0.1-0.3, small; 0.3-0.5, moderate; 0.5-0.7, large; 0.7-0.9, very large; and >0.9, nearly perfect. Cohen's *d* (Cohen, 1988) (standardized effect) was received from the results of the independent t-test, and the following thresholds for effect size were used: < 0.2, trivial; 0.2, small; 0.5, moderate; > 0.8, large.

## Results

### Reliability analysis

The reliability analysis showed good validity and reliability with the items used, and Cronbach's alpha for passion  $\alpha = .776$ , for grit  $\alpha = .771$ , and for mindset  $\alpha = .908$ . These results match previous studies where the scales originate (Sigmundsson et al., 2020b; Duckworth & Quinn, 2009; Dweck et al., 1995).

### Descriptive statistics

Descriptive statistics were derived from the group as a whole and on each individual level. Age did not show any significant correlation with mean total score in either passion ( $r = .183$ ), grit ( $r = .144$ ) or mindset ( $r = .043$ ) for the group as a whole. Table 1 shows the mean and standard deviations for the group as a whole, Elite, Division 1, Division 2 and Junior-16. Elite shows higher means in passion and grit, while Division 2 scores the highest in mindset. Junior-16 has the lowest mean score in passion, grit and mindset.

**Table 1**

*Mean and standard deviation for passion, grit and mindset for the group as a whole and players from Elite, Division 1, Division 2 and Junior-16.*

	Group as whole (N = 60)	Elite (N = 13)	Division 1 (N = 20)	Division 2 (N = 17)	Junior-16 (N = 10)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Passion	4.39 (.45)	4.56 (.52)	4.39 (.27)	4.35 (.58)	4.22 (.36)
Grit	3.51 (.63)	3.71 (.72)	3.49 (.53)	3.49 (.58)	3.33 (.78)
Mindset	4.55 (.95)	4.43 (1.05)	4.66 (.90)	4.74 (1.03)	4.16 (.75)

*Note: Passion and grit are on a scale from 1 to 5, while mindset is on a scale from 1 to 6.*

## One-way ANOVA

To be able to uncover any significant patterns that could explain differences in mean variable scores between the four groups of playing levels, a one-way ANOVA analysis was conducted. The results of the one-way ANOVA, displayed in Table 2, showed no significant differences in mean scores for passion, grit and mindset between the four groups.

None of the variables in the one-way ANOVA violated the assumption of homogeneity of variance shown through Levene's test, which tests if the variance in score is the same for each of the groups. As an effect of the results seen in Levene's test the null hypothesis of equal population variances was not rejected. Further consultations of post-hoc tests such as Welch and Brown-Forsythe are therefore not needed in this situation, because the assumption of the homogeneity of variances was not violated (Pallant, 2020).

**Table 2**

*One-way ANOVA to measure between group differences.*

Variables		Sum of Squares	Df	Mean squares	F	Sig.
Passion	Between groups	.682	3	.227	1.130	.345
	Within groups	11.263	56	.201		
	Total	11.945	59			
Grit	Between groups	.886	3	.295	.738	.534
	Within groups	22.404	56	.400		
	Total	23.290	59			
Mindset	Between groups	2.566	3	.855	.945	.425
	Within groups	50.666	56	.905		
	Total	53.231	59			

*Note: The grouping variable is Playing Level – containing the four groups of participants.*

## Independent Sample t-test

The independent sample t-test showed significant differences between the groups: Elite ( $M = 4.56$ ,  $SD = 0.52$ ) and Junior-16 ( $M = 4.22$ ,  $SD = 0.36$ ) when it came to passion ( $t(21) = 1.744$ ,  $p < .05$ ,  $d = .733$ ). This shows Cohen's  $d$  with moderate magnitude, .733, of the differences in the means, (mean difference = .34, 95% CI [-.06, .74]).

### Correlation analyses

Several Pearson correlations were conducted to investigate the relationships between passion, grit and mindset on both a group level, but also in each individual level. From table 3 it is possible to see that the group as a whole showed significant correlations only between variables; passion-grit ( $r = .462$ ,  $p < .001$ , moderate correlation), and not passion-mindset ( $r = .224$ , small correlation) or grit-mindset ( $r = .176$ , small correlation).

**Table 3**

*Pearson correlation between passion, grit and mindset in the group as a whole (N = 60).*

	Passion	Grit	Mindset
Passion	1	.462**	.224
Grit		1	.176
Mindset			1

*Note:*

\* Significant at the 0.05 level (2-tailed).

\*\* Significant at the 0.01 level (2-tailed).

Elite showed a significant correlation between passion-grit ( $r = .796$ ,  $p < .001$ , strong correlation), but no significant correlation between passion-mindset ( $r = .287$ , small correlation) or grit-mindset ( $r = .378$ , moderate correlation). Elite group presented in Table 4.

**Table 4**

*Pearson correlation between passion, grit and mindset in the group: Elite (N = 13).*

	Passion	Grit	Mindset
Passion	1	.796**	.287
Grit		1	.378
Mindset			1

*Note:*

\* Significant at the 0.05 level (2-tailed).

\*\* Significant at the 0.01 level (2-tailed).

Division 1 showed a significant correlation for passion-mindset ( $r = .497$ ,  $p < .05$ , moderate correlation), but no significant correlations in passion-grit ( $r = .109$ , small correlation) or grit-mindset ( $r = .071$ , trivial correlation). Table 5 shows the results for the Division 1 group.

**Table 5**

*Pearson correlation between passion, grit and mindset in the group: Division 1 (N = 20).*

	Passion	Grit	Mindset
Passion	1	.109	.497*
Grit		1	.071
Mindset			1

*Note:*

\* Significant at the 0.05 level (2-tailed).

\*\* Significant at the 0.01 level (2-tailed).

Division 2 showed no significant correlations. The correlations for passion-grit ( $r = .284$ , small correlation), passion-mindset ( $r = .074$ , trivial correlation), and grit-mindset ( $r = -.152$ , small negative correlation) were all relatively small. The Division 2 group is shown in Table 6.

**Table 6**

*Pearson correlation between passion, grit and mindset in the group: Division 2 (N = 17).*

	Passion	Grit	Mindset
Passion	1	.284	.074
Grit		1	-.152
Mindset			1

*Note:*

\* Significant at the 0.05 level (2-tailed).

\*\* Significant at the 0.01 level (2-tailed).

For Junior-16 both passion-grit ( $r = .604$ ,  $p = .064$ , strong correlation) and grit-mindset ( $r = .626$ ,  $p = .053$ , strong correlation) were non-significant, but strong, nonetheless. Passion-mindset ( $r = .200$ , small correlation) was smaller and also not significant. Results for Junior-16 are displayed in table 7.

**Table 7**

*Pearson correlation between passion, grit and mindset in the group: Junior-16 (N = 10).*

	Passion	Grit	Mindset
Passion	1	.604	.200
Grit		1	.626
Mindset			1

*Note:*

\* *Significant at the 0.05 level (2-tailed).*

\*\* *Significant at the 0.01 level (2-tailed).*

## Discussion

The objective of this study is to get a better view of which, if any, of the psychological factors grit, passion and mindset play a role in the sport of American football in Norway – and if there are any distinguishing differences between these factors when comparing the skill levels of the athletes. The three different measuring scales were administered to the 60 participants – 59 males and one female – 13 from Elite (mean age: 25.36), 20 from Division 1 (mean age: 23.41), 17 from Division 2 (mean age: 23.33), and 10 from Junior-16 (mean age: 15.00). Age showed no significant results when it came to correlations with mean total scores for either of the three factors, and because there is such a skewed participation towards males in the sample there is no way to examine potential differences between males and females. American football is a sport that is currently predominantly popular among males, which is also something to take into consideration when interpreting the results as males have shown to have a higher relationship between passion and grit, and score higher in passion compared to females (Sigmundsson et al., 2020c; Sigmundsson, 2021; Sigmundsson et al., 2021), which arguably could be related to more active dopamine systems in males (Sigmundsson et al., 2021). Females on the other hand have shown higher scores in grit compared to males (Christensen & Knezek, 2014; Kannangara et al., 2018), and therefore having a more equal gender sample would absolutely be of great interest to check for similar findings in studies like this on American football.

### Passion

The scores on the passion scale were relatively high for all the four groups, ranging from 4.22 to 4.56. The Elite group showed the highest mean values for passion at 4.56 and means for passion declined steadily with playing level. These passion scores relate well to findings in Sigmundsson et al. (2020a) where Elite soccer players scored a mean passion score of 4.64, with total group range of 4.58 – 4.64. This is slightly higher than our lowest scores, but still higher compared to a passion mean score of 4.10 in Icelandic university students (Sigmundsson et al., 2020c). The reason for this difference could be that school and studying is seen by many students as work rather than something they are passionate about. With real passion comes a certain experience of loss of control, often referred to as flow (Vallerand, 2015), and this experience might not be as common in academics as in sports, or at least dependant on many more factors to be present for students to be able to engage in



specific passionate tasks (Csikszentmihalyi et al., 2014). Research supports the idea that to be excellent at something you need to have a lot of passion for what you do (Ericsson & Pool, 2016), and it is therefore perhaps not surprising that the players on the highest level of play have the highest passion scores. There was a significant difference between mean passion scores for two of the groups; the Elite group scored significantly higher than Junior-16. Similar findings were also made in Sigmundsson et al. (2022), which found that players with higher football competence scored higher in passion compared to those with lower football competence – which was also done by comparing Elite and Junior teams. The high passion scores for the Elite group also show that passion really could be a driving force at the highest level of the sport. The lowest mean passion scores in our study were found in the Junior-16 group, which also has an upper age limit (16 years), compared to no age limit in the other three groups. This fact could contribute to their low passion scores, as they might not yet have grown to become really passionate about their sport – which might come with age and experience.

Furthermore, Vallerand's Dualistic Model of Passion (Vallerand et al., 2003) should be taken into consideration when discussing the passion of these American football players, and for athletes in general for that matter. Doing something through harmonious passion promotes subjective well-being (Vallerand et al., 2008) and in many cases is the driving force behind a successful athlete (Ericsson et al., 1993). When seeking out a sport that has not yet become widely popular where you live, it is reasonable to believe that these athletes have a special interest for the sport – or put in other words, they are highly passionate about it. This further suggests that harmonious passion could be the drive for many of these athletes, precisely because of the special interest and wish to participate in something that is not easy or normal to come by. In addition to this, because the sport is in its infancy phase in Norway, the community around it is even more tight knit compared to many other sports, which in itself can be a cause for more passionate individuals being around each other, and thereby encouraging each other to keep going.

## **Grit**

The mean scores for grit could also be classified as relatively high – ranging from 3.33 to 3.71 – yet somewhat smaller than the mean scores from Sigmundsson et al. (2020a) (3.78 – 3.99). The Elite team again showed the highest scores, with scores for grit also being higher for level of play – which also was true for passion. This level of play is in most cases

associated with years of experience, and grit is shown to increase with age and life experience (Duckworth et al., 2007; Duckworth & Quinn, 2009; Beck & DeBeliso, 2020; Sigmundsson, 2021), which again shows why it would be reasonable to expect that the Elite group would score the highest and Junior-16 the lowest. Grit, as the passion and perseverance for long-term goals, is argued to be important to be able to achieve success in what you do (Duckworth et al., 2007), and it would therefore also make sense that players who have grinded towards their long-term goals and achievements in the face of the hardest competition are the ones who possess the most grit. Beck and DeBeliso (2020) use the need for encouragement in their grit-testing model for NFL athletes, with the reasoning that the absence of need for encouragement should be interpreted as a positive predictor of grit. In other words, scoring low on need for encouragement shows higher grit. The need for encouragement is something that could be related to the need for positive feedback in passion – which again shows the association between grit and passion. This way of measuring grit, by looking at the absence of something to prove the presence of something else could potentially end up giving problems with validity. It is therefore important to remember that even though science tries to measure the same thing in different ways, we have to be weary of validity and reliability for such research methods.

Tedesqui & Young (2017) connected grit to deliberate practice (Ericsson et al., 1993), which furthermore showed the connection all of this has to passion as well. Practicing American football consists of – like many other sports – large amounts of deliberate practice. Drills of doing the same exercises over and over again, just to perfect the smallest of nuances which are needed to create advantages during games, are what is needed to come out on top. This shows the important connection between passion and grit, and although the importance of passion in sports has been known by clubs for a long-time grit has just recently entered the discussion. Teams like the Seattle Seahawks (Seahawks Wire, 2021; The Seattle Times, 2020) and the Green Bay Packers (Forbes, 2021) have started putting focus on grit because they believe that the term carries merit in the sport. The Seahawks were personally also visited by Angela Duckworth, which further shifted the focus of their organization over on the importance of grit in athletes they were looking at. If NFL calibre teams choose to put emphasis on grit during selection processes – it most likely means that they also believe that grit has an important role in the sport, or just in athletic performance in general. Beck and DeBeliso (2020) showed that high levels of grit proved to be especially important in positions such as the Quarterback – the leader of the offense. This does not mean that grit is not

important for other positions, as a matter of fact it should be considered useful for any position and athlete who is looking to expand on their talent and push towards a goal. Talent alone will only take you so far (Duckworth et al., 2007) – what you need is talent with grit.

### **Mindset**

The average scores for mindset ranged from 4.16 to 4.74, where the Junior-16 group scored the lowest (4.16) and the Division 2 group scored the highest (4.74). Sigmundsson et al. (2020a) had their athletes scores ranging from 4.26 to 4.58, which also is within our range. Even though their Elite group was the one that scored highest (4.58), they scored just barely higher than the youngest group Junior-15 (4.54) – which is interesting to see. Remember, scoring higher means you are leaning more towards a growth mindset compared to scoring lower which illustrates a more fixed mindset. In the current study the Elite group was not the highest scorer, but rather the athletes in Division 2 which seemed to have good amounts of growth mindset among them. Once again the youngest and least experienced athletes score the lowest out of the four groups, which differs from the results of Sigmundsson et al. (2020a). This could come as a result of the athletes being relatively new to the sport and are unfamiliar with the concept of a growth mindset, and also having an easier time projecting their flaws and shortcomings on things they themselves cannot control (Dweck, 2016). Teaching and moulding these athletes early on can contribute to positive development and doing this at the lowest level is a great opportunity to lay a solid foundation which you are able to build upon for the future (Dweck, 2016).

Looking back at our results, what could explain that Division 2 had higher scores than both Division 1 and Elite? Division 2 is the lowest level of organized divisional play for any athlete above the age of 16, and thus it is reasonable to assume that many of these athletes treat the sport primarily as a hobby for the sake of fun and exercise. Therefore, the answer could possibly be that players at this level might not focus as much on their own talent and rather contribute in the best way possible for the team by impacting the team morale and spirit which is an important factor when playing for fun – and also in a growth mindset. Many players from Division 2 could likely be playing for their team at the current level primarily because they enjoy the sport and the social aspects that it brings, rather than striving for success and achieve greatness at the higher levels of play. It could be that many of these athletes simply work together very well as a team. Finding enjoyment in what you do is not only important in matters of passion (as in harmonious passion) and subjective well-being

(Vallerand et al., 2008), but also in general when it comes to athletics, hobbies, activities, and all other areas in life. Athletes that score low on mindset might be predisposed to variations in their performance in such a way that internal and external influences could affect their mindset further, and perhaps thereby also their mood and subjective well-being. It is important to remember that American football in the US is treated as a career path for many involving larger sums of money compared to the Norwegian counterpart – and therefore study subjects from US studies might have completely different outer and inner motives for performing at the highest level.

### **Relationships in the group as a whole**

The results from the Pearson correlation of the group as a whole showed only one significant correlation, this was the moderate correlation between passion-grit,  $r = .462$ . This correlation further strengthens previous findings shown in football/soccer players,  $r = .576$  (Sigmundsson et al., 2020a), which arguably tells us that there seems to be a strong connection between passion and grit, especially in sports like these. Passion and grit seem to both play large roles in relation to achievement, and Sigmundsson et al. (2020b) suggested that passion could be visualized as the direction of an arrow towards the theme/skill/activity you are striving for, and grit plays the role as the size and strength of that arrow. This makes sense as the Elite team had the highest mean scores for both passion and grit out of all groups, and this group should arguably be the one with the highest amount of skill and level of play.

### **Relationships in the different groups**

Elite: This was the only group that showed a significant passion-grit correlation ( $r = .796$ ) which was relatively strong. A similar result was found in the Elite group from Sigmundsson et al. (2020a) who also found a significant passion-grit correlation ( $r = .474$ ), although a bit lower. Our Elite group also showed a moderate, but non-significant, correlation between grit-mindset ( $r = .378$ ) which also seems to be the trend when it comes to these high-level athletes. These results are very interesting, and furthermore contribute to the research that suggests that doing something at the highest level requires a lot of passion, grit and a growth mindset (Duckworth et al., 2007; Sigmundsson et al. 2022; Sigmundsson et al. 2020a; Ericsson & Pool, 2016). When looking at the results from the independent t-test the Elite group was also the only group that scored significantly higher on passion compared to Junior-

16 when looking at passion means between all the groups. This tells us that passion really should be considered a driving source for those who compete at the highest level. No other differences of significance were observed between the groups for either passion, grit or mindset.

Division 1: This group showed a significant correlation between passion-mindset on a moderate level ( $r = .497$ ) and was the only one out of all the groups to show a significant correlation between these two factors. The group was also the second highest scorer on both mindset and passion, which again speaks to the importance of these factors at a highly competitive level. The correlation between passion-mindset is not very common but could certainly stem from the fact that these teams possess a lot of qualities that are needed to be able to play at a high level yet are missing the final touch to be able to reach the top class. This push could perhaps be made through even grittier tendencies, which could be what separates the good from the best (Duckworth et al., 2007).

Division 2: There were not found any significant correlations in this group, and the only notable of them was the small passion-grit ( $r = .284$ ) correlation. Although non-significant this can be seen as a nod towards the importance of these factors in sports in general. This group had the highest mindset scores, but mindset still only had a trivial correlation with passion, and a negative-trivial correlation with grit. It is uncertain why correlations for this group ended up being so poor, but like mentioned earlier one reason could come from the source of the athlete's motivation for playing.

Junior-16: This group showed two strong correlations for passion-grit ( $r = .604$ ,  $p = .064$ ) and grit-mindset ( $r = .626$ ,  $p = .053$ ) which narrowly missed the cut for significance. When looking for reasons behind these correlations it is possible that the interest and passion for the sport – which drove them to start playing the sport in the first place – is what has been found here. Nevertheless, these correlations are of such a high value that it is reasonable to assume that a bigger sample size than  $N = 10$  could help them become significant, and possibly still stay as strong. On the other hand, we could also end up with completely

different results. Hence, the importance and effects of an overall small sample size will be discussed further in the limitations section.

## **Limitations**

The main limitations of the study are the low number of participants, and the unequal distribution of the genders. Each group should preferably be much larger – and striving to reach a better female to male ratio would likely improve the data substantially.

Because of the small sample size, the data is very prone to small adjustments, and results from outliers will therefore impact the overall view in a much more radical way compared to a larger sample size. The most extreme outlier was therefore removed, and only outliers within the acceptable measures were kept, but this still needs to be kept in mind.

The fact that teams are spread out in many different cities in Norway, travelling around to distribute and oversee data collection is not feasible – especially not during Covid-19. The choice to collect this data through online questionnaire is therefore reasonable and good, because it makes the process easier and more accessible – but also complicates the matter when it comes to getting the most possible participation. Players will in most cases have gotten word of the questionnaire from their coaches either through common online communication channels, or through verbal information, which when combined with it being fully voluntary creates the potential for low participation. This could be changed with physically showing up to their practice, having a short introduction of the study, and perhaps encouraging every player to fill out the questionnaire right then and there. Limitations with filling out online questionnaires also include potential answers affected by social desirability (Van de Mortel, 2008), which thereby could cause problems with validity and reliability. Players could also be affected by the outcome of their season and depending on how their team did their answers could be slightly tainted by this. The hope was to minimize the effect this could have on the results by waiting a while after the conclusion of the season before collecting the data.

Furthermore, concerning analyses, the One-Way ANOVA showed no differences between groups, but the independent t-test on the other hand did. Could this be a result of our small sample size and heavily skewed normal distribution? One could absolutely argue that. Because of the sample size and unclearness of a solid normal distribution, the author decided to perform a Kruskal Wallis test with an additional Mann-Whitney test – in case of non-

parametric interpretation of the dataset. The results from these tests showed the same results as from the independent t-test – that the Elite group scored significantly higher on passion than the Junior-16 group. It could therefore be argued that our choice of parametric or non-parametric analyses had no real effect on the outcome of the comparison of differences between groups.

The shortcoming of relevant theory for the study is also visible in the repeating use of many of the same articles, which is because this specific field of science has not yet reached a great level of mainstream interest and is still expanding. Further studies on this field should therefore be of great interest, and hopefully this study can contribute to more exploration on psychological factors in the field of American football in general – but also specifically in Norway and other countries where American football is not as prevalent as other sports.

It is nonetheless a great achievement to be able to get such widespread participation during the Covid-19 pandemic, and with a bigger and more thorough researching team – and closer to normal life settings – the outlook of expanding on this research should be bright.

### **Changes that occurred after data collection**

After the end of the 2021 playing season the Norwegian American football Association decided to change one of their divisions: The Junior-16 group now is called Junior-17 and now allows all players up until the age of 17 to participate in that part of the league. This should not have affected the data collection, because there are not any other divisions for that age group to participate in, and this should therefore in reality only be considered an extension of the previous year that might have been interrupted by Covid-19, and a name change that these players themselves are aware of.

## Conclusion

The purpose of this study was to get a better understanding for the importance of the psychological factors – passion, grit and mindset – at the different levels of play in American football in Norway, and how these factors were represented at each of these different skill levels. All three of the variables were found to be of importance in athletes playing American football, but passion and grit showed some greater presence in athletes with higher skill level. We can therefore – in accordance with previous research – conclude that passion and grit play major roles in high levels of athletics – in our case American football, and even though mindset was not as present at the top it still seems to contribute in a meaningful way. Passion and grit seem to both play very important roles in relation to achievement and success, which is crucial on the road to excellence in your sport.

More research on the subject of psychological factors in American football is still required, which is why examining the potential effects of personality traits as a contributing factor for success in high achieving athletes could be of great interest. Furthermore, differences in passion, grit and mindset – and potentially personality traits or other factors of choice – should also be examined in different player positions in American football, seeing as there are vast differences in playing style and qualities needed at these positions. Our results are therefore a mere foundation in the expanding research area of psychological factors in American football.



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## Appendix

### 1.1 Questionnaire

Alder:

Kjønn:

- Mann
- Kvinne
- Annet/Ønsker ikke å oppgi

På hvilket nivå spilte du Amerikansk fotball denne sesongen?

Kryss av for det høyeste nivået hvis det er snakk om flere nivå.

- Eliteserien
- D1 Senior Herrer
- D2 Senior Herrer
- U16
- Annet

Er du student?

- Ja
- Nei

Din høyeste fullførte utdanning:

- Grunnskole
- Videregående skole/yrkesfag
- Bachelorgrad
- Mastergrad
- Doktorgrad
- Annet/Ønsker ikke å oppgi

## Generelle spørsmål

Hvor typisk er dette 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.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg kunne tenkt meg å bruke mye tid til å bli god innen et område/emne/ferdighet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg tror jeg kan bli ekspert i et område/emne/ferdighet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg har lidenskap nok til å bli ekspert i det området/temaet/ferdigheten jeg liker.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg er arbeidsom nok til å oppfylle mine mål.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg har brennende lidenskap for noen områder/tema/ferdigheter.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg bruker mye tid på de prosjekter jeg liker.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Min lidenskap er viktig for meg.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



### Hvor typisk er dette 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.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg mister ikke motet ved tilbakegang/motgang.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg har vært besatt av en bestemt ide eller prosjekt i en kort periode, men har seinere mistet interessen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg er arbeidsom.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg setter meg ofte et mål, men bestemmer meg så for et annet isteden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg har vansker med å beholde fokus på prosjekter som tar mer enn et par måneder å fullføre.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg fullfører alt jeg påbegynner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg er flittig.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



