

Andrea Kittelsen

Exploring Passion, Grit, Mindset, Self-efficacy, Experienced Coach Effect, and Practice Hours for Adolescent Swimmers and Handball Players at Different Competition Levels

Master's thesis in Psychology, Specialization in Learning - Brain, Behaviour, Environment

Supervisor: Hermundur Sigmundsson

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Faculty of Social and Educational Sciences
Department of Psychology



Preface

I've finally achieved my ultimate goal, writing and completing my master's thesis in psychology at NTNU. It's been several wonderful years in Trondheim, where I've balanced my work as a swim coach with my degrees in psychology. It's been a long and at times hard journey, where grit has played a huge part in concluding this race. The opportunity to combine my interests in developmental psychology and my passion for swimming has been fulfilling. I've always been fascinated by mechanisms within the individual that enables stamina and the will to develop skills at an expert level, and this thesis has met my curiosity. I was able to study the theory of passion, grit, mindset, self-efficacy, and the coach effect through my project thesis in the spring of 2022, and the theoretical background of this thesis is heavily inspired by my previous work.

First, I want to thank my supervisor Hermundur Sigmundsson who believed in me and my perspectives as a coach and gave me both autonomy and direction when needed. His enthusiasm and interest in my project have been really motivating. A huge thanks should also be given to Benjamin Holen Dybendal, who helped me with the first stages of data processing. Most of all, I want to thank my partner Erlend and my family, who's always pushed and believed in me, and at times helped me redirect my focus and priorities. Their support has been priceless. I also want to thank all coaches and club leaders who helped me gather data and gave me new insights for my project. A big thank you to all athletes that responded to my questionnaire, and last but not least; Thank you to all of my previous swimmers, who have given me such joy and allowed me to be a part of their journey, I admire you all more than you know.

Abstract

This thesis aimed to explore passion, grit, mindset, self-efficacy, experienced coach effect, and practice hours for adolescent swimmers and handball players at different levels of competition. The sample consisted of 293 athletes with a mean age of 17. Swimmers accounted for 145, and handball players 148 of the participants. Most athletes competed at a high level, with 21% at the regional, 50% at the national, and 22% at the international level. Data was collected through an online survey with scales for passion (Sigmundsson, Haga, et al., 2020a), grit (Sending, 2014), mindset (Bråten & Strømsø, 2004), self-efficacy (Schwarzer & Jerusalem, 1995), and the coach effect. This scale was a new construct, based on CART-Q (Jowett & Ntoumanis, 2004). Statistics and t-tests revealed high scores for the whole sample on all researched variables, where only the coach effect ($p = .002$) and practice hours ($p = .001$) had significantly different scores for swimmers and handball players. Pearson correlational analysis revealed that passion and self-efficacy had the strongest correlation for the whole sample ($r = .50$), followed by passion and grit ($r = .45$), and grit and self-efficacy ($r = .44$). However, a few correlational differences were found between the two sports.

Analyses further revealed that most variables' mean scores increased with a higher competition level. MANOVA with Bonferroni post hoc test revealed significant differences. Athletes at the international level scored significantly higher on passion, grit, and self-efficacy than athletes at the regional level. Additionally, a correlational analysis found that athletes at the international level had stronger correlations for most researched variables, compared with athletes at the national and regional levels. The strongest significant correlation was found between passion and self-efficacy ($r = .57$) at the international level. The methodology has been disclosed and the results discussed, followed by implications and limitations for this thesis, with suggestions for further research.

Sammendrag

Denne studien undersøkte lidenskap, driv, tankesett, mestringsstro, opplevd trenereffekt og treningstimer for unge svømmere og håndballspillere på ulikt konkurransenivå. Utvalget bestod av 293 utøvere med en gjennomsnittsalder på 17 år. Svømmerne utgjorde 145 og håndballspillerne 148 av utvalget. De fleste av deltagerne hadde konkurrert på et høyt nivå, med 21% på et regionalt-, 50% på et nasjonalt-, og 22% på et internasjonalt nivå.

Datamaterialet ble samlet inn gjennom et nettskjema med skalaer for lidenskap (Sigmundsson, Haga, et al., 2020a), driv (Sending, 2014), tankesett (Bråten & Strømsø, 2004), mestringsstro (Schwarzer & Jerusalem, 1995), og trenereffekten. Denne skalaen var en ny konstruksjon basert på CART-Q (Jowett & Ntoumanis, 2004). Deskriptiv statistikk og t-tester fant høy skår for alle variablene som ble studert for hele utvalget. Kun trenereffekten ($p = .002$) og treningstimer ($p = .001$) var signifikant forskjellig for svømmere og håndballspillere. En Pearson korrelasjonsanalyse fant at lidenskap og mestringsstro hadde den sterkeste korrelasjonen for hele utvalget ($r = .50$), etterfulgt av lidenskap og driv ($r = .45$) og driv og mestringsstro ($r = .44$). Korrelasjonsanalysene for hver av sportene fant merkbare forskjeller mellom svømmere og håndballspillere.

Videre viste en korrelasjonsanalyse en tendens der de fleste av variablene økte med høyere konkurransenivå. En MANOVA med Bonferroni post hoc fant signifikante forskjeller. Utøverne på et internasjonalt nivå skåret signifikant høyere på lidenskap, driv og mestringsstro enn utøvere på regionalt nivå. En korrelasjonsanalyse fant at utøvere på internasjonalt nivå hadde sterkere korrelasjoner for de fleste studerte variabler, sammenlignet med utøvere på nasjonalt- og regionalt nivå. Den sterkeste signifikante korrelasjonen var mellom lidenskap og mestringsstro ($r = .57$) for utøvere på internasjonalt konkurransenivå. Metodologien har blitt gjennomgått og resultatene diskutert, etterfulgt av begrensninger, implikasjoner samt forslag til videre forskning.

Table of Contents

Theoretical Background	1
Swimmers.....	1
Handball Players.....	1
Passion	2
<i>Definition</i>	2
<i>Harmonious and Obsessive Passion.....</i>	2
<i>Performance.....</i>	3
<i>The Passion Scale</i>	4
Grit.....	6
<i>Definition</i>	6
<i>Perseverance</i>	7
<i>Athletes and Age</i>	7
<i>Grit and Conscientiousness</i>	8
<i>Critique.....</i>	9
Mindset	10
<i>Definition</i>	10
<i>Growth Mindset and Performance</i>	12
<i>Growth Mindset Intervention</i>	13
<i>Growth Mindset and Grit.....</i>	13
Self-efficacy	14
<i>Definition</i>	14
<i>Development of Self-efficacy.....</i>	14
<i>Self-efficacy and Performance</i>	15
<i>Interventions for Higher Self-efficacy</i>	16

The Effect of a Coach	17
<i>Definition</i>	18
<i>Relationship</i>	18
<i>The Need for a Coach</i>	19
Individual- vs. Team Sports	21
Practice Hours	22
Previous Studies of Athletes on Passion, Grit, Mindset, and Self-efficacy	23
<i>Football Players</i>	23
<i>American Football Players</i>	24
<i>Iranian Wrestlers</i>	24
<i>Norwegian Rifle Shooters</i>	25
The Current Study	26
Methods	28
Participants	28
Procedure	29
Measurements	30
<i>Passion Scale</i>	30
<i>Grit Scale</i>	30
<i>Mindset Scale (Implicit Theories of Intelligence Scale)</i>	31
<i>Self-efficacy Scale</i>	31
<i>The Coach Effect Scale</i>	32
Statistical Analysis	33
Results	36
Reliability	36

RQ1: Descriptive Statistics and T-test	36
RQ2: Correlational Analysis.....	37
RQ3: Descriptive Statistics and MANOVA	41
RQ4: Correlation Analysis with Filter.....	44
Discussion	48
RQ1:.....	50
<i>Passion</i>	50
<i>Grit</i>	52
<i>Mindset.....</i>	53
<i>Self-efficacy.....</i>	54
<i>The Coach Effect</i>	54
<i>Practice Hours</i>	55
<i>Overall</i>	56
RQ2:.....	57
<i>Passion</i>	58
<i>Grit</i>	61
<i>Mindset, Self-efficacy, Coach Effect, and Practice Hours</i>	64
RQ3:.....	65
<i>Passion</i>	66
<i>Grit</i>	67
<i>Mindset.....</i>	68
<i>A Comparison</i>	68
<i>Self-efficacy and the Coach Effect.....</i>	69
<i>Practice Hours</i>	71
<i>Overall</i>	71
RQ4:.....	72

<i>Passion, Grit, and Mindset</i>	72
<i>Self-efficacy</i>	74
<i>The Coach Effect</i>	75
<i>Practice hours</i>	76
Limitations	78
Implications	79
Future Research	81
Conclusion	82
References	83
Appendix	94
Appendix A	94
Appendix B	95
Appendix C	96

List of Tables

Table 1: Frequency statistics for each competition level	29
Table 2: Descriptive statistics and t-tests for the researched variables	37
Table 3a: Correlational analysis for all researched variables for the whole sample	38
Table 3b: Correlational analysis for all researched variables for swimmers	39
Table 3c: Correlational analysis for all researched variables for handball players	40
Table 4: Descriptive statistics for all researched variables for each competition level.....	42
Table 5a: Correlational analysis for all researched variables for competition level.....	45
Table 5b: Correlational analysis for all researched variables for each competition level	47

List of Figures

Figure 1: To become experts.....	x
Figure 2: The achievement arrow.....	6
Figure 3: Significance test between the competition levels for the researched variables.....	44

Exploring Passion, Grit, Mindset, Self-efficacy, Experienced Coach Effect, and Practice Hours for Adolescent Swimmers and Handball Players at Different Competition Levels.

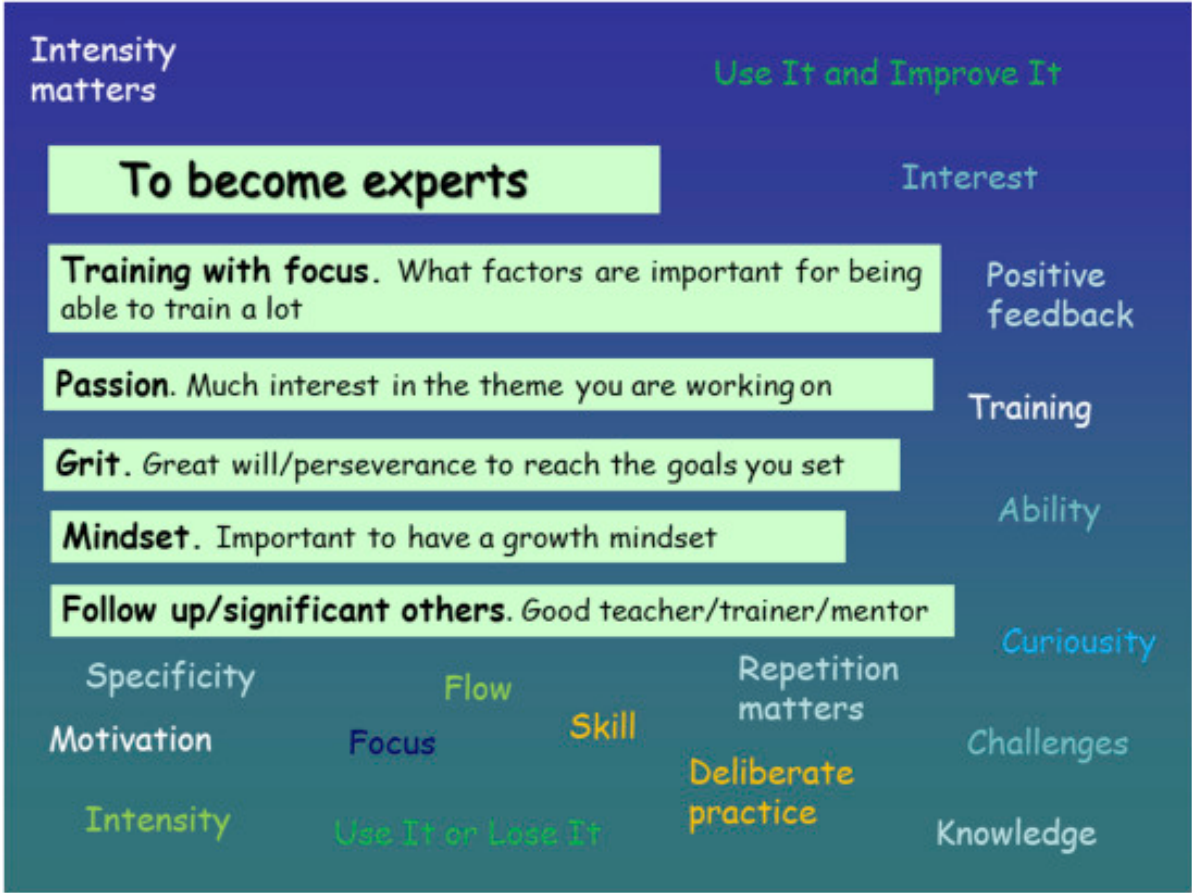
Athletes push their bodies and minds to the extreme to develop and become number 1. What mechanisms lay within the individual that enables performance at the highest level? Sigmundsson, Haga, et al. (2020a) developed Figure 1, which lists important factors to becoming an expert. This thesis explores some of these factors; passion, grit, mindset, significant others, and training. It also explores self-efficacy, which is not listed in Figure 1, but frequent literature and studies of motivation and performance (Lillegård, 2020; Sklett et al., 2018). In his research, Sigmundsson explores passion, grit (Sigmundsson, Clemente, et al., 2020), mindset (Shamshirian et al., 2021; Sigmundsson, 2021; Sigmundsson, Dybendal, et al., 2022; Sigmundsson, Haga, et al., 2022b; Sigmundsson, Haga, et al., 2020a), and self-efficacy (Sklett et al., 2018), as motivational factors. Thus, these four will be addressed as such in this thesis. Figure 1, also lists significant others, like good trainers, referred to in this thesis as the coach effect. In addition, the figure incorporates training specifically and generally through; intensity, repetition, deliberate practice, specificity, and training with focus. This thesis captures the aspect of training through weekly practice hours.

The main aim of this study is to explore whether there are differences in scores regarding motivational factors, the coach effect, and practice hours, dependent on what type of sport one competes in; an individual sport like swimming, or a team sport like handball. Athletes have been found to score higher on some of these factors compared to others (Sigmundsson, 2021), but a study comparing individual and team sports based on these factors has not yet been conducted. In addition, this thesis explores if there are differences in scores based on competition level. Given Figure 1, athletes competing at the international level could score higher on the researched factors, as they are closer to becoming experts.

Results could reveal the importance of these variables, for achievement. This research was similar to the study conducted by Sigmundsson, Dybendal, et al. (2022), where passion, grit, and mindset were researched dependent on football competence.

Figure 1

To become experts



Note. Different factors of importance to becoming an expert

Theoretical Background

Swimmers

Swimming is an individual sport, which places high demands on both anaerobic and aerobic capacity, in addition to technical abilities. Swimming is a learned set of movements in an environment that is not natural for humans, and where humans move relatively slow (Løvberg et al., 2018). Thus swimming requires an absurd amount of hours in the pool from early on, to develop the necessary tactile abilities to move faster in the pool. Spending 3-6 hours each day at practice with deliberate, high-quality workouts, demands exceptionally high motivation, especially when practice begins at 06.00 am and with no off-season. Based on this, high inner motivation is a key factor in swimming, to implement the required practice to succeed in competitions (Løvberg et al., 2018).

Handball Players

Handball is a complex team sport, demanding frequent intensity changes, hard body confrontations, and great mental-, physical-, and social skills in each athlete. Performance is dependent on each player's individual-, and collective performance (Wagner et al., 2014). The sport places heavy emphasis on physical aspects like; running, jumping, and throwing. Each game has a duration of 2x30 min, with some additional minutes if necessary. Because of this, great aerobic capacity is needed, as well as high anaerobic abilities; explosivity, and velocity (Gorostiaga et al., 2005; Wagner et al., 2014). The impact of interpersonal processes applies strongly to team sports, and the dynamics of relationships in a team influence performance (Kleinert et al., 2012).

Passion

In 2003 Vallerand and his colleagues published an article on obsessive- (OP) and harmonious passion (HP). Before this, the concept of passion had received little attention in the field of psychology (Vallerand et al., 2003). In their article, Vallerand and his colleagues refer to a few studies on the subject of passion, that was published before 2003, where passion was seen as either high-priority goals, or a form of motivation (Frijda et al., 1991), or creativity (Goldberg, 1986). However, these studies provided limited empirical data (Vallerand et al., 2003). Vallerand further claimed that the majority of empirical data on passion collected earlier than 2003, related to passionate love (Walster et al., 1978).

Definition

This thesis explores the passion for achievements, Vallerand on the other hand focused on the passion for activities. However, there are similarities. Passion for activities is «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). An activity qualifies as passionate if it has a significant role in the individual's life. People spend a considerable amount of time on activities they don't find engaging or enjoyable but necessary. Passionate activities are different because they are driven by enjoyment. Considering the time and energy spent on the activity, the activity becomes a part of the identity and consequently influences motivation and achievements (Vallerand et al., 2003). To illustrate; instead of being an individual who does competitive swimming, you are a swimmer.

Harmonious and Obsessive Passion

Vallerand et al. (2003) introduced the dualistic approach, which entails harmonious passion (HP) and obsessive passion (OP), two types of passion that they hypothesized would

have different effects on emotion. Their findings suggested that HP was related to positive emotions (affect), like flow (Rogatko, 2009) and good concentration. They also found that HP facilitated positive affect both during the activity and long after the activity. Conversely, the experience of OP was associated with negative affect and psychological dependence when the desired activity was not feasible. In other words, with obsessive passionate activities, the activity controls the person, but with harmonious passionate activities, the person controls the activity (Vallerand et al., 2003). Subsequently, they concluded that having an HP towards an activity would make life more fulfilling (Vallerand, 2008; Vallerand et al., 2003), and thus may act as a motivational factor.

Curran et al. (2015) conducted a meta-analytical review of the relationship between HP and OP, that provided strong empirical support for the dualistic model. After analyzing 94 independent studies on the dualistic model, the conclusion was that HP positively corresponded with positive intrapersonal outcomes, such as positive affect, satisfaction, flow, and performance. In contrast, OP had a maladaptive pattern of association with both positive and negative interpersonal outcomes, such as negative affect and rumination. These results were in line with Vallerand et al. (2003) original findings. They concluded that HP was probably a significant force that co-varies with well-being, motivation, deliberate practice, and performance, as well as being a force that controls for negative cognition. And on this basis, HP was considered far more desirable than OP. Undoubtedly there are benefits attached to time spent on your passionate activity at least if this passion is harmonious (Curran et al., 2015).

Performance

Jachimowicz et al. (2018, p. 9980) gave another definition to passion; «a strong feeling towards a personally important value/preference that motivates intentions and

behaviors to express that value/preference». This definition is more in line with effect and motivation towards performance, in comparison with Vallerand et al. (2003), who focus on the activity and time spent on it. Thus, the definition of passion made by Jachimowicz et al. (2018) is more in line with this thesis. Passion is an intense affective state (Jachimowicz et al., 2018; Sigmundsson & Haga, 2019; Vallerand et al., 2003), that may provide the necessary energy and motivation, through intense affection, that is needed to develop a skill/area to the level of expertise because passion provides engagement in the valued activity, passion drives each individual toward their goals (Curran et al., 2015; Sigmundsson & Haga, 2019), and might even contribute to attained focus (Duckworth et al., 2011).

The Passion Scale

In 2020 Sigmundsson, Haga, et al. (2020a) published a new scale measuring passion for achievement or passion toward an area, theme, or skill. In line with previous research (Curran et al., 2015; Sigmundsson & Haga, 2019), Sigmundsson et al. (2020a) explored if passion could help explain how some people can invest the necessary time and energy to become skillful. They concluded that passion indeed could account for some of the explanation. Sigmundsson, Haga, and Hermundsdottir further used their passion scale (Sigmundsson, Haga, et al., 2020a) to assess levels of passion. By collecting data on 146 Icelandic students they found a significant negative correlation between age and mean total score ($r = -.23$), furthermore, males were shown to gain a higher score on passion 4.19 ($n = 66$, $SD = .60$), in relation to women 4.03 ($n = 80$, $SD = .62$) in the group, which was a significant gender difference ($p < .05$) (Sigmundsson, Haga, et al., 2020b). These results were further supported by Sigmundsson et al. (2021). In a larger study of 917 participants, aged 14 to 77, they found a significant gender difference in passion, where women scored 3.86 ($n = 502$, $SD = .64$), while males scored 4.12 ($n = 415$, $SD = .61$) on passion. These findings

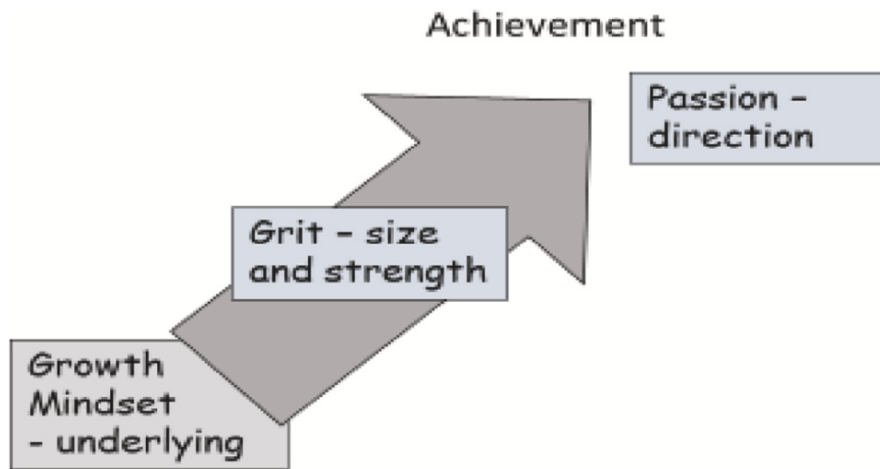
suggest that passion decreases with age, across the lifespan (Sigmundsson, Haga, et al., 2022b; Sigmundsson, Haga, et al., 2020b), and that males score higher on passion relative to women.

This was also supported by a small study of 63 football players conducted by Sigmundsson, Clemente, et al. (2020). Their data revealed that these athletes had significantly higher passion scores compared with the adult Icelandic students mentioned in the previous section (Sigmundsson, Haga, et al., 2020b). The football players scored significantly higher on the passion scale compared with the Icelandic students (Sigmundsson, Haga, et al., 2020b). These findings indicate that football players, or maybe athletes in general, have a higher degree of passion for what they do than other adults or students.

The next section will explore grit. In research on passion and performance, perseverance is often mentioned. Jachimowicz et al. (2018) wrote «Highly persevering individuals achieve success only when pursuing goals they are passionate about» (Jachimowicz et al., 2018, p. 9981). Sigmundsson, Haga, et al. (2020b) found that among the factors they studied, passion and grit had the highest correlation ($r = .44$) when it comes to achievement. These findings suggest that the two factors have a close relationship, and capture similar aspects of achievement (Sigmundsson, Haga, et al., 2020a). Sigmundsson separates the two by suggesting that passion could be the arrow that gives direction to an area you want to succeed in, while grit controls the strength and size of the arrow, in other words, the effort. This is illustrated in Figure 2, which is derived from Sigmundsson et al. (2021)

Figure 2

Achievement Arrow with Passion, Grit, and Growth Mindset



Note. This figure illustrates how passion, grit, and mindset relate to achievement. Passion gives direction, grit strength, and size, while mindset acts as an underlying mechanism.

Grit

Definition

Grit can be defined as «perseverance and passion for long-term goals» (Duckworth et al., 2007, p. 1087). This entails working hard and being goal-oriented, with constant effort and interest, for a considerable amount of time. It also entails resilience in the face of challenges, failure, and stagnation in progress, which are inevitable. Individuals with a high degree of grit, the «grittiest» of the bunch, approach challenges or a new goal, like they would a marathon (Duckworth et al., 2007). «To be gritty is to keep putting one foot in front of the other. To be gritty is to hold fast to an interesting and purposeful goal. To be gritty is to invest, day after week after year, in challenging practice. To be gritty is to fall down seven times, and rise eight» (Duckworth, 2017, p. 332).

Much the same as passion, grit is a predictor of well-being and future success (Duckworth, 2016, 2017; Jachimowicz et al., 2018; TED Conferences, 2013). In a study of 2000 American adults, Angela Duckworth found a positive relationship between the possession of grit, healthy emotional life, and well-being, even at the top (extreme) end of the grit scale (Duckworth, 2017, p. 351). Duckworth further explains that when studying experts in any domain, whether it be academics, music, sports, or entrepreneurial endeavors, a combination of passion and perseverance is a common denominator (Duckworth, 2017).

Perseverance

Although Duckworth made grit a hot topic (TED Conferences, 2013), she was not the first person to research perseverance. In 1926 Catharine Cox published a study, where she analyzed the biographies of 301 exceptional leaders and creators (Cox, 1926). Her sample was drawn from a larger sample collected by Cattell (1903), who studied IQ and rank order of eminence. She explored her sample of geniuses by using 67 character traits derived from Webb (1915), and she concluded that if IQ was kept constant, the following traits would predict lifetime achievement; persistence in effort, confidence in abilities, and a strong character. Duckworth et al. (2007) have also found that grit can predict lifetime achievements or success, but unlike Cox, she could not find a positive relationship between success and IQ.

Athletes and Age

Persistence in effort can be observed from an early age (Cox, 1926). Duckworth writes that grit has the potential to be grown from the inside and developed through a person's environment. If an individual is allowed to pursue and cultivate their interests, as well as receive guidance and help from significant others through task techniques, an individual can grow a strong sense of grit. Duckworth states that others are crucial for grit development,

especially in learning processes. Examples of significant others that can have a direct and indirect effect on grit are parents, friends, coaches, teachers, or leaders (Duckworth, 2017). The study by Sigmundsson, Clemente, et al. (2020) found an age difference, where the youngest group of football players (mean age 14.85) scored 3.78 on grit compared with the elite group (mean age 22.32) who scored 3.99. The third group lies in between, both in terms of mean age and grit score of 3.81 (mean age 17.82). These findings support results by Duckworth and Quinn (2009) who reported that older adults scored higher on grit than young adults, and it also shows a difference in grit score with increased competition level. Suggesting that experience may to some extent explain how age effect grit scores. With age, people in general will come to experience and understand that hard work often pays off. Making grit increase across the lifespan (Sigmundsson, Haga, et al., 2022b). Sigmundsson, Clemente, et al. (2020) did not, however, find a positive significant correlation between age and grit. In addition, Sigmundsson, Clemente, et al. (2020) found that compared with young adults from Iceland (Sigmundsson, Haga, et al., 2020b), young football players had a significantly higher grit score. The Icelandic sample (mean age 22,01) had a mean grit score of 3.52 relative to a mean score of 3.78 for all of the football players.

Grit and Conscientiousness

Grit has been connected with the big-five personality trait; conscientiousness (Duckworth et al., 2007). Individuals who score high on conscientiousness show behavior and personality traits that could contribute to achievements. Specifically; being organized, thorough, careful, and having a high degree of self-control. Duckworth et al. (2007) acknowledge an overlap between grit and conscientiousness in predictability for achievement, but point out that grit entails long-term perseverance and goals, which conscientiousness does

not. Conscientiousness could predict some forms of achievement, but they conclude that grit had far better predictability of success than conscientiousness (Duckworth et al., 2007).

Critique

The concept of grit has received skepticism and scrutiny. Credé et al. (2017) underwent an extensive meta-analysis on grit with 88 samples (n = 66 807). Interestingly, this resulted in 584 effect sizes that could not confirm the higher-order construct of grit. However, there was a moderate correlation between grit and performance in their data set, in addition to a high correlation between grit and conscientiousness. Credé et al. (2017) describes how the perseverance of effort explains some variance in academic performance, even when conscientiousness was controlled for. Nevertheless, they concluded that grit did not predict success and performance, and rather than being its own concept, might just be an aspect of the personality trait conscientiousness. For future research, they proposed that the perseverance factor of grit should be given more attention and that a new scale was needed.

Grit is not only perseverance and effort toward long-term goals, it's also passion. Some of the critiques grit has received are based upon the shortcomings of capturing passion. Credé et al. (2017) propose a new scale, to better capture grit in performance. This was supported by Jachimowicz et al. (2018, p. 9980) who suggest that «passion is key to grit but missing in its theory and measurement». Jachimowicz and colleagues conducted a large meta-analysis containing 127 studies, where they used the grit scale and assessed performance. Their data showed that effect sizes became larger when participants felt more passionate about their performance objective. Duckworth, the creator of the referenced grit scale, has acknowledged the shortcomings regarding passion in her scale. Emphasis has been put on passion and immersion (being deeply engaged with something) as the key mechanisms for performance

(Jachimowicz et al., 2018). Jachimowicz et al. (2018) suggest that using both the grit scale and a second scale for passion would be a solution to better predict performance.

Mindset

Definition

Dweck (2012) defines mindset as people's beliefs about the nature of human attributes, regarding intelligence and personality. A common assumption about intelligence is that intelligence is something one is born with, a fixed trait that an individual has little control over. This could also be said for personality and behavior. Beliefs that intelligence, personality, or behavior is a fixed aspect of human nature, are called having a fixed mindset by Carol Dweck. In contrast, having a growth mindset entails believing in «endless» development. Abilities, intelligence, personality traits, and behavior are something that can be developed. To illustrate, instead of being born with a fixed level of intelligence, you can develop and expand your intelligence, if you work hard enough (Dweck, 2012).

Mindset and learning

For a young individual with a fixed mindset, adolescence is one big test. This is a life-defining period, where people place themselves in social categories; beautiful or ugly, smart or dumb, a winner or a loser (Dweck, 2017). A need to protect their ego and avoid situations where it's easy to be judged negatively is a natural response. For individuals with a growth mindset, adolescence is a time for great development and opportunity. When students enter college, a new challenging period begins. Mindset is again tested when the comparison-group change, an A in High school could turn into a C at University. Dweck found in her study that if a student with a growth mindset did poorly on a test, they usually delivered a better test the next time around. In comparison, when students with a fixed mindset got a low grade, they

rarely were motivated to do better on their next test (Dweck, 2017). This is explained by the lack of belief in change.

Differences in mindset have also been found in study methods at college. In general, students with a fixed mindset read the textbook or article, took notes, and studied them once or twice, if they experienced the material as difficult. In addition, they would try to memorize important subjects. If results did not reflect success, they would conclude that the subject was not for them. In contrast, students who score high on a growth mindset show a great deal of ownership for learning and motivation. Instead of reading the curriculum from the first to the last page, they searched for underlying topics, and when failing to reach their goals, they tried to understand where they made mistakes, as well as how they could improve (Dweck, 2017). This is only possible if an individual can see that a lacking result is not a reflection of a lacking person, but only a result with a large potential for improvement.

Mindset exists on a spectrum and is situational dependent to some extent. For example, a student might have a fixed mindset in English class but have a growth mindset in physical education. Mindset will also affect the environment in which children grow up, dependent on how parents approach talent and achievement. To illustrate, a parent might have a fixed mindset about their child's competitiveness in their sport, by solely focusing on scores and placements. At the same time, the parent might have a growth mindset about their child's intelligence and help them successfully through homework, preaching that with practice they will succeed and that you should only compare results with yourself (Dweck, 2017) This, in turn, might be the dependent variable that makes up their child's mindset, and ultimately performance.

Growth Mindset and Performance

How people approach interests or challenges is influenced by mindset. A fixed mindset can inhibit development because people consider their talent (low or high) as set in stone, and that practice is a waste of time (Blackwell et al., 2007; Plaks & Stecher, 2007). Consequently, with a fixed mindset the individual would rather use their energy to avoid failure (Dweck & Master, 2009). Individuals with a growth mindset view setbacks and difficult tasks as opportunities that motivate hard work, and growth (Blackwell et al., 2007). To become an expert, excellent, highly knowledgeable in an area, or reach the highest point of a skillset, a great deal of practice is essential (Ericsson et al., 2007). Ericsson et al. (2007) assume that at least 10 000 hours of deliberate practice is required and that setbacks and stagnation during this time are unavoidable. Having a fixed mindset becomes difficult in the pursuit of expertise, as challenges tend to be handled poorly.

Ericsson et al. (2007) state that difficulties and stagnation are inevitable, and following that line of research, a fixed mindset will not lead to expertise. One example of this is that a fixed mindset makes it difficult to take advice and feedback as anything other than a personal threat. Their downfall lies in the belief that skills are a part of their talent, negative feedback is taken as a critique of who they are. This mindset makes them less active in stagnation periods or less motivated with setbacks, and eager to quit when encountering difficulty. This reactional pattern is for protection, and a way of not showing weakness (Dweck, 2017). The same cannot be said for a growth mindset. Regardless of «talent» individuals with a growth mindset believe that hard effort is the path to success. The only real factor that results in excellence, is hard work (Dweck, 2017).

Growth Mindset Intervention

Yeager et al. (2019) conducted a growth mindset intervention, designed to change students' mindsets in less than an hour. His findings showed a substantial effect on upcoming results at school. In addition to an effect on grades, his intervention caused an increase in students who signed up for an advanced mathematics course. This was seen as a great achievement as there are correlations between studying mathematics in high school and later educational attainment (Yeager et al., 2019). This experiment illustrated how a short intervention can change a mindset, both regarding how people view themselves and how they approach challenges. Mindset is most likely a result of the upbringing environment. Growing up believing in the achievement of set goals, that setbacks are normal, and that it's the approach to difficulties that determine success, could be knowledge that set people on the path to great achievements (Park et al., 2020; Yeager et al., 2019).

Growth Mindset and Grit

Growth mindset and grit are two distinct personal attributes that appear to have a close relationship and are mutually reinforcing (Park et al., 2020). When accepting that high effort pays off in the long run, people are more prone to set ambitions and long-term goals that they implement. Considering this, a growth mindset affects grit (Park et al., 2020). Reversely, Duckworth (2016) proposed that grit could affect the mindset. Individuals who score high on grit, are more likely to engage in deliberate practice, and thereby improve their skills (Duckworth et al., 2011). With time this is a mutually reinforcing effect (Park et al., 2020). Although, Sigmundsson, Haga, et al. (2022b) found that these two variables evolve differently throughout the lifespan of an individual, with mindset decreasing and grit increasing in strength.

Self-efficacy

Definition

Self-efficacy is a psychological factor essential for performance (Bandura, 1986). Self-efficacy is «beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments» (Bandura, 1997, p. 3). In other words, believing that you can accomplish a task or assignment. Bandura thought that self-efficacy had an impact on which activities an individual chooses, the effort and persistence they invest in that activity, as well as the final achievement or result (Schunk, 1995). Bandura (1990) stated that when individuals with higher self-efficacy experience failure they attribute this to low effort, while individuals with lower self-efficacy attribute it to lower abilities. This is similar if not the same to what Dweck describes as growth and fixed mindset.

Development of Self-efficacy

Self-efficacy evolves in each individual through experience, personality, abilities, and social support. Relative to people who doubt their capabilities, those with high self-efficacy will engage in activities more freely, will work harder and persevere longer when encountering obstacles, and they generally perform at a higher level. Most people will know or have an understanding of how they are performing while working on a task. Their evaluation will influence self-efficacy for that task, affecting further progression and results (Schunk, 1995). While success may heighten self-efficacy, failure can reduce it. Chase (2001) found in her study that, for children, attributions for failure are of great importance for future self-efficacy and motivation. Bandura and Cervone (1986), on the other hand, write that if a strong sense of self-efficacy is established, future failures or stagnation may not have the same negative impact.

Observation, social comparison, and feedback function as sources of information that can affect the development of self-efficacy. By observing an equal peer, the observer may gain confidence that they too can accomplish the movement, task, or test. This will only have an effect if confirmed through performance. Similarly, self-efficacy can be gained through feedback, «*Your explosive throws will save this match*» or «*I believe in you*» are motivational feedback or comments that can have a temporary positive effect on self-efficacy, a more permanent effect is only possible if they succeed in their task (Schunk, 1995).

Self-efficacy and Performance

Bandura (1986) describes that self-efficacy and motivation have a positive relationship. «If motivation is defined as choice, effort, and persistence, a person with high self-efficacy will more eagerly choose to participate, put forth more effort, and persist longer at a task than an individual with low self-efficacy» (Chase, 2001, pp. 47-48). Schunk (1995) takes it further and writes that self-efficacy predicts motivation, performance, and achievement. This entails cognitive skill learning, pain tolerance, athletic performance, career choices, and sales performance (Bandura & Cervone, 1986; Schunk, 1989). These findings support Cox's early results, that if IQ was kept constant, confidence in abilities was a predictor of achievement (Cox, 1926). Self-efficacy by itself is no miracle cure, achievement without the necessary skill or knowledge is not possible. Yet, self-efficacy acts as a motivational factor due to confidence in abilities. Confidence without skill can only take you so far. Another interesting tendency is outcome expectations and self-efficacy. Individuals with high self-efficacy will often expect a positive result when they have performed well. This expectation is often met, even though there is no automatic relation (Schunk, 1995). Moritz et al. (2000) conducted a large meta-analysis based on 45 studies, with more than 100 correlation coefficients. Their results revealed a large specter of correlational size for self-

efficacy and performance in sports, ranging from a low $r = .01$ to a high $r = .79$, with some correlations being negative. However, the average correlational score between self-efficacy and performance in sports was $r = .38$, a positive moderate relationship (Moritz et al., 2000).

Interventions for Higher Self-efficacy

Schunk (1995) wrote of three types of interventions that can be introduced for higher self-efficacy; models, feedback, and goal setting. Models could give individuals insight into their capability to accomplish a task if they follow the same sequence of action as motioned by the model. Knowledge of how to perform a task, and the perceived similarity to the model, is an important factor that can develop and strengthen self-efficacy (Bandura & Cervone, 1986; Schunk, 1989; Schunk, 1995). In addition to self-efficacy, these models affect motivation, persistence, and achievement (Schunk, 1981). Feedback also impacts self-efficacy, motivation, and performance (Schunk, 1995). In 1982 Schunk conducted an experiment where he found that children (7 to 10 years of age) who were given attributional feedback on their past achievements, gained greater skill development and a higher percept of self-efficacy. Setting goals is hypothesized to affect self-efficacy, motivation, and performance (Bandura, 1988; Locke & Latham, 1990; Schunk, 1990). Goals affect these aspects indirectly, through cognitive mechanisms (Locke & Latham, 1990), driving effort and endurance. Furthermore, goals enable the assessment of progress and strengthen commitment, but only if goals are self-set, which may not be the case for goals set by others. Conflicting research exists on this topic, with findings being both confirmed and denied (Schunk, 1995).

High self-efficacy is associated with hard workers who choose demanding challenges, endure longer, and perceive high effort as something positive (Mouloud et al., 2015). They also experience less anxiety. Self-efficacy plays a central role in sports performance, through the regulation of emotions (Bandura, 1997). Decades of research also show that children's

self-efficacy is a robust predictor of motivation and performance in school (Furrer & Skinner, 2003). Dinç (2011) found that compared with individual sports, team sports had a positive correlation with social self-efficacy. Results showed significant differences in social self-efficacy scores between the individual sport; table tennis and team sports; handball and basketball. The same results were true for swimming and handball, as well as basketball. To further strengthen these results there were no significant differences between individual sports such as; table tennis and swimming, nor between team sports; handball and basketball.

As illustrated above, models function as a source for higher self-efficacy. Models can be teammates, champions, coaches/teachers, or mentors. The next section will explore how significant others like teachers, coaches, and mentors affect learning, development, and performance. This thesis research motivational factors in athletes, hence most emphasis will be put on the coach, but in addressing this subject, other important models will be discussed, as some aspects may be relevant for more than coaches and athletes specifically.

The Effect of a Coach

In school, teachers affect motivation, perceived control, effort, engagement, and performance (Birch & Ladd, 1997; Furrer & Skinner, 2003; Goodenow, 1993; Murdock, 1999; Ryan et al., 1994; Wentzel, 1997). In sports, this might be true for coaches. Data from 2020 show that 54% of children and adolescents (6-17 years of age) in the USA participated in sports the past year (Black et al., 2022), and an extensive rapport by Bakken (2019) found that 75% of Norwegian youth (13-18 year-olds) were or had been active in sports. These numbers suggest that a large percentage of youth will at some point participate in sports, gain a relationship and feel the effect of a coach. Similarly to teachers, coaches will affect performance, and the relationship between athletes and their coaches is acknowledged as a key factor for success in sports, entailing performance, and well-being (Frøyen, 2021).

Definition

The relationship between an athlete and a coach has a great impact on the training processes, performance outcomes, and athlete experience. In addition, the relationship can affect many aspects of the athlete's life (Coakley, 1990). The relationship between a coach and an athlete can be defined as «the situation in which coaches' and athletes' emotions, thoughts, and behaviors are mutually and casually inter-connected» (Jowett & Ntoumanis, 2004, p. 245). The definition of the athlete-coach relationship has three major components; a technical and instructive component, focusing on training and performance issues. The second is a social-psychological component regarding behavior, needs, and cognition in the relationship. The third is a spiritual component, thoughts, and beliefs regarding their mutual connection (Poczwardowski et al., 2002).

Relationship

Furrer and Skinner (2003) researched the sense of relatedness as a factor in children's academic engagement and performance and found that student-teacher relationships are a factor that develops with age and that these relationships have an effect on motivation and performance. Results supported earlier findings on the subject matter. Trusted others can function as a motivational resource and buffer when faced with difficulty. For young students in middle school, perceived teacher care predicted a positive change in motivational outcomes after two years, when controlling for previous academic performance (Wentzel, 1997), as well as engagement (Ryan et al., 1994). Research done using teacher reports found that teachers perceived closeness to a student strongly predicted children's performance in preschool (Birch & Ladd, 1997). This extends to early adolescence, where teachers self-report predicted performance and achievement, effort, and engagement in their students (Goodenow, 1993; Murdock, 1999).

Frøyen (2021) researched the need for relatedness in athletes competing at a world-class level. She defines a positive relationship as an equal investment in time and effort, where both the coach and athlete work toward a mutual goal and agree on their path. Athletes will thus experience their coaches as task-, and development-oriented (growth mindset). On the other hand, a negative relationship is conversely affected by differences in engagement, energy, and effort, where athletes can experience their coach as primarily result-orientated (fixed mindset). Consequently, they will struggle to perform and achieve their goals, and in some cases, reduce well-being. Especially, poor communication can reduce energy and waste time, which should be assigned to development. Frøyen (2021) even reported that any issues in the relationship had to be resolved before the beginning of a new season, as athletes felt it affected their performance negatively.

The Need for a Coach

«New research shows that outstanding performance is the product of years of deliberate practice and coaching, not of any innate talent or skill» (Ericsson et al., 2007, p. 115). While researching world-class performers, Ericsson found that teachers closely supervised each practice session. Even at the highest level of performance, supervision was essential. This being said, upcoming experts had different needs at each developmental stage and thus required different types of teachers or coaches. Early on, most people learning a new craft have local teachers, with whom they gain a close relationship, devoting a lot of energy, and praise. Later, more knowledgeable and experienced teachers may be required for continued development. The ultimate teacher or coach is often an individual who has reached the highest performance level in their subsequent field and thus has first-hand experience. Having a coach, or a teacher who guides learning is of great importance, as they can teach their student the existing framework or take them through organized materials. This enables

quicker learning and the possibility of reaching new heights (Ericsson et al., 2007). Example: Why is it that countless world records are set every year? One explanation is that athletes use existing knowledge, guided by their coaches, and continue to push the limits, thus developing an even higher level. Using an existing framework allows more time for development.

Genes or Environment in the Quest for Success

In 1985 Bloom examined factors that contributed to talent. While investigating 120 elite performers, from multiple fields, he couldn't identify any initial childhood predictors for success. In contrast with research at that time, he concluded that IQ was not sufficient in explaining high performance in music or sports. However, physical aspects like height and body size were found to have some predictability in sports performance (Bloom, 1985; Ericsson et al., 2007). Interestingly, Bloom found that the presence of devoted others, and the quality of practice sessions, affected performance, but not necessarily talent. With this, he concluded that experts are made and not born (Bloom, 1985; Ericsson et al., 2007). The presence of a devoted other, like a coach that can assure development quality, is important. Not all practice is good practice, and for a teacher or coach to positively affect performance, they need to have a good relationship and use the necessary teaching and coaching techniques, and enable deliberate practice, to reach their goals (Ericsson et al., 2007).

Mozart is arguably the most well-known composer in history, associated with great musical talent from a young age. Even though Mozart seemed abnormally gifted as a child, it's important to acknowledge that his father, a skilled composer and the author of the very first instruction book for the violin, acted as his mentor (Ericsson et al., 2007). His father was both a highly successful composer and probably had skills that enabled him to teach, based on his instructions book. Mozart's father guided him through the framework, giving him exposure to music from an early age.

Individual- vs. Team Sports

Differences in Personality

Within Sports Psychology, studies have compared team and individual athletes and found differences in personality characteristics between the two groups. Results show that individual sports athletes score significantly higher on two personality traits; conscientiousness and autonomy, compared with team sports athletes, who score higher on extraversion, agreeableness, and sociotropy (Nia & Besharat, 2010). Nia and Besharat (2010)'s findings confirm previous findings by Eysenck et al. (1982) about the possibility of differences between personality characteristics of individual sport athletes and team sport athletes. These differences were explained by differences in how the individual likes to achieve competence and success. Do they need control and autonomy, or are they more sociable, trusting, and team players (Nia & Besharat, 2010)? Another study on female athletes, from both individual and team sports, found that individual sports athletes scored higher on dominance, sensitivity, introversion, and self-sufficiency than women of team sports. In contrast with Nia and Besharat (2010), they could not find a difference in conscientiousness, sociability, or stability (Peterson et al., 1967). Using a form of the 16 personality factor questionnaire to gather their data. A third study that researched the athlete-coach relationship found that individual sport athletes felt closer, more strongly committed, and more complimentary with their coaches, compared to team sport athletes (Rhind et al., 2012). With knowledge of previous research findings, where athletes score higher on motivational factors, and where differences in psychological characteristics between individual and team sports athletes exist, this thesis set out to research if these two groups differ in their scoring on motivational factors.

Practice Hours

San and Lee (2014) conducted a study of 30 swimmers. They were 15 elite swimmers with at least one medal in national-level competitions, with a mean age of 16, and 15 sub-elite swimmers who had represented their state, but not won any medals at national-level competitions, with a mean age of 14-15 years. The elite swimmers accumulated significantly ($p = .03$) more hours at swim-related practice than the sub-elite swimmers, between the ages of 6-15. This difference increased toward adolescence. 13-15 years old elite swimmers had a mean score of 2823.5 hours ($SD = 1033.7$), and the sub-elite swimmers had a mean score of 1134.8 hours ($SD = 996$). This phase is often called the specialization phase, and there is a clear difference between the elite swimmers and the sub-elites at this phase, with the elites practicing more than twice as much. This difference in practice hours was significant ($p < .001$) (San & Lee, 2014). By visual inspection of Figure 1 in San and Lee (2014), swimmers at the elite level spent 1000 hours at swim practice (age 14), compared with the sub-elite swimmers who spent 400 hours at the same age each year (San & Lee, 2014). This is roughly 21 hours of practice each week through the entire year for the elite level, compared with 8 hours for the sub-elite level.

Wedderkopp and colleagues conducted a study that was published in 1997 where their sample consisted of young female handball players. They used a questionnaire to gather data from 217 young athletes aged 16-18 years ($M = 17$). Two elite teams ($n = 24$) reported 6-11 weekly practice hours and ten intermediate teams ($n = 107$) reported attending handball practice for 2-4 hours per week. Ten additional recreational teams ($n = 86$) were also part of their study and reported practicing handball for 2-3 hours per week (Wedderkopp et al., 1997). These data give an overview of hours spent at practice for young female handball players, in that area and point in time. It's interesting to note that there is almost no difference between the recreational and intermediate teams, but a noticeable difference once they

belonged to an elite team. Data was not given as to which competitive level the elite team competed at, but there is a substantial difference between swimmers and handball players in hours spent at practice, given these two references.

This thesis compares how swimmers-, and handball players score on passion, grit, mindset, self-efficacy, coach effect, and practice hours. Previous studies have shown that athletes score higher on passion, grit, and mindset than control groups using students (Shamshirian et al., 2021; Sigmundsson, Clemente, et al., 2020). Athletes are an interesting group to study, as they spend a considerable amount of time and energy, developing their skills. These two sports belong to different categories; individual and team sports. Previous studies at NTNU and in collaboration with Hermundur Sigmundsson have studied some of the same variables as in this thesis and found differences based on competition levels, performance, and achievement. The next section elaborates on some of their findings, both regarding individual and team sports. Data from the American football players and the rifle shooters were two master theses and not officially published research articles. However, it's interesting to observe their scores nonetheless.

Previous Studies of Athletes on Passion, Grit, Mindset, and Self-efficacy

Football Players

Sigmundsson, Clemente, et al. (2020) collected data from 3 teams of Norwegian male football players ($N = 63$) within the same club and studied how they scored on passion, grit, and mindset using the same scales as in this thesis. These teams were; the junior team 16 (mean age 15), the second junior team 18 (mean age 18), and the elite team (mean age 22). Some of these athletes ($N = 46$) were reviewed based on football competence by their coaches, with some placing in the 30% highest football competence group (HFC) and others 30% lowest football competence group (LFC). The junior teams had significant differences in

their passion scores, based on the two categories; LFS and HFC. The junior LFC players had a passion score of 4.46, in comparison to the HFC group who had a passion score of 4.87, and a grit score of 3.64 for the LFC players, relative to 3.98 for the HFC players. However, this mean difference for grit was not significant. With regards to mindset, scores for LFC (4.70) and HFC (4.69) were the same and thus not significantly different (Sigmundsson, Dybendal, et al., 2022). The same tendencies of increased passion scores between LFC and HFC were true for the elite team, with scores that were a bit lower. Additionally, the same tendency was visible for grit, but with a higher mean score than the juniors. The elite group had a similar increase from junior LFC to HFC for mindset, but scores were noticeably lower than for the junior group.

American Football Players

Askeland (2022) wrote a master's thesis where he researched American football players at different levels. The total sample consisted of 60 athletes, with the elite team, division 1, division 2, and the junior team. He found a steady increase from a passion score of 4.22 (juniors) to 4.35 and 4.39 at the 2 and 1 division teams, and ultimately a passion score of 4.56 for the elite group. The difference in scores between the elite and junior teams was significant. The same trend was visible for grit, but mindset had varying results, with the lowest score for the junior team (4.16), the highest in the division teams, and a considerable drop for the elite team. Mindset did not increase with increased competition level in his sample but varied across levels.

Iranian Wrestlers

Shamshirian et al. (2021) researched how Iranian wrestlers scored on passion, grit, and mindset. The sample consisted of 124 male wrestlers with a mean age of 22 ($SD = 4.54$). The

wrestlers were separated by their levels of competitiveness; national and international. The national group had higher passion scores ($M = 4.62, SD = .33$) in comparison with the international group ($M = 4.52, SD = .46$). Grit had a microscopical increase from national ($M = 4.09, SD = .62$) to international ($M = 4.10, SD = .56$) levels, and mindset had a decrease in scores from national ($M = 82, SD = .94$) to international levels ($M = 4.70, SD = .92$). These data does not show higher passion nor mindset scores for the international competitors, which were interesting findings in comparison with the previous sections. Shamshirian et al. (2021) also compared how their sample (the wrestlers) and the Norwegian football players scored (Sigmundsson, Clemente, et al., 2020). He suggested that culture could explain some of the differences. His sample of wrestlers mainly came from rural, low-income backgrounds, making wrestling their ticket out of poverty and upward social mobility. Arguably, their quest for excellence was driven by other motives like fame and wealth, which could outweigh passion. As these athletes don't necessarily have lots of equipment available, the aspiring wrestlers had to be embedded into the cultural environment and learn from previously successful Iranian wrestlers, and masters (Shamshirian et al., 2021).

Norwegian Rifle Shooters

Lillegård (2020) studied how 49 of the 100 highest-ranked rifle shooters nationally (summer of 2019) scored on passion, grit, self-efficacy, and flow. The sample was for the most part males (78%), with a big age range from 16 to 61, and a mean age of 34 ($SD = 12.29$). The passion score for this sample was 4.18 ($SD = .54$), and the grit score was 3.81 ($SD = .47$). The self-efficacy scale used was different from the scale utilized in this thesis, and thus results were not directly comparable, although scores were high relative to the minimum and maximum values. In her sample, self-efficacy had the highest significant correlation with performance ($.33 p = .011$). Passion had a low to moderate negative correlation with

performance $-.24$ $p = .046$, although significant. Grit, on the other hand, was not found to correlate significantly with performance in this sample. The relationship between the studied variables was also conducted, revealing the strongest relationship between passion and self-efficacy (.47**), followed by grit and self-efficacy (.41**), and lastly, passion and grit (.38**). These were all positive moderate to strong correlations that had a significant relationship with one another.

The Current Study

The purpose of this study is given in the main title for this thesis; exploring passion, grit, mindset, self-efficacy, experienced coach effect, and practice hours for adolescent swimmers and handball players at different levels of competition. In doing this, four main questions are being researched.

RQ1: Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on individual and team sports?

RQ2: What are the correlations for the motivational factors, the coach effect, and practice hours for the group as a whole, and for both sports?

RQ3: Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on competition levels?

RQ4: What are the correlations for the motivational factors, the coach effect, and practice hours for the different competition levels?

As illustrated in the introduction, the variables researched in this thesis are based on Figure 1 «To become expert» by Sigmundsson, Haga, et al. (2020a). In his research, Sigmundsson explores passion, grit (Sigmundsson, Clemente, et al., 2020), and mindset (Shamshirian et al., 2021; Sigmundsson, 2021; Sigmundsson, Dybendal, et al., 2022;

Sigmundsson, Haga, et al., 2022b; Sigmundsson, Haga, et al., 2020a), as well as self-efficacy, as motivational factors. Figure 1 also lists significant others, such as good trainers, as an important factor to become an expert. Figure 1 also incorporates training specifically and generally; intensity, repetition, deliberate practice, specificity, and training with focus. In this thesis, weekly practice hours were chosen to measure aspects of training. Self-efficacy is not mentioned in Figure 1, but frequents literature and studies of motivation, and has been used in one other master's study in addition to passion and grit (Lillegård, 2020), supervised by Sigmundsson. Considering this, when this thesis describes and elaborates on motivational factors, this entails passion, grit, mindset, and self-efficacy. The coach effect and practice hours are separate constructs, which this thesis investigates.

The main aim of this study is thus to explore if there are differences in scores regarding motivational factors, the coach effect, and practice hours, dependent on what type of sport one competes in; an individual sport like swimming, or a team sport like handball. Athletes have been found to score higher on some of these factors compared to students and samples of convenience, but a study comparing individual and team sports based on these factors has not yet been conducted. In addition, this thesis explores if there are differences in scores based on competition level. This could give insight into how important these factors are for athletes competing at different levels. This is similar to the study conducted by Sigmundsson, Dybendal, et al. (2022), where passion, grit, and mindset were researched dependent on football competence.

Methods

Participants

The sample consisted of 293 athletes, with a mean age of 17 ($M = 16.65$, $SD = 1.16$). Most participants finished the questionnaire, but some had a few questions that remained unanswered. In these cases, the mean result for each variable was calculated and added. The sample consisted of 153 males (52%) and 140 females (48%), ranging from 15 to 19 years of age, males mean age ($M = 16.59$, $SD = 1.17$), and females ($M = 16.72$, $SD = 1.14$). This age group was chosen due to it being a sensitive phase where athletes either quit or choose to continue, and because athletes have reached higher levels of performance at this age. As illustrated in Table 1, swimmers accounted for 145 (49,5%), and handball players 148 (50,5%) of the participants. Swimmers' mean age was ($M = 16.38$, $SD = 1.25$), and handball players were ($M = 16.92$, $SD = 1.00$). Among the athletes, 62 (21%) reported that the highest level they had competed at in swimming/handball was at a regional level (mean age 16.43, $SD = 1.22$). 145 (50%) reported a national level (mean age 16.85, $SD = 1.22$), 63 (22%) at an international level (mean age 16.57, $SD = 1.17$), and 21 (7%) answered none of the above (mean age 16.20, $SD = .95$), see Table 1. It is likely that the last mentioned group belongs to the regional level, or is not actively competitive athletes. These respondents were filtered out while analyzing research questions 3 and 4, due to the aim of researching active competitors. When using the filter the total number of swimmers was $n = 135$ and for handball players $n = 135$.

Table 1*Frequency Statistics for Competition level -Swimmers and Handball players*

	Total (N = 293)		Swimmers (n = 145)		Handball players (n = 148)	
Competition level	Freq.	Percent	Freq.	Percent	Freq.	Percent
Regional level	62	21%	25	17%	37	25%
National level	145	50%	74	51%	71	48%
International level	63	22%	36	25%	27	18%
None of the above	21	7%	10	7%	11	7%

Procedure

A self-reporting questionnaire was conducted in August 2022 using the online survey service; Nettskjema (<https://nettskjema.no>). Data collection was administered using the same survey service, which began on the 27. of August and closed on the 2. of October 2022. The survey targeted competitive Norwegian swimmers and handball players aged 15 to 19 years. The master's project was first presented at the Norwegian Swim Federation's annual conference for coaches and leaders. After this, the survey was published in two swim-coach groups on Facebook. The national and regional teams were contacted, and selected leaders and coaches were directly contacted to ensure the athlete's participation. Data from handball players were collected by contacting clubs in Norway and four national handball teams, consisting of 16- and 18-year-olds. Thus this was a sample of convenience, as well as targeted teams at regional and national levels. The survey informed of the purpose of the study targeted age groups and anonymity. Information was also given about the estimated time spent on the questionnaire as well as information that one could withdraw at any point, before the final send (see Appendix A). None of the questions were mandatory, and there was no reward for participation. Data about gender, age, sport, hours spent practicing, the highest

level of competition, and grades were collected (see Appendix B). The combination of these data does not entail enough personal information for identification; thus, it was not necessary to apply for NSD.

Measurements

Passion Scale

This study used the passion scale by Sigmundsson and colleagues (2020a) (see Appendix C). This scale measures the degree of passion for achievement in themes, skills, or areas. The passion scale used in this study contains 8 questions, examples of questions are «*I have an area/theme/skill that I am passionate about*» and «*I work hard enough to fulfill my goals*». These questions were answered using a 5-point Likert scale, where 1 represented «*very much like me*» and 5 «*not like me at all*». A high passion score was closer to 1, and a low score was closer to 5. This was later reversed during analysis so that a high passion score corresponded with a higher number. This scale has been used in multiple previous studies with participants from football, university students, and different age groups (Sigmundsson, 2021; Sigmundsson, Dybendal, et al., 2022; Sigmundsson, Haga, et al., 2020b). Taylan et al. (2020) published a study using the passion scale on a Turkish sample. Their results showed good dimensionality, an adequate factor structure for the scale, and a Cronbach's alpha of .87. This result confirms good internal consistency for the scale.

Grit Scale

Grit was measured using the Norwegian version of the Short-Grit scale (Sending, 2014), see Appendix C. This 8-item scale has proven to have good psychometric properties and it is more time efficient than the original 12-item by (Duckworth et al., 2007). The Grit scale measures perseverance of effort through questions like «*I finish whatever I begin*» and

«*I am a hard worker*». It also measures the consistency of interest (long term) with items such as «*I often set a goal but later choose to pursue a different one*». This scale was also measured with a 5-point Likert scale, where 1 was «*very much like me*» and 5 was «*not like me at all*». The scale has been used in multiple studies and has a good factor structure, and reliability tests have shown a Cronbach's alpha of .80-.83 (Duckworth & Quinn, 2009; Li et al., 2018).

Mindset Scale (Implicit Theories of Intelligence Scale)

A Norwegian translation of Dweck's 1999 Implicit Theories of Intelligence Scale (ITIS) was used to measure mindset (Bråten & Strømsø, 2004; Dweck, 2013), see appendix C. This scale measures beliefs about intelligence (Dweck & Leggett, 1988). ITIS contains 8 items, that measure both a fixed and a growth mindset (Dweck, 2013). Of the 8 items, 4 of these measure a fixed mindset, for example, «*To be honest you can't really change your intelligence*», and 4 measure a growth mindset «*You can always substantially change your basic intelligence*». A 6-point Likert scale was used to answer these items, where 1 meant «*strongly agree*» and 6 «*strongly disagree*». Assumptions about growth mindset were later reversed so that 1 became «*strongly disagree*» and 6 «*strongly agree*», the reversal was so that a high mean score for growth mindset would represent an increase in the growth mindset. The scale has been found to have good internal consistency. Bråten and Strømsø (2004) found a Cronbach's alpha of .86 and Dybendal (2022) found a Cronbach's alpha of .94.

Self-efficacy Scale

The General Self-efficacy Scale (GSE) conducted by Schwarzer and Jerusalem (1995) was used to measure self-efficacy. This scale was originally German, but it is available in 33 languages. In this study, a Norwegian translation was utilized (see Appendix C). The GSE

scale was created to assess a general sense of perceived self-efficacy, designed for adults and adolescents. The construct of perceived self-efficacy reflects an optimistic self-belief (Jerusalem & Schwarzer, 1992), and can be viewed as a positive resistance resource factor (Schwarzer & Jerusalem, 1995). To assess this, 10 items with positive assumptions about coping mechanisms were administered. To illustrate; «*I can solve most problems if I invest the necessary efforts*» and «*I can usually handle whatever comes my way*». To answer these assumptions a 4-point Likert scale was used, ranging from; 1; «*not at all*», 2; «*hardly true*», 3; «*moderately true*», and 4; «*exactly true*». This scale has great strength, as it has been used internationally with success for more than three decades, as well as a solid reliability measure, with Cronbach's alpha ranging from .70 to .90 (majority high .80s) from 23+ different nations.

The Coach Effect Scale

A new composition of questions was assembled to assess the coach's effect (see Appendix C). The Coach Athlete-Relationship Questioner (CART-Q) (Jowett & Ntoumanis, 2004) acted as inspiration but was altogether too long for this study. CART-Q contains 23 questions, divided into factors; commitment, closeness, and complementarity. CART-Q has been found to have a good internal consistency (reliability) for each subscale, with a Cronbach's alpha ranging from .82 to .88 on the subsequent subscales. The higher order Cronbach's alpha for the coach-athlete relationship was .93. (Jowett & Ntoumanis, 2004).

To assess the effect of a coach on an athlete's performance, only five items were used. These items needed to capture the athlete's perception of the coach's importance for their development and how they perceived their relationship. This was done through the following assumptions; «*My coach and I work goal orientated towards the same goals*». This assumption was intended to test whether there was a partnership/cooperation between the two

parties, as a good athlete-coach relationship needs mutual goals and a mutual plan for achievement (Frøyen, 2021). Another assumption was «*My coach has been significant for my development*», this assumption forces the candidate to reflect and more directly captures what the previous assumption set out to do. These two assumptions arguably capture the same as Jowett's factor of Commitment.

The assumptions «*I feel that my coach can see/understand all of me*», and «*I feel that we have a good relationship*» aimed to capture their understanding of their relationship, as this may play an important factor in development and performance. These two assumptions were in line with Jowett's factor of closeness. The ultimate assumption of the five items used in the new scale was «*I consider my coach to be qualified*». This would not fit in with Jowett's last factor of complementarity, but give insight into a relationship, as this may influence an athlete's perception of their coach's effect on their development, and performance. These five items were answered with a 7-point Likert scale, that was adopted from CART-Q, ranging in agreement from 1 «*not at all*» to 7 «*extremely*» (Jowett & Ntoumanis, 2004).

Statistical Analysis

Data collected in the survey using Nettskjema was downloaded and screened in IBM SPSS version 28. For each missing value in the data set, a mean score was calculated for that specific variable, within its respective athlete group. Two individuals were removed from the dataset, based on only answering the first 2-3 questions. Next, relevant variables were investigated, to check if statistical assumptions were met. Normality and linearity were first checked through box plots and scatterplots, where a few outliers could be found, especially for the coach effect variable. To further investigate; skewness, kurtosis, and histograms were considered, and these data showed that 8 participants were distinct outliers, and should be removed, to get the assumption of normality to this sample, with skewness and kurtosis values

between -1 and +1 (Pallant, 2020). After the removal of these outliers, the data showed normal and linear distributions, with some factors being negatively skewed. However, one could argue that this sample should be skewed due to high-performing athletes, making the goal of normal distribution less important.

Primarily, a reliability analysis was conducted to check good internal reliability for each scale. To answer the first research question (RQ1); Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on individual and team sports? Descriptive statistics were done to observe differences in mean total scores and standard deviations between the sample as a whole, swimmers, and handball players. In addition, multiple independent sample T-tests were used to investigate if the mean total scores on each researched variable were significantly different for swimmers and handball players. Next, a Bivariate Pearson Correlation analysis was conducted to research the relationship between passion, grit, mindset, self-efficacy, coach effect, and practice hours for all participants together, but also for each group: swimmers and handball players. This was done for research question 2. To assess the strength of each correlation, guidelines by Cohen (1988) were used.

To assess the third research question (RQ3); Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on competition levels? A filter was added where participants who answered «*None of the above*» when asked; «*What is the highest level you have competed at?*» were removed from the sample. This change led to a reduction of 25 participants, and so new descriptive statistics were done, giving a summary of how this affected the motivational scores for the new total sample, swimmers, and handball players. Next, descriptive statistics were done to gain insight into how the sample, divided into competition-level, scored on motivational factors and practice hours. Further, a Multivariate Analysis of Variance (MANOVA) was performed with a Bonferroni Post Hoc

test. This test was done to investigate significant differences in mean scores for each competition level; regional-, national-, and international levels. Ultimately, a Pearson Correlation analysis was used to assess research question 4 (RQ4); What are the correlations for the motivational factors, the coach effect, and practice hours for the different competition levels? This was done to observe the relationship between competition level and each motivational factor. The same filter that was used in the previous research question remained active while conducting the correlational analysis for RQ4.

Results

Reliability

Since the scale that measured the coach effect was a new construct, with questions derived from a huge scale, and with questions the author found important, Cronbach Alpha was calculated to assure good internal reliability. The scale for the coach effect displayed good internal consistency, with a Cronbach's Alpha of .85 for the five items. Removal of any question, except question 1, would result in a lower Cronbach's alpha, and reduced internal reliability. If Item 1 was deleted, Cronbach's alpha would be .87. Reliability analysis also revealed good internal reliability for all scales used on this sample, similar to previous results for these scales. Cronbach's alpha for each scale was; passion at .87, grit at .70, mindset at .87, and self-efficacy at .84.

RQ1: Descriptive Statistics and T-test

Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on individual and team sports?

To begin with, total scores for each scale were calculated, and results shown in Table 2, are descriptive statistics of mean scores of each motivational variable in addition to practice hours, for all athletes together as well as swimmers and handball players separately. The descriptive statistics revealed that the athletes as a whole scored high on all variables. There were marginal differences in scores dependent on the type of sports, but swimmers had the highest scores on all variables, except for passion, where handball players scored higher. However, the coach effect and practice hours had a more substantial difference between the groups. T-tests were performed to investigate the significance of these mean differences. None of the motivational factors had significant differences based on the sport. However,

significant differences in the coach effect and practice hours could be observed. Swimmers had a mean coach-effect score of ($M = 6.26, SD = .61$) which was significantly higher ($p = .002$) than coach-effect scores for handball players ($M = 5.99, SD = .82$). Practice hours were measured based on categories, and these statistics reveal that swimmers ($M = 3.14, SD = .87$) had a significantly higher mean score for practice hours ($p < .001$), compared with handball players ($M = 1.78, SD = .93$), see Table 2.

Table 2

Mean (M), Standard Deviation (SD), Minimum (min), and Maximum (max) Values for Each Variable for the Total Sample, Swimmers, and Handball Players

Variables	All Athletes ($N = 293$)		Swimmers ($n = 145$)		Handball Players ($n = 148$)		p^*
	$M (SD)$	Min-Max	$M (SD)$	Min-Max	$M (SD)$	Min-Max	
Passion	4.21 (.55)	2.75-5.00	4.20 (.49)	2.88-5.00	4.22 (.61)	2.75-5.00	.735
Grit	3.48 (.53)	2.00-5.00	3.49 (.52)	2.25-5.00	3.46 (.54)	2.00-4.75	.631
Mindset	4.06 (.85)	1.88-6.00	4.08 (.86)	2.00-6.00	4.05 (.83)	1.88-6.00	.752
Self-efficacy	3.24 (.38)	2.00-4.00	3.27 (.38)	2.00-4.00	3.22 (.38)	2.20-4.00	.223
Coach effect	6.12 (.74)	3.60-7.00	6.26 (.61)	4.20-7.00	5.99 (.82)	3.60-7.00	.002
Practice hours	2.45 (1.13)	0-4	3.14 (.87)	0-4	1.78 (.93)	0-4	.001

Note: p-values (two-tailed) derived from independent sample t-tests.

RQ2: Correlational Analysis

What are the correlations for the motivational factors, the coach effect, and practice hours for the group as a whole, and for both sports?

A Pearson Bivariate Correlation was conducted to investigate the relationship between the relevant variables, and if there were any differences depending on the type of sports. One correlational analysis was conducted to study the effects for all participants ($N=293$), and two additional correlational analyses were conducted for swimmers and handball players. All correlations and significant scores can be found in Tables 3a, 3b, and 3c. Results elaborate on the two highest and lowest correlations illustrated in each table.

Table 3a

Pearson Bivariate Correlation for Passion, Grit, Mindset, Self-efficacy, Coach Effect ($N = 293$), and Practice Hours ($N = 292$) for the Whole Sample.

Variables	Passion	Grit	Mindset	Self- efficacy	Coach effect	Practice hours
Passion	1.00	.45**	.14*	.50**	.33**	.18**
Grit		1.00	.20**	.44**	.17**	.15**
Mindset			1.00	.15*	.06	.12*
Self-efficacy				1.00	.21**	.13*
Coach effect					1.00	.23**
Practice hours						1.00

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

Table 3a shows low to moderate significant correlations for most of the measured variables for athletes in this sample. The strongest correlations could be found between passion and self-efficacy $r(293) = .50, p < .001$, passion and grit $r(293) = .45, p < .001$, and grit and self-efficacy $r(293) = .44, p < .001$. Passion correlated the strongest with most

variables, followed by grit and self-efficacy. Coach effect and mindset had the lowest correlation for the total sample and was the only relationship not to be significant.

Table 3b

Pearson Bivariate Correlation for Passion, Grit, Mindset, Self-efficacy, Coach Effect (n = 145), and Practice Hours for Swimmers (n = 144)

Variables	Passion	Grit	Mindset	Self- efficacy	Coach effect	Practice hours
Passion	1.00	.45**	.24**	.56**	.37*	.12
Grit		1.00	.17*	.45**	.21*	.19*
Mindset			1.00	.16	.13	.12
Self-efficacy				1.00	.21*	.14
Coach effect					1.00	.15
Practice hours						1.00

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

Table 3b shows that swimmers had the highest correlations between self-efficacy and passion $r(145) = .56, p < .001$, and self-efficacy and grit $r(145) = .45, p < .001$. Both of these correlations were positive and significant at a moderate level. Mindset and coach-effect $r(145) = .08, p < .05$, and mindset and self-efficacy $r(145) = .13, p > .05$, had the lowest correlations of the motivational factors. Both coach effect and self-efficacy had a positive low non-significant correlation with mindset. Table 3c shows that handball players had the highest correlations between passion and grit, as well as passion and self-efficacy, and self-efficacy and grit. Passion had moderate positive correlations with grit $r(148) = .45, p < .001$, and self-efficacy $r(148) = .47, p < .001$, and both of these correlations were significant. The lowest

correlations for handball players could be found between mindset and coach-effect $r(148) = .00, p > .05$, where there was no relationship, and mindset and passion $r(148) = .06, p > .05$.

Table 3c

Pearson Bivariate Correlation for Passion, Grit, Mindset, Self-efficacy, Coach Effect, and Practice Hours for Handball Players (n = 148)

Variables	Passion	Grit	Mindset	Self- efficacy	Coach effect	Practice hours
Passion	1.00	.45**	.06	.47**	.32**	.33**
Grit		1.00	.23**	.43**	.15	.15
Mindset			1.00	.14	.00	.15
Self-efficacy				1.00	.20*	.09
Coach effect					1.00	.17*
Practice hours						1.00

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

There were key differences in correlational scores for swimmers and handball players. The biggest differences could be found in passion and mindset, where these two factors had a much higher correlation for swimmers $r(145) = .24, p < .001$, compared to handball players $r(148) = .06, p > .05$. There was also a substantial difference for passion and practice hours, where handball players score $r(148) = .33, p < .001$, in comparison to swimmers who score $r(144) = .12, p > .05$. Swimmers had higher correlations for self-efficacy with all other variables, compared to handball players.

RQ3: Descriptive Statistics and MANOVA

Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on competition levels?

A filter was added to the sample to assess differences based on competition level, where everyone who answered category 3 «None of the above» was filtered out of the sample. This affected scores on each motivational factor. Mean scores of all motivational factors were slightly increased, for example, the passion score ($M = 4.21$, $SD = .55$) for the total sample ($N = 293$) increased to a *mean* score of 4.25 ($SD = .53$) for the newly filtered sample ($N = 270$). With the filter, the new total sample became $N = 270$, with $n = 135$ swimmers and $n = 135$ handball players. Coach effect ($p = .016$) and practice hours ($p < .001$) remained the only two factors that were significantly different between the two sports groups. In the investigation of this research question the sample was not divided into sports categories, but rather swimmers and handball players were combined and then divided by competition levels.

Descriptive Statistics

When using the filter and splitting the file into competition levels, it became possible to observe differences in mean scores between the three levels, see Table 4. For passion, mean scores increased with the competition level. Regional $M = 4.13$, national $M = 4.20$, international $M = 4.47$. The same could be said for grit, the lowest mean score could be found at the regional level ($M = 3.38$), and the highest mean score at the international level ($M = 3.69$). Mindset slightly increased from $M = 4.06$ at the regional level to $M = 4.11$ at the international level. Self-efficacy had a larger increase, similar to passion and grit. Contrastingly, the coach effect stood out, with its highest mean score at the regional level ($M = 6.27$), and the lowest mean score at the national level ($M = 6.07$). Mean scores for hours

spent at practice increased substantially with a higher competition level, based on categories.

Regional $M = 2.00$, national $M = 2.63$, and international $M = 2.84$.

Table 4

Mean and Standard Deviation on Passion, Grit, Mindset, Self-efficacy, Coach Effect, and Practice Hours Divided by Competition Level

	Regional Level		National Level		International Level	
Variables	$(n = 62)$		$(n = 145)$		$(n = 63)$	
Passion	$M = 4.13$	$SD = .50$	$M = 4.20$	$SD = .55$	$M = 4.47$	$SD = .45$
Grit	$M = 3.38$	$SD = .48$	$M = 3.46$	$SD = .53$	$M = 3.69$	$SD = .51$
Mindset	$M = 4.06$	$SD = .82$	$M = 4.07$	$SD = .88$	$M = 4.11$	$SD = .84$
Self-efficacy	$M = 3.19$	$SD = .39$	$M = 3.24$	$SD = .37$	$M = 3.35$	$SD = .35$
Coach effect	$M = 6.27$	$SD = .79$	$M = 6.07$	$SD = .78$	$M = 6.25$	$SD = .71$
Practice hours	$M = 2.00$	$SD = 1.07$	$M = 2.63$	$SD = 1.04$	$M = 2.84$	$SD = 1.00$

Note. Mean (M), Standard deviation (SD)

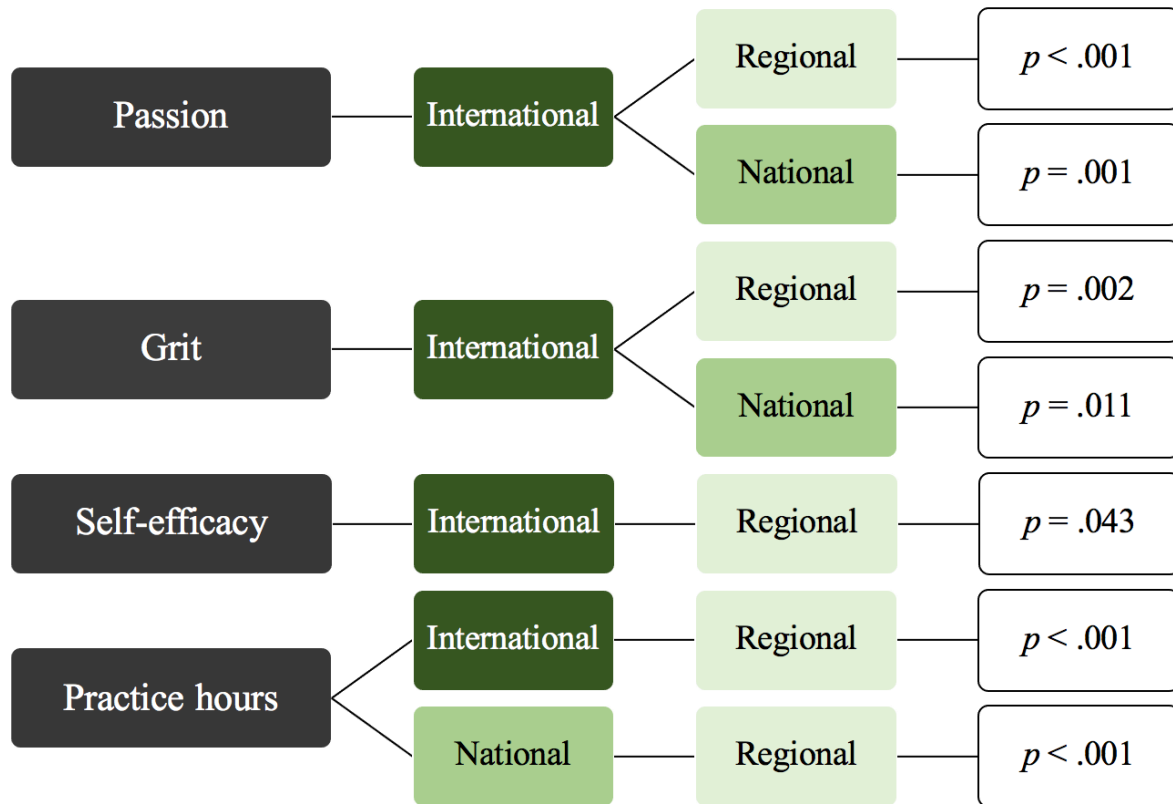
MANOVA - Multivariate Analysis of Variance - Bonferroni (Post Hoc test) with Filter

A MANOVA with a Bonferroni Post Hoc test was used to investigate if there were any differences in group means on motivational factors, the coach effect, and practice hours dependent on competition level, see Figure 3. For passion; there was a significant difference in scores for those competing at the international and regional levels $p < .001$, and international and national levels $p = .001$. There was no significant difference between regional and national competition levels on passion scores. For grit; there was a significant difference in scores for those competing at the international level and the national- $p = .010$, and regional levels, $p = .002$. There was no significant difference between regional and

national competition levels on grit scores. For self-efficacy; there was a significant difference in scores for those competing at the international level and regional levels, $p = .043$. There was no significant difference between international and national levels, nor national and regional competition levels on self-efficacy scores. For mindset and coach effect, no significant differences in scores could be found, based on competition level. For practice hours per week, there was a significant difference in categories between the regional level and national level $p < .001$, and a significant difference between the regional and international levels $p < .001$. There was no significant difference between the national and international levels, based on categories for hours spent at practice each week.

Figure 3

Bonferroni Post Hoc Test of Passion, Grit, Self-efficacy, and Practice Hours



Note. The figure illustrates which factors had significant differences based on competition level, where these differences occurred, and at which significant level. The mindset and coach effect did not appear as there were no significant differences between the competition levels for these two.

RQ4: Correlation Analysis with Filter

What are the correlations for the motivational factors, the coach effect, and practice hours for the different competition levels?

A Pearson bivariate correlation was conducted to investigate the relationship between the researched variables and differences dependent on competition level; regional-, national-

or international levels, see Table 5b. The variable that measures competition level (without splitting it into regional, national, and international levels), had significant, low to almost moderate, positive correlations with most researched variables (see Table 5a). However, there were two exceptions; mindset had a positive low correlation with competition level, and the coach effect had a low negative correlation with competition level. Both of these correlations were non-significant and with scores so low, they suggested no relationship for these variables (see Table 5a). The strongest relationship could be found for competition level and practice hours at $r(269) = .27, p < .001$. Splitting the file based on competition level revealed that there were some differences in correlations based on the regional, national, and international levels.

Table 5a

Pearson Bivariate Correlation of Motivational Factors, the Coach Effect, Practice Hours, and Competition level (N = 270).

Variables	Comp- level	Passion	Grit	Mindset	Self- efficacy	Coach effect	Practice hours
Comp- level	1	.22**	.21**	.02	.15*	-.01	.27**

*Note. $p^{**} < .001$ $p^* < .05$ (two-tailed)*

For passion, correlations with grit remain moderate in size, positive, and significant ($p < .001$) at all levels, see Table 5b. The correlations with mindset were low and non-significant at the regional and national levels, but at the international level, it became a moderate positive significant correlation $r(63) = .35, p < .001$. Correlations with self-efficacy were the highest significant correlations for this sample at all levels, with a high increase from $r(62) = .48, p$

< .001 at the regional- and national $r(144) = .47, p < .001$ to the international $r(63) = .57, p < .001$. Passion scores had the highest correlations with coach-effect at the national level $r(144) = .38, p < .001$, but was also significant at the regional level $r(62) = .26, p < .05$. There was no significant correlation for the international level.

Correlation scores for grit and mindset were only significant at the international level, the score was considerably higher at $r(63) = .35, p < .001$, compared to the low correlations at the regional and national levels, see Table 5b. Grit had its strongest correlations with self-efficacy, but interestingly it decreased from $r(62) = .47, p < .001$ for regional, to $r(144) = .46, p < .001$ for national, and last $r(63) = .33, p < .001$ for international levels. Coach effect had positive low to moderate significant correlations with grit at the national- $r(144) = .18, p < .001$ and international levels $r(63) = .28, p < .05$, but not at the regional level, $r(63) = -.01$. For practice hours the correlations were low and non-significant.

Mindset correlates significantly with self-efficacy at the national level $r(144) = .17, p < .05$, and even though the correlation for these variables was a fraction higher at the international level $r(63) = .19$, this correlation was not significant, similar to the regional level. No correlations were significant for mindset and coach effect. Mindset and practice hours had a moderately significant correlation at the regional level $r(62) = .29, p < .05$. The same was not true for the national or international levels.

Self-efficacy correlates significantly with coach-effect on one level; the national $r(144) = .24, p < .001$, this was a moderate positive significant correlation. Correlations for the regional $r(63) = .20$ and international levels $r(63) = .22$ were low to moderate, but not significant. Additionally, there were no significant correlations between self-efficacy and practice hours. Lastly, the coach effect had positive low to moderate correlations with practice hours, but these were only significant at the national $r(144) = .25, p < .001$, and international levels $r(63) = .27, p < .05$ (see Table 5b on the next page).

Table 5b

Pearson Bivariate Correlation of Motivational Factors, the Coach Effect, and Practice Hours Based on Regional Level (n = 62), National Level (n = 144), and International Level (n = 63), for the Total Sample.

Variables	Comp-level	Passion	Grit	Mindset	Self- efficacy	Coach effect	Practice hours
Passion	Regional	1	.37**	.12	.48**	.26*	.06
	National	1	.37**	.09	.47**	.38**	.15
	International	1	.38**	.35**	.57**	.13	-.06
Grit	Regional	.	1	.08	.47**	-.01	-.04
	National		1	.15	.46**	.18*	.09
	International		1	.34**	.33**	.28*	.09
Mindset	Regional			1	.09	-.05	.29*
	National			1	.17*	.09	.07
	International			1	.19	.10	.05
Self- efficacy	Regional				1	.16	.20
	National				1	.24**	.06
	International				1	.22	.09
Coach effect	Regional					1	.16
	National					1	.25**
	International					1	.27*
Practice hours	Regional						1
	National						1
	International						1

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

Discussion

This thesis aimed to explore passion, grit, mindset, self-efficacy, and experienced coach effect in adolescent swimmers and handball players at different competitive levels, also considering hours spent at practice. The research questions were designed to cover differences between the two sports and differences based on competition level. Correlational values for the variables of interest were also researched. The descriptive statistics showed that the athletes had high scores on all relevant variables. There was a marginal difference in scores dependent on the type of sports, where swimmers scored higher on all variables, except for passion. However, the only significant difference between the two sports could be found for the coach effect and practice hours. The correlational results indicated that the total sample had significant low to moderate correlations for all variables, except mindset and coach-effect which had a low non-significant correlation. Passion and self-efficacy had the strongest relationship for the whole sample ($r = .50$), followed by passion and grit ($r = .45$), and grit and self-efficacy ($r = .44$). The biggest differences between swimmers and handball players could be found for the passion and mindset score, where swimmers had a noticeable stronger significant relationship ($r = .24, p < .001$), compared to handball players ($r = .06, p > .05$), who had a significant positive moderate relationship for passion and practice hours ($r = .33$), whereas swimmers had a non-significant low correlation ($r = .12$). All over, correlations were stronger for swimmers, but not by much.

Descriptive statistics for the competition levels revealed that most variables increased with a higher competition level. The greatest differences could be found in passion, grit, and practice hours. Mindset remained quite constant, while coach effect varied in mean scores. A MANOVA with Bonferroni post hoc test revealed that several of these differences were significant between the competition levels. Athletes at the international level scored significantly higher than athletes at the regional level for passion, grit, and self-efficacy.

Additionally, there were significant differences for athletes competing at the international- and national levels for passion and grit. The amount of practice hours was significantly different for all levels, except the international and national levels. Athletes at the various competition levels did not differ significantly in their mindset or coach-effect scores. The ultimate correlational analysis showed that athletes at the international level had stronger correlations for most variables, compared to athletes at the national and regional levels. The strongest significant correlation was between passion and self-efficacy ($r = .57$) at the international level.

The first part of this section will discuss the first research question (RQ1): Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on individual and team sports? This was discussed based on results from the descriptive statistics and t-tests. The second part will regard RQ2: What are the correlations for the motivational factors, the coach effect, and practice hours for the group as a whole, and for both sports? Considering results from the three correlational analyses done for the sample as a whole, and swimmers and handball players separately. The third section elaborates on RQ3: Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on competition levels? This was founded on results from the multivariate analysis of variance (MANOVA) and the Bonferroni post hoc test. The fourth section will discuss RQ4: What are the correlations for the motivational factors, the coach effect, and practice hours for the different competition levels? Utilizing the results from the ultimate correlational analysis, where correlations for all research variables were given based on competition level. Eventually, limitations, implications, and future research will be reflected on, and finally, conclusions are drawn.

RQ1: Are there any differences in scores for the motivational factors, the coach effect, and practice hours based on individual and team sports?

The results show that swimmers scored higher on all motivational factors compared to handball players, except passion, where handball players had a higher mean score compared to swimmers, see Table 2. These differences were for the most part marginal, and thus not significant. Two of the researched variables were significantly different for swimmers and handball players. Swimmers had substantially higher scores for both the coach effect ($p = .002$), and practice hours ($p = .001$), which will be discussed after the motivational factors.

Passion

Swimmers in this sample had a passion score of 4.20 ($n = 145$), which was lower than the handball players who scored 4.22 ($n = 148$). However, this difference was not significant. Both swimmers and handball players had a high passion score, suggesting that they were invested through a high sense of belonging and had strong affection toward their sport. This is important, as it sparks enjoyment and commitment, which is essential to perform at the highest level (Shamshirian et al., 2021; Sigmundsson, Clemente, et al., 2020; Vallerand, 2008). Swimmers and handball players had similar scores for passion, the lack of difference supports the suggestion that passion is a potential an individual has, where if allowed to flourish, will develop independently of the type of passionate activity (Vallerand et al., 2003). Passion might be crucial for the provision of energy and motivation that is required to develop a skill to the highest level (Curran et al., 2015), but these data did not support that one sport requires significantly more passion than the other.

Compared to students and individuals who are not primarily athletes, passion scores for swimmers and handball players were higher (Sigmundsson, 2021; Sigmundsson, Haga, et

al., 2020b), although not considerably. Relative to samples consisting of athletes, passion scores for swimmers and handball players were low (Askeland, 2022; Loftesnes et al., 2021; Shamshirian et al., 2021; Sigmundsson, Clemente, et al., 2020). Both the football players, the wrestlers, and the American football players had higher scores for passion. In contrast, passion scores for swimmers and handball players were higher than for the rifle shooters (Lillegård, 2020). These data did not suggest an evident significant difference in passion scores based on individual and team sports, although scores were in line with previous studies, even if they were lower.

Passion tends to be higher for males relative to women (Sigmundsson et al., 2021; Sigmundsson, Haga, et al., 2020b), and decrease with age (Sigmundsson, Haga, et al., 2022a). The American football junior team, had a mean age of 15 (Askeland, 2022), making them the most similar age group to the swimmers and handball players. Their passion scores were also the closest to this sample, which could suggest an age effect on passion. However, the junior football players were also close in age to this sample (mean ages of 15 and 18) (Sigmundsson, Clemente, et al., 2020), and they had much higher passion scores relative to this sample. In addition, the rifle shooters, who had an even higher mean age, had lower passion scores than the swimmers and handball players. Given these different results for passion, age cannot explain why swimmers and handball players had lower scores relative to these other samples. Gender distribution was almost equal for this sample, which could lower the mean score. All samples discussed above consisted primarily of males, with the exception of a few female rifle shooters, which might be a source for their lower passion scores. Gender could have some explanatory power of the lower passion scores for this sample. However, nothing suggests that a vast difference in passion scores was present for individual and team sports.

Grit

Grit scores were similar and not significantly different for swimmers and handball players, with a grit score of 3.49 for swimmers and 3.46 for handball players. Again, grit scores were rather high, suggesting that these athletes were «gritty» individuals. High grit scores strengthen the belief that determination, resilience, and endurance are essential factors within the individual, to manage the marathon of becoming great in sports (Duckworth, 2017). In comparison with students (Sigmundsson, Haga, et al., 2020b) and other young individuals ($n = 141$, mean age 17.82) (Sigmundsson, 2021) this sample had lower, but not too dissimilar grit scores. This contradicts the assumption that athletes have more grit than the general public. However, one could argue that grit is an essential ingredient and that the lack thereof, would not permit athleticism at a high level, instead of associating a higher grit score with sports. In contrast to this view, wrestlers (Shamshirian et al., 2021), and rifle shooters (Lillegård, 2020) scored substantially higher on grit compared to other samples referred to in this thesis. Their scores would probably be significantly higher than grit scores for swimmers and handball players, as well as students and other young individuals researched by Sigmundsson. Rifle shooters and wrestlers were older than the swimmers and handball players of this sample, which could explain why they had higher scores, given that grit increase with age (Duckworth & Quinn, 2009; Sigmundsson, Haga, et al., 2022a). However, the junior football players were the same age as the swimmers and handball players, and nevertheless had a higher grit score (Sigmundsson, Clemente, et al., 2020).

There are conflicting findings regarding grit, the rifle shooters and wrestlers had the highest scores reviewed, but was this because they belong to an individual sport, or because they had a higher mean age? The swimmers and handball players will probably gain a stronger grit score with age and experience, but their scores were too similar to confirm a trend where individual athletes score higher on grit.

Mindset

Mindset scores were similar to what has been discussed for passion and grit. Equivalent to grit, mindset scores for swimmers (4.08) were a bit higher than for handball players (4.05), although not significantly. These scores may confirm the motivational force that a mindset can have. With a growth mindset, swimmers and handball players believe in the development of abilities and skills and that challenges are a natural part of the journey toward achievement (Dweck, 2017; Shamsirian et al., 2021). Individuals in this sample had a high competitive status, with the majority competing at a national and international level. Individuals who reach these levels have probably overcome several hurdles, which suggests a growth mindset. Some exceptions are always present, where athletes with a fixed mindset compete at the highest levels, but given the high mindset score in the results, this sample mainly consists of those with a growth mindset.

Given the nature of a growth mindset, it is arguably not surprising that swimmers and handball players had similar scores. Despite the sports, a growth mindset is required to reach and stay at a high level. One could think of a growth mindset as an underlying mechanism that enables development but does not necessarily increase with age or competence. Swimming demands more practice hours, practice at inconvenient times, and a tremendous amount of drilling, which could explain why they score higher, but this is not relevant considering the small difference. In comparison, the junior American football players (Askeland, 2022), the students (Sigmundsson et al., 2021), and the young adults (Sigmundsson, 2021) had the most similar scores to swimmers and handball players, while the wrestlers and football players had the highest mindset scores reviewed. These results suggest a difference in grit scores for athletes and the general public, although results for this thesis cannot confirm this, because swimmers and handball players had similar scores.

Self-efficacy

This sample scored high on self-efficacy, with swimmers scoring 3.27 and handball players 3.22. Again, no significant difference between the two sports could be found, but swimmers had a slightly higher score. Self-efficacy is the belief that you can accomplish a task or cause of action required to produce given attainments (Bandura, 1997). This motivational variable seems to be regardless of activity, but rather an important factor that builds and stays with an individual, giving them trust in their abilities and capabilities, which may be crucial when facing competitors. One could argue that self-efficacy should be more important to swimmers, as their capabilities alone to a higher degree define the outcome of a performance, whilst, for handball players, the outcome was to some extent based on the teams' performance. Team athletes can lean on each other, but most will know whether or not they accomplished their task or not in a match. Dinç (2011) found that compared to individual sports, team sports had a positive correlation with social self-efficacy. Results showed significant differences in social self-efficacy scores between table tennis and handball, as well as basketball. He could not find any differences in social self-efficacy for individual sports; table tennis and swimming, nor between the two team sports; handball and basketball. A small difference was observable between swimmers and handball players in this study, although not significant. Results for this thesis were thus not in line with Dinç (2011), although social self-efficacy and general self-efficacy did not measure exactly the same aspects of self-efficacy.

The Coach Effect

Results show that the only significant difference in scores was for the coach effect. While both athlete groups had high scores, swimmers had the highest score with 6.26, compared to 5.99 for the handball players. The difference could be due to variations in the

role a coach has towards an individual athlete, compared to an athlete belonging to a team. With individual athletes, the coach has the opportunity to spend more time with each athlete, which could lead to a stronger connection (Rhind et al., 2012). For example, when an individual athlete qualifies for a competition, some travel alone with their coach, whereas handball players travel with a large team. For many individual sports, the coach has several assignments, in addition to being the support system for each athlete. In swimming, the number of athletes a coach is responsible for decreases with increased performance levels, as more time and effort are required. This may be true for handball players as well, with a coach being responsible for multiple teams when they are young, but mainly committing to one team at a championship level. However, an advantage of participating in team sports is that they can gain a lot from each other, as team-mates will adopt some of the coaching duties.

These results show that there were differences in how swimmers and handball players regard their coach and their relationship, with swimmers scoring higher. Rhind et al. (2012) found in their study on the athlete-coach relationship, that individual sport athletes felt closer, more strongly committed, and more complimentary with their coaches, compared to team sport athletes. Results from this thesis were in line with this difference, where individual sports athletes score higher on the coach-athlete relationship in comparison to team sports athletes.

Practice Hours

Practice hours each week at organized practice were measured based on categories, and results for this variable revealed that swimmers scored significantly higher on practice hours, compared to handball players. Swimmers gained a score of 3.14, whilst handball players gained a score of 1.78. This is the largest difference of all variables measured in this thesis. Most swimmers answered categories 3 and 4; «16-20 hours» and «21 hours or more»

respectively, while handball players answered categories 1 and 2, which were «6-10 hours» and «11-15 hours», see Table 1. It is interesting that even though the swimmers in this sample scored significantly higher on practice hours compared to handball players, they did not score significantly higher on the motivational factors, which could be assumed. This assumption is based on the thought that; to be able to practice as much as swimmers do, they need high inner motivation (Løvberg et al., 2018).

Another interesting finding was that athletes of this sample had similar practice hours as the athletes referenced introductory. The elite swimmers studied by San and Lee (2014), reportedly practiced around 21 hours each week, while the elite handball players practiced 6-11 hours each week (Wedderkopp et al., 1997). Handball players of this sample practice a bit more, but given that the referenced study is older, this might be a natural development. Both the swimmers studied by Nia and Besharat (2010) and the handball players studied by Wedderkopp et al. (1997) had similar mean ages to athletes in this thesis. These similarities strengthen the results for this thesis, where there was a substantial difference in practice hours weekly based on these two sports.

Overall

Maybe, instead of asking why swimmers endure significantly more hours at organized practice each week, one should question whether handball players would have given the same amount of hours if this was required. Even though these athletes were competing in different sports, where one is individual and the other team-based, they had much in common. They were of the same age, in high school, and spend considerable time at their sport. In other words, there were probably more similarities between the two groups than differences. Swimmers and handball players competed at approximately the same levels, and given the other similarities, this might explain why their scores were so similar. Swimmers did not have

significantly more passion, grit, growth mindset, or self-efficacy in comparison to handball players. The results indicate that handball players were infinitesimally more passionate than swimmers, while swimmers were microscopely more gritty and had a stronger growth mindset and self-efficacy than handball players, but these differences were not big enough to be considered significant. The fact that swimmers spent so much more time at organized practice does not seem to entail them being more motivated, but rather that they do what is necessary. Given that the motivational scores were so similar, handball players would most probably give the same amount of hours to their sport, if required. Even though some studies in sports psychology have found differences in personality for individual and team sports athletes (Eysenck et al., 1982; Nia & Besharat, 2010), data from this thesis did not show the same tendency toward motivational differences.

RQ2: What are the correlations for the motivational factors, the coach effect, and practice hours for the group as a whole, and for both sports?

The correlational results indicated that the total sample had significant, positive, low to moderate correlations for all variables, except mindset and coach-effect, which had a low non-significant correlation. This suggests that these variables collectively measure aspects of achievement, and strengthen both Figure 1 «Too become expert» (Sigmundsson, Haga, et al., 2020a), and Figure 2 «Achievement arrow» (Sigmundsson et al., 2021). Passion and self-efficacy had the strongest relationship for the whole sample ($r = .50$), followed by passion and grit ($r = .45$), and grit and self-efficacy ($r = .44$). These strong correlations confirm self-efficacy as a significant factor for performance and achievement, and based on this, it belongs in Figure 1 and Figure 2 with the other motivational factors and variables for expertise.

The most prominent differences between swimmers and handball players could be found in the passion and mindset score, where swimmers had a noticeably stronger significant relationship between the two variables ($r = .24, p < .001$), compared to handball players ($r = .06, p > .05$). Handball players on the other hand, had a significant positive moderate relationship for passion and practice hours ($r = .33$), whereas swimmers had a non-significant low correlation ($r = .12$). The highest correlation of this sample could be found between passion and self-efficacy for swimmers ($r = .56, p < .001$), further strengthening the suggestion above. All over, correlations were stronger for swimmers regarding the researched variables, but not by much. To answer this research question more closely, each correlational value will be discussed. Correlations with passion will demand the biggest part of this section, following Table 3a, b, and c.

Passion

Passion correlated moderately and almost strongly with grit for both swimmers and handball players ($r = .45, p < .001$). Their correlational scores were the same and both were significant. Their moderate and almost strong correlation signifies that passion and grit have a close relationship, where a high passion score often comes with a high grit score, and the same in reverse. Jachimowicz et al. (2018) claim that even though passion and grit share important conceptual similarities, they arguably play different roles. This theory and the results of this thesis support Sigmundsson's (2021) arrow for passion, grit, and mindset, see Figure 2. The moderate and almost strong significant correlation suggests that both passion and grit are important for motivation and high performance in their sport. It also indicated that athletes are passionate about aspects they spend considerable time at and that they do so because they are passionately interested and invested.

This correlation was stronger for swimmers and handball players compared to the wrestlers (.21*) (Shamshirian et al., 2021) and the rifle shooters (.38**) (Lillegård, 2020), although the age difference should be remembered. In comparison to the junior teams for the American football athletes (.60) (Askeland, 2022) and the football players (.65**) (Sigmundsson, Dybendal, et al., 2022), correlations for passion and grit for swimmers and handball players were weaker. Interestingly, students or young adults who were not primarily athletes also had a stronger relationship between passion and grit (.59**), than swimmers and handball players in this sample (Sigmundsson, 2021). These research findings had different directions on the relationship between passion and grit. The results of this thesis support a moderate and almost strong connection between passion and grit for athletes, with no difference regarding the type of sport.

Regarding passion and mindset, there were substantial differences between the two sports. The total sample gained a score of ($r = .14, p < .05$). This does not signify a close relationship, and makes it clear that regardless of your mindset, an individual can still feel very passionate about their activity, and the same reversed. Swimmers had a low to moderate positive correlation for passion and grit ($r = .24, p < .001$), while handball players had a correlational score that was so low, it qualifies as non-existent ($r = .06, p > .05$). A theory that could explain the difference in correlational scores for passion and mindset, is that swimming is a highly technical sport, where most practice sessions consist of drilling, and with small adjustments of technique to move faster in the pool. Without a growth mindset, it could be too demanding to stay passionate about swimming. One must to some extent enjoy working on minor details, and understand that it is part of the bigger developmental picture. Reversed, one could say that passion is required to endure the technical work and the narrow regime of swimming. Handball players, on the other hand, feel passionate about their sport, regardless of their mindset, given these results.

Handball players' correlation between passion and mindset was substantially lower than other correlations between passion and mindset for samples previously reviewed. The wrestlers had a significant correlation, although low (.21*), but both the junior American football team (.20) and other football players (.17) had low non-significant correlations. The correlation for the wrestlers was similar to swimmers, but the handball players had an unusual score on this correlation, considering how the junior football players score. However, the relationship between passion and mindset for swimmers was the highest of all samples reviewed. This was the primary indication that there were differences based on individual and team sports regarding the motivational factors in this thesis.

Passion and self-efficacy had a strong correlation for the whole sample ($r = .50, p < .001$), but the correlational value for swimmers, was the highest correlation of all variables researched in this thesis. Their significant correlational score of .56 means that the two motivational variables had a strong positive relationship. This was also true for handball players, although they had a moderate to strong, significant positive correlation of .47. These correlational values were in line with what was found for the rifle shooters (Lillegård, 2020), who had a significant relationship of .47 for passion and self-efficacy. The fact that these variables were strongly connected suggests that a strong belief in personal abilities often comes with high degrees of passion, and a strong degree of passion is associated with a strong belief in capabilities. This relationship was not included in the Achievement Arrow (see Figure 2) by Sigmundsson et al. (2021), but these strong results suggest that it should be.

Passion and the coach effect had moderate significant positive correlations for both swimmers (.37) and handball players (.32), with the total sample gaining a relationship of .33. Again, swimmers had a stronger connection, which could be explained by a coach bias. Athletes that seem more passionate and engaged in their sport, may gain more favors with the coach, as they enjoy working with passionate athletes. This might lead to a closer relationship

for the two, where the athletes feel recognized and thus regard their coach as competent with mutual goals. The more passionate one feels about their sport, the higher they appreciate their coach, and conversely. The difference in correlational scores could be connected to what was discussed for RQ1, where swimmers and their coaches gain a closer relationship with more ease.

Ultimately, passion and practice hours had a noticeable relationship. The correlation was positive, low, and significant for the whole sample ($r = .18, p < .001$), which was not a remarkable finding, but the two sports differ considerably from each other. For swimmers, this relationship was positive, low, and non-significant ($r = .12, p > .05$), whereas the relationship for handball players was positive, moderate, and significant ($r = .33, p < .001$). Swimmers have, as previously shown and discussed, significantly more practice hours each week, with tight regimes. Even though they practice more, the relationship was not strong with passion. One explanation could be that the large number of practice hours were not driven by passion, but rather by necessity and requirement. However, for handball players, a moderate relationship exists. This suggests that highly passionate handball players, practice more. Since these data were based on organized practice hours each week, this indicates a looser framework for handball, where athletes to some extent can choose how much they practice each week. Conversely, a swimmer who does not meet the requirements, risks being excluded from the team.

Grit

In addition to a significant positive moderate correlation with passion, grit correlates significantly with a growth mindset for both swimmers and handball players. The total sample combined gained a significant correlational score of .20. Handball players ($r = .23, p < .001$) had a stronger relationship for these two variables, in comparison to swimmers ($r = .17, p$

< .05). Park et al. (2020) suggested that grit and mindset could be mutually reinforcing and as such have an effect on the development of the other. It was clear from these results that they indeed had a relationship, but that it was stronger for handball players. These findings were reversed from those between passion and mindset, where swimmers had a stronger connection. Here, it seems that to a higher extent, handball players will have a stronger growth mindset if they have more grit, and more grit if they have a solid growth mindset. Grit is important to persevere toward your goal (Duckworth et al., 2007), but a growth mindset is essential (Blackwell et al., 2007). With a growth mindset, an understanding of development occurs, which enables less stress and resilience that is visible in grit. Given this, one could assume that the relationship between grit and mindset should be stronger. Even though there were differences in scores for swimmers and handball players, where handball players had a closer relationship for these two, this was still not a strong or even a moderate relationship.

Previous studies have shown variations in this relationship depending on the sample. For example, American football juniors had a correlational score of .63, which were not significant (Askeland, 2022). The wrestlers had a positive significant moderate correlational score of .40 (Shamshirian et al., 2021), and the junior football players scored .27, a low to moderate, non-significant relationship (Sigmundsson, Dybendal, et al., 2022). Football players had the most similar relationship to handball players regarding these two variables. When it comes to individuals who were not primarily athletes, the youngest individuals in the sample of Sigmundsson (2021) had a correlational score of .06 which was too low to be considered a relationship. Age could offer some explanation for the low relationship between grit and mindset for this sample, and why a stronger correlation can be found for the wrestlers. Except for the junior American football players, all other young individuals mentioned this far had a low relationship between grit and mindset. Grit increase with age and

since these samples consist of young individuals, this relationship could probably grow stronger with age, like what you can observe with the wrestlers (Shamshirian et al., 2021).

Grit and self-efficacy had a moderate and almost strong positive significant relationship for both swimmers ($r = .45, p < .001$), and handball players ($r = .43, p < .001$), total sample ($r = .44, p < .001$). These variables promote action in the individual to achieve their goals, grit through drive and resilience, and self-efficacy through a push of confidence. Given this drive towards action, it was not surprising that they had a moderate to strong relationship with one another. Working for a long period, ranging from months to years in a specific field or sport, one must to some extent believe in achievement, and that the goals set are achievable. When an individual believes in themselves, and understands that hard work is the key, an individual will persevere. This knowledge is not reliant on sport, and thus it was not surprising that no difference was detected. Even though Lillegård (2020) used a different scale to measure self-efficacy, she gained a moderate to strong positive significant relationship between grit and self-efficacy ($r = .41, p < .001$), which was in line with the results found for this sample.

The grit and coach effect had a low positive relationship for both swimmers and handball players, with the total sample scoring ($r = .17, p < .001$). The difference was noticeable, but small between the two sports, with swimmers scoring .21 ($p < .05$), and handball players .15, a non-significant correlation. Grit and practice hours had a positive significant correlation for swimmers ($r = .19, p < .05$), but results for the handball players show a non-significant correlation ($r = .15, p > .05$). There was a closer connection for swimmers regarding the degree of grit and how many hours of practice they endure each week, but this was not a strong correlation. Handball players' grit does not significantly relate to practice hours. They can have a high grit score without a large number of practice hours,

and conversely. Since grit is perseverance and passion, one could assume that there would be a stronger relationship between the two variables, but these data did not support this.

Mindset, Self-efficacy, Coach Effect, and Practice Hours

Mindset had low non-significant correlations with self-efficacy, coach effect, and practice hours for both swimmers and handball players separately. As discussed above, mindset correlated low, although significantly with grit for both athlete groups, and with passion for swimmers. Even though there was no significant relationship while the two sports were separated, when reviewing the total sample, mindset correlated significantly with self-efficacy ($r = .15, p < .05$), and practice hours ($r = .12, p < .05$). These were low, both in regards to correlations scores and significance levels, but significant nonetheless. The fact that mindset correlated low and non-significantly with most motivational variables, suggests that mindset stands on its own. As previously discussed, mindset is regarded as an underlying mechanism, and this might be why athletes separately did not have significant relationships between mindset and other variables. One could assume that mindset and self-efficacy should correlate substantially more than they did. As belief in oneself and belief in their development capture similar aspects. This was not the case for this sample.

When reviewing the total sample of athletes, self-efficacy correlated significantly with all other variables. The relationship with passion was the strongest, the relationship with grit was moderate, and the three remaining had positive low correlations with self-efficacy. The same cannot be claimed for swimmers and handball players separately. Self-efficacy did not correlate significantly with either mindset or practice hours when groups were separated. The only significant relationship not yet discussed for this variable was that of self-efficacy and the coach effect. Self-efficacy had a low significant relationship with the coach effect, and the relationship was almost completely the same for both groups, with swimmers scoring .21 (p

< .05), and handball players .20 ($p < .05$). This relationship is present, but not strong, suggesting that to some extent the relationship and how an athlete regards their coach, may relate to their self-efficacy. Schunk (1995) wrote that feedback could strengthen self-efficacy, and considering that this is the coach's main job, this function might explain the relationship between these two variables.

The coach effect correlated significantly with all variables, except mindset, for the whole sample. In addition, all correlations were positive and low, except for the relationship between the coach effect and passion, which was positive moderate, and significant ($r = .33$, $p < .001$). However, when looking at the swimmers and handball players, some differences emerge. Some of these have already been discussed, but the coach effect had stronger correlations with passion, grit, mindset, and self-efficacy for swimmers, compared to handball players, while handball players had a stronger correlational score for practice hours. This difference was minimal, but interesting as one was significant (handball players), and the other not (swimmers). These results could mean that the more time handball players spend at practice, the higher they regard the effect their coach has had on their development. Or the higher they regard their coach, the more time they spend on organized practice. For swimmers, this connection was not significant, and the coach effect does not influence the amount of time a swimmer spends on practice significantly. They will practice, regardless of how they feel about their coach. This was partially due to the limits described earlier.

RQ3: Are there any differences in motivational scores, the coach effect, and practice hours based on competition level?

The descriptive statistics for competition levels revealed that most variables increase with higher competition levels. The biggest increases could be found in passion, grit, and

practice hour scores, whilst mindset remained quite constant, and coach-effect varied in mean scores. Compared to the total sample (without filter), mean scores on all variables for the international level were higher than the total sample scores, making athletes at the international competition level the highest-scoring group in this sample. To assess RQ3, the sample was separated into three groups; the regional, national, and international competitive levels, and were thus not separated by sport. Athletes belonging to each category, had this as their highest level of competition ever attended, meaning that athletes at the international level also attend competitions at a national level. Athletes who did not place themselves in either of these categories were filtered out. To discuss this research question, other studies will be mentioned. Among them are the football players (Sigmundsson, Clemente, et al., 2020; Sigmundsson, Dybendal, et al., 2022), the American football players (Askeland, 2022), and the Iranian wrestlers (Shamshirian et al., 2021).

Passion

Athletes at the international level had significantly higher passion scores than athletes competing in both the national and regional competition levels ($p < .001$). The passion score is characterized by an increase from the regional ($M = 4.13$), to the national ($M = 4.20$), and ultimately the international ($M = 4.47$) levels. Interestingly, there was a substantial increase from the national to the international level, which was much larger than the increase from the regional to national levels. Meaning that a great deal of passion was required to reach the international level, or that passion spikes after reaching this level, and that passion was one of the variables that separate athletes of this sample. It also strengthens the theory that a high degree of passion was essential to reach high levels of achievement. The trend of increased passion score with increased competence and competition level was similar for both the American football players (Askeland, 2022), and the football players (Sigmundsson,

Dybendal, et al., 2022), although the football players had higher scores, with the 30% lowest football competence (LFC) athletes scoring similarly to the top performers of this sample, the international level competitors. The mean age for the regional, national, and international competitors was similar within this sample, with all athletes having a mean age of 16-17, independent of levels. Other studies (Askeland, 2022) have discussed whether age could explain the higher passion scores for the higher competitive levels, but this was not the case for athletes in this sample, as they were of the same age.

Grit

Grit scores behaved similarly to passion scores in this sample. There was a steady increase, although the difference from level to level was a tad lower. Again, athletes at the international level ($M = 3.69$) had significantly different grit scores compared to both the national competitors ($M = 3.46$) and regional competitors ($M = 3.38$). Based on these results, one could say that an athlete who reaches the international level has significantly more grit than athletes at the lower levels, making grit an important motivational variable for high performance and achievement. This tendency mirrored that of the football players, with the 30% highest football competence (HFC) athletes scoring higher on grit than the group with the 30% LFC. This difference was however not significant. Similar to passion, athletes of this thesis had lower grit scores relative to the football players in the sample of Sigmundsson, Dybendal, et al. (2022). The trend of increased grit scores with increased competition levels can also be observed in the research of Askeland (2022), where the grit score of junior players (mean age 15) was 3.33, 3.49 for the first and second divisions (mean age 23), and lastly 3.71 for the Elite team (mean age 25). These scores were similar to the grit scores of swimmers and handball players at each level, ranging from 3.38 to 3.69, but athletes in the study by Askeland (2022) were a bit older.

With age and life experience grit increase (Duckworth et al., 2007; Duckworth & Quinn, 2009; Sigmundsson, 2021), but when regional-, national-, and international groups of this sample are of the same age, how come the international athletes still score higher? Given the results of this thesis, age alone cannot explain increased grit scores with higher levels of competition. If this was the case, grit scores should have remained the same for all three levels. One could suggest that with age, an increase in grit score is probable, however, there seems to be a stronger presence of grit when competing at the highest levels, despite age.

Mindset

Mindset acted differently from passion and grit for both samples. Athletes at the regional level had a mean score of 4.06, athletes at the national level had an infinitesimally higher score (4.07) and the international level scored the highest with 4.11. These differences across the motivational factor were quite small, however, scores were high for all levels, making athletes of this sample have a growth-orientated mindset. These findings strengthen the belief that mindset is an underlying mechanism that needs to be present to reach a high level of performance and excellence (Sigmundsson et al., 2021). The football players in the junior teams showed the same tendency, with a .01 difference in score between the 30% LFC ($M = 4.69$) and the HFC ($M = 4.70$) players (Sigmundsson, Dybendal, et al., 2022). There were no significant differences between mean scores for either the football players (LFC and HFC), or the swimmers and handball players together based on competition levels.

A Comparison

Despite the football players scoring higher on passion, grit, and mindset than the athletes studied in this thesis, the same tendencies can be observed. For passion and grit, a distinct increase takes place from the regional to the national and international levels, with a

moderate increase followed by a large increase respectively. Previous studies (Askeland, 2022; Shamshirian et al., 2021; Sigmundsson, Dybendal, et al., 2022) have conflicting findings, with the samples of Askeland (2022) and Sigmundsson, Dybendal, et al. (2022) scoring higher on the motivational factors passion and grit with an increase in competence and competition level. In addition, football players had relatively stable mindset scores, while American football players had varying results, that did not follow the same trend as passion and grit. Both of these samples were small, consisting of around 40-60 athletes, and thus one could argue that their findings were less reliable. The sample of Shamshirian et al. (2021) was larger, with more than 120 wrestlers, but they could not find significant differences between the national and international levels. Thus this sample was probably the first of a substantial size to confirm that passion and grit scores increase with a higher competitive level, and it supports and gives strength to the trend shown in (Askeland, 2022) and (Sigmundsson, Dybendal, et al., 2022).

Self-efficacy and the Coach Effect

Self-efficacy follows the same pattern as passion and grit for athletes. While scores were generally high despite the competition level, a noticeable increase occurred. Swimmers and handball players at the regional level had the lowest score ($M = 3.19$), with athletes at the national level scoring slightly higher ($M = 3.24$), and with a more sizeable increase for the international level ($M = 3.35$). The Bonferroni post hoc test demonstrated that the only significant difference concerning self-efficacy was between the international and regional competitors ($p = .043$), which suggests that athletes competing at the national level had similar scores to both the regional and international levels. Compared to how passion and grit scores increase, the increment for self-efficacy was much lower, making it more similar to mindset. As discussed for passion and grit, self-efficacy seems to be increasingly stronger

with the competition level. This suggests that; to reach the highest level an athlete needs to develop a high sense of self-efficacy, or with increased competition level, a stronger sense of self-efficacy establishes.

This sample had good relationships with their coaches, where they considered them competent and with mutual goals. In contrast to the motivational factors, the coach effect scores did not follow the same pattern of increased competition level causing higher scores. Athletes at the regional level had a mean score of 6.27, which reflect the strongest coach effect, compared to the national ($M = 6.07$), and international levels ($M = 6.25$). Mean scores for the athletes at the international level were quite similar, with a .02 lower score. Curiously, if scores were the same for the regional and international levels, how come there was a large drop in scores for the national level?

One explanation could be based on Ericsson et al. (2007) who explained that when individuals set out to learn a new skill or craft, they start with a local teacher. This relationship is often defined as intimate, with mutual devotion and praise. Later, more knowledgeable and experienced teachers may be required for continued development. The ultimate teacher or coach is often an individual who has reached the highest performance level in their subsequent field and thus has first-hand experience. Based on this, athletes competing at a regional level might have had the same coach for many years, building up a solid relationship, before they presumably change coach at a national level. For example, most swim clubs in Norway are organized in a way where they have an elite coach, who coaches the highest level, which for most clubs are the national competitors. With the change of coach, a new relationship must be built, requiring time and effort. This may explain why there was a considerable drop. When reaching this level, most athletes will be part of the national team, and gain access to the most qualified coaches, whose main job is to assist the athletes to reach their full potential and become a champion.

Practice Hours

Becoming skilled and accomplished in a sport requires thousands of practice hours. As competence develops, the number of practice hours increases steadily from a young age. For this reason, one could assume significant differences between the competition levels in this sample. Assumptions were met, with athletes at the regional level reporting a score of $M = 2.00$ based on categories, athletes at the national level scoring $M = 2.63$, and athletes at the international level scoring $M = 2.84$ based on categories. These differences in scores were significant at multiple levels. The international level scores were significantly different from the regional level scores ($p < .001$), and the national level scores were significantly different from the regional level scores. A significant difference between the national and international levels could not be found. One explanation for this is that the national athletes already utilize the most available hours, and so did not practice significantly less, but they might focus on different aspects while at practice. These findings were not surprising, again given Eriksson's research (Ericsson & Pool, 2016; Ericsson et al., 2007) practice hours are most important to reaching expertise, being the foundation of achievement.

Overall

So, are there any differences based on competition levels? Absolutely. Passion, grit, self-efficacy, the coach effect, and practice hours had significant differences within the different competition levels, indicating that competition levels or competence are of importance for these motivational factors, the coach effect, and practice hours. For passion, grit, self-efficacy, and practice hours there were clear increments from the regional, national, and finally international levels, with the lowest scores belonging to the regional level, and the highest to the international level. Mindset follows this pattern as well, but the increase was

minimal, and not significant, making it the variable that had the least differences dependent on competition level. The coach effect had a large drop from the regional and international levels to the national. And because of this, the variable stands out in the crowd.

It may seem self-explanatory that motivational factors, how one regards their coach, and practice hours were higher for athletes competing at an international level. Although this might be true, these data gave better insight into each of the studied variables and strengthened the assumption that; yes, athletes at the highest level do have more passion, and grit, stronger self-efficacy, feel more connected to their coach, and practice more. They also have a stable foundation with a growth mindset. Results support that these factors indeed are important «To become an expert», see Figure 1.

RQ4: What are the correlations for the motivational factors, the coach effect, and practice hours for the different competition levels?

The correlational analysis revealed that athletes at the international level had stronger correlations for most variables, compared with athletes at the national and regional levels. The strongest significant correlation could be found between passion and self-efficacy ($r = .57$) at the international level.

Passion, Grit, and Mindset

Passion had moderate to strong, positive, significant correlations with all variables, except for practice hours. Correlations with grit, mindset, and self-efficacy were the strongest at the international level, and correlations with coach effect and practice hours were the strongest at the national level. This suggests that passion became stronger at the highest level measured for this sample, which strengthens the theory that a high sense of passion is

important to achieve a high level of performance. Identically, grit correlate with all variables except for practice hours. In addition, grit had the strongest correlations with each variable at the international level as well, except grit and self-efficacy, which were strongest at the regional level. Passion and grit had a close significant relationship, with positive significant moderate scores ($p < .001$) at each competitive level. The relationship between these two variables was equally strong for all three levels, with scores of .37, .37, and .38 for the regional, national, and international levels respectively. Results signal that passion and grit scores develop and stay similar and that the relationship remains the same across competition levels.

Mindset correlates the strongest with each variable at the international level, except for practice hours. This variable was the strongest at the regional level and will be discussed later. With regards to self-efficacy and coach effect, correlational scores were low, signaling weak relationships. However, the correlational scores looked quite different for passion and grit. For both variables, correlational scores with mindset were low and non-significant at the regional and national levels. However, when entering the international level correlations were moderate and significant with both passion ($r = .35, p < .001$), and grit ($r = .34, p < .001$). The Achievement Arrow (Sigmundsson et al., 2021)(see Figure 2), suggests that collectively passion, grit, and mindset are important factors for achievement. Correlational values between passion and grit confirm that this relationship was important at any level of achievement, while mindset had the strongest relationship with both passion and mindset at the international level. These findings could suggest that the relationship between passion and grit is important regardless of level, while a growth mindset is more relevant to passion and grit when at the international level. Does this diminish the theory of mindset as an underlying mechanism for achievement? Only further investigation with these variables and different levels of achievement can tell. However, as suggested previously, self-efficacy is not present

in the Achievement arrow by Sigmundsson et al. (2021). The next section will elaborate on self-efficacies correlations, and perhaps strengthen the suggestion that self-efficacy should be part of the Achievement Arrow.

Self-efficacy

Self-efficacy had the strongest correlations with passion and grit, and these correlations were the strongest correlations of this sample. In regards to mindset, correlations were low positives, and only significant at the national level ($r = .17, p < .05$). Thus self-efficacy does not particularly correlate with mindset, although one could assume that they measure some of the same aspects in regards to achievement. The correlations with the coach effect and practice hours will be discussed in sections further down, but the next section will elaborate on the correlational values for passion and grit with self-efficacy. Correlational values were positively significant, ranging from moderate to strong for both passion and grit with self-efficacy. They did not however follow a specific pattern or tendency, as some of the other correlational values in this thesis. Although, one could argue that correlational scores were similar for the regional and national levels for both self-efficacy and passion, and self-efficacy and grit, followed by a large increase in self-efficacy and passion at the international level, and a large decrease in self-efficacy and grit at the international level. Even though the relationship between self-efficacy and passion was strong at all levels, it was increasingly stronger for international-level athletes. This suggests that when athletes feel passionate about their sport, they often feel a stronger self-efficacy, and when their self-efficacy is low, their passion is correspondingly low. This suggests that both variables must be in place within the individual to compete at the international level. The same cannot be said for self-efficacy and grit, where the relationship was the strongest for the regional-level athletes. This relationship decreased and was less strong at the international level, although still moderate.

The Coach Effect

The coach effect variable correlated significantly at either one or two levels of each researched variable, except for mindset, where all correlations were almost non-existent and non-significant. Coach effect varies a lot in correlational values with the other variables, and there was a large specter within each variable as well, regarding the competition levels. The variable was a construct of this thesis, and might potentially lack in its capture of the coach effect. This might explain why the results were varying to this degree. However, some correlational values were valid for discussion. As previously mentioned, passion and coach effect correlated low but almost moderately at the regional level ($r = .26, p < .05$). Following a large increase for the national competitors ($r = .38, p < .001$), where a positive, moderate, and significant correlation was clear. This relationship was at its strongest at the national level before it decreased at the international level ($r = .13, p > .05$). Correlations with self-efficacy were also the strongest for the national-level competitors ($r = .24, p < .001$), although differences in correlational values for the other two levels were not as large as with passion.

The data suggest that the relationship between passion and the coach effect, and self-efficacy and the coach effect, was at its peak at the national level. Before this, how an individual regarded their coach was important, and the degree of self-efficacy was somewhat relevant, but it became more important at the national level. One explanation could be that this is a sensitive phase for an athlete, where one either continues competing and potentially become professional, or quit. If an individual did not regard their coach highly, they were likely less passionate, with lower self-efficacy, and conversely. The correlational value between coach effect and passion at the national level, was the strongest correlation for the coach effect variable, both regarding correlation and significance. The coach effect and self-efficacy correlation were the fourth-strongest, but the second-strongest regarding significant

levels. Coach effect correlated almost moderately with grit ($r = .28, p < .05$), at the international level. The correlations with this variable increased steadily with a higher competition level. This signifies that with a greater competition level, the relationship becomes more essential. For athletes at the regional level, this relationship was non-existent, meaning that grit scores were independent of how the individual rated the coach effect variable. On the other hand, for international athletes, a strong score in one of these was often followed by a strong score in the other. Practice hours follow this same trend and will be discussed below.

Practice hours

The variable practice hours stand out in this correlational analysis, with only a few significant correlations while divided into regional, national, and international levels. However, as Table 5a illustrates, the strongest correlation for the variable competition level was with practice hours. This means that these two had the strongest relationship before the variable was split in three.

The variable that correlates the strongest with practice hours was the coach effect. Here, correlations increase with increased competition level, although not by much. Correlations for practice hours and coach effect were the lowest for the regional level, with a score of .16, which was not significant. For athletes at the national level, this relationship was significant at .25, which was almost a moderate positive correlation at $p < .001$. This correlation was further increased for the international level with a score of .27 ($p < .05$), although the significance level was lower. The increase in scores could suggest that this relationship becomes important with increased levels. The relationship was most unrelated at the regional level, which could mean that you think highly of your coach, but do not practice much, and conversely. It also suggests that with a higher competition level, these two

variables are more likely to influence one another, so the more time you spend at practice, the more probable you are to have a better relationship with your coach, and conversely. These two variables had undoubtedly a stronger connection for this sample compared to the other variables.

Practice hours did not correlate significantly with passion, grit, or self-efficacy at any level. However correlations with self-efficacy were noticeable with its score of .20 at the regional level, and more so with mindset at the regional level. Practice hours and mindset did indeed have a significant positive low, but almost moderate correlation with mindset. This relationship was non-existing for the two higher levels. The fact that the correlational score for both self-efficacy and mindset was considerably stronger for athletes at the regional level, could suggest that the belief one has in personal development and personal success is important for how many hours an individual is willing to spend at practice. Athletes at the regional level were, as suggested by these data, more dependent on a strong mindset and self-efficacy to practice. On the contrary, athletes at the national and international levels were not dependent on this and might practice more out of necessity, or follow their established routines. This could explain why practice hours correlate so low and non-significantly with most other variables. Athletes in this sample, practice because it's essential for development. They follow regimes and routines, which was not dependent on the degree of passion, or grit, and for the most part not by mindset and self-efficacy. The coach effect, on the other hand, was important, but again, this might be because they decide the standard, meaning the required hours of practice.

These results were not in line with some aspects of the theory presented for these variables. Passion is suggested to make an individual able to spend essential time and energy on the passionate activity (Jachimowicz et al., 2018; Vallerand et al., 2003), and grit is supposed to give drive toward working hard and with effort for a long duration (Duckworth et

al., 2007). If this was true, then correlations with practice hours should probably be stronger. However, one could argue that these variables must be present to a certain degree to stay in sports as a teenager. Being passionate and gritty enables the individual to stay committed, and thus practice based on this commitment. If this was the case, the correlational score would not affect practice hours, as observed in this thesis.

Limitations

The first limitation to be addressed is that of the sample and the self-measures that could be answered based on social desirability. The sample consists of 15 to 19-year-old athletes who attend high school and are active competitors in their sport. This age group is known for their «achievement of perfection» and thus might have answered socially desirable, as to seem more passionate, have more grit, and have a mindset and self-efficacy that is viewed to be more acceptable. This in turn could result in less valid data.

The second limitation regards coaches. To gain contact with participants for this study, the questionnaire was distributed to coaches and club leaders, with a request for them to share and hand out the questionnaire to their athletes. Another aspect of this was that this age group might not be the easiest group to convince to participate. Following this assumption, coaches who took on this task might be more developmental orientated and might have a closer relationship with their athletes. In turn, making this a sample with a closer relationship or that were more developmentally orientated than the general young swimmer or handball player.

A clear limitation in this thesis is the fact that the variable coach effect was a self-made construct, although questions were based on an established scale (CART-Q), this composition has never been used in a published study. This is a limitation as its validity has not yet been supported, however, results from this thesis did show good internal consistency with a Cronbach's alpha of .85. The scale consisted of five questions that were derived from a

larger scale called CART-Q, by Jowett and Ntoumanis (2004). In addition, the chosen questions were heavily inspired by Ericsson et al. (2007) and research findings done by Frøyen (2021). In trying to capture how each athlete evaluated the importance of their coach, this variable may have tried to capture too much, and in doing so made it less precise.

Another limitation concerns the normal distribution. When first conducting tests for normality and linearity, box plots, histograms, skewness, and kurtosis were checked. A few outliers could be found for most variables, and skewness and kurtosis values were too high, especially for the coach effect variable. 8 outliers stood out as distinct outliers and were removed from the sample to gain a more normal distribution. A few outliers remained in the sample, but with the primary removal, skewness, and kurtosis values became acceptable. Most were within the limit of -1 to +1 suggested by Pallant (2020), and all were within the limit of -2 to +2 for skewness and -7 to +7 for kurtosis, as suggested by West et al. (1995). There are differences in opinion regarding skewness and kurtosis, and even though the extreme outliers were removed, they could still affect the mean scores considerably. For example, after using the filter and dividing the sample into regional, national, and international levels in RQ3, skewness had a value of -1.5 which was acceptable, but higher than the rest and the kurtosis value became 5.08, which was much higher and close to the limit, and some would say above the limit for a normal distribution.

Implications

Despite the limitations, this thesis gave new data that confirmed and challenged earlier findings. Analysis for the first research question revealed that there were no significant differences between swimmers and handball players regarding motivational factors. Results were in line with previous studies on passion, grit, mindset (Askeland, 2022; Shamshirian et al., 2021; Sigmundsson, Dybendal, et al., 2022), and self-efficacy (Lillegård, 2020; Sklett et

al., 2018) suggesting that athletes score especially high on motivational factors. No study had previously compared individual and team sport athletes on these factors, making them new research findings. Additionally, this thesis found significant differences regarding the coach effect and practice hours, revealing that swimmers regard their coaches higher and have a stronger relationship with them, compared to handball players. They also practice considerably more, but this is seemingly out of necessity rather than higher motivation. The second research question further supported results from these previous studies, with low to moderate correlations for most of the motivational variables. However, few studies have previously researched self-efficacy with passion, grit, and mindset. Results of this study revealed that self-efficacy correlated strongly with passion and grit for swimmers and handball players, which few studies previously had uncovered.

The third research question further revealed significant differences for most researched variables for the different competition levels. Studies have been conducted earlier that explored if passion, grit, and mindset differ dependent on competence (Shamshirian et al., 2021; Sigmundsson, Dybendal, et al., 2022), but never on a sample as large as this, and with such a clear increase in the motivational factors with a higher competition level. Ultimately, research question 4 demonstrated that athletes at the international level had the strongest correlations for the researched variables, followed by the national and regional level athletes. This suggests that these variables had a closer relationship with each other at a higher level, further strengthening their position as motivational factors and important to become an expert.

The thesis set out to explore differences, and the lack thereof was somewhat surprising, especially considering the significant difference in practice hours, as well as personality differences observed in previous studies. The thesis also wanted to explore if there were differences in motivational factors, as well as how one regards their coach and time spent at practice, in relation to the level of competence. Results unveiled much the same as

what was set out to discover, mainly that higher competence equals higher scores and correlations for the motivational factors. These findings contribute to the field of psychology and sport science, as well as to coaches and organizations aiming to develop talent. One theoretical implication was the strong results for self-efficacy in this study, which again strengthen the suggestion that self-efficacy should be a part of Figure 1 «To become expert» (Sigmundsson, Haga, et al., 2020a), and «The Achievement arrow», see Figure 2 (Sigmundsson et al., 2021). Another theoretical implication was the new data that clearly show an increase in most factors with a higher competition level, which strengthens these factors' role collectively in motivation and performance research. Practical implications concern coaches and organizations that develop talent. Knowledge of these motivational factors is essential to foster talent. Results have shown how athletes at a higher level had stronger scores on all motivational factors in addition to practice hours, which suggests that these are aspects coaches should be looking for and develop within the individual.

Future Research

As illustrated in this thesis, multiple studies ranging in sample size have researched passion, grit, and mindset. Research on athletes shows variations in both mean scores and correlational values. A meta-analysis of all data using the same scales could be interesting, and comparing mean scores for athletes and non-athletes would give more insight into the importance of these motivational variables for athletes. One aspect that could differ for individual and team sports athletes is the social aspect of motivation. This study revealed the importance of self-efficacy, but could not detect any differences in scores for swimmers and handball players. In the future one could explore social self-efficacy instead, when comparing individual and team sports athletes. Another suggestion is that future research measures the motivational factors together with a variable that captures what role others, such as

teammates, have in their motivation. Next, given the self-efficacy scores for this sample, more studies should be conducted, where self-efficacy is a natural fourth part of passion, grit, and mindset research. Ultimately, a well-developed scale measuring how coaches affect athletes' development and progression as an athlete would be an enrichment to the field of sports psychology.

Conclusion

This sample does not expose sufficient differences in motivational factors to conclude important variations depending on the type of sport. There were differences in how athletes regarded their coach and the number of practice hours endured each week dependent on the sport, but otherwise, little suggests significant differences. Regarding competition level, significant differences could be found for most variables. The tendency was that with a higher competition level, ranging from regional, national, to international level, scores on motivational factors increase incrementally. To perform and achieve at the highest level, an individual need to have stronger passion and grit, they need a growth mindset and self-efficacy. They also need to have a qualified coach with whom they have a good relationship and be willing to invest the necessary practice hours. Self-efficacy has emerged as an essential factor together with passion, grit, and mindset, and should be a natural fourth factor in the Achievement arrow, and in the strive to become an expert.

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Appendix

Appendix A

Information About the Study and Consent to Participation

Dette er en spørreundersøkelse som inneholder spørsmål om de fem faktorene; lidenskap, driv, vekst-tankesett, mestringstro og betydningen av en god trener. Disse faktorene er sentrale for god utvikling og prestasjon på høyt nivå. Hensikten er å måle hvordan ungdom i alderen 16-19 år fra konkurranseidrettene håndball og svømming skårer på de fem faktorene.

Deltakelse i spørreundersøkelsen vil bidra til økt kunnskap om personlige egenskaper som må utvikles for å prestere på høyt nivå, samt gi deg som respondent en mulighet til å vurdere hvordan du selv skårer på disse egenskapene.

Det vil ta ca 4-8 minutter å svare på undersøkelsen og alle svar vil være anonyme. Spørsmålene er standardiserte og brukt i flere tidlige studier. Det er mulig å trekke seg, men når du trykker på send godtar du å være med i studien.

Takk for tiden din.

Ved spørsmål ta gjerne kontakt:

Andrea.kit@hotmail.com

Appendix B

Demographic Variables from the Questionnaire

Kjønn

Mann

Kvinne

Annet

Alder

Eks: 17

Idrett

Svømming

Håndball

Annet

Hvor mange timer i uken er du aktiv i din idrett?

Dette inkluderer landoppvarming og organisert landtrening/basis. Hvis du går på idrettslinje (vgs) kan du inkludere timene du bruker målrettet mot din idrett.

5 timer eller mindre

6-10 timer

11-15 timer

16-20 timer

21 timer eller mer

Hva er det høyeste nivået du har konkurrert på?

Velg ett alternativ. Hvis du ikke har konkurrert i nasjonalt eller internasjonalt mesterskap, kryss av for krets nivå. Hvis du er kvalifisert til et kommende mesterskap, kan du krysse av for dette.

Krets nivå (region)

Nasjonalt nivå (mesterskap/serie)

Internasjonalt nivå (mesterskap/serie)

Ingen av alternativene

Appendix C

Scales for Passion, Grit, Mindset, Self-efficacy, and the Coach Effect

Lidenskap (Passion)

Vurder hvor enig eller uenig du er med de følgende påstandene:

	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/tema/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 på 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 prosjektene 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"/>

Driv (Grit)

Vurder hvor enig eller uenig du er med de følgende påstandene:

	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 tilbakemelding/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 et prosjekt i en kort periode, men har senere 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 ett mål, men bestemmer meg så for ett 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 ett 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"/>

Tankesett (Mindset)

Vurder hvor enig eller uenig du er i de følgende påstandene:

	Svært enig	Enig	Stort sett enig	Stort sett uenig	Uenig	Svært uenig
Du har et bestemt intelligens-nivå, og du kan egentlig ikke gjøre så mye for å endre det	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Intelligensen din er noe ved deg som du ikke kan endre særlig mye	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Uansett hvem du er, så kan du endre intelligensnivået ditt i betydelig grad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For å være ærlig så kan du egentlig ikke endre hvor intelligent du er	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hvor intelligent du er, er noe du alltid kan endre betraktelig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Du kan lære nye ting, men du kan egentlig ikke endre din grunnleggende intelligens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Uansett hvilket intelligens-nivå du har, så kan du alltid endre den en hel del	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selv ditt grunnleggende intelligens-nivå kan du endre betraktelig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Mestringstro (Self-efficacy)

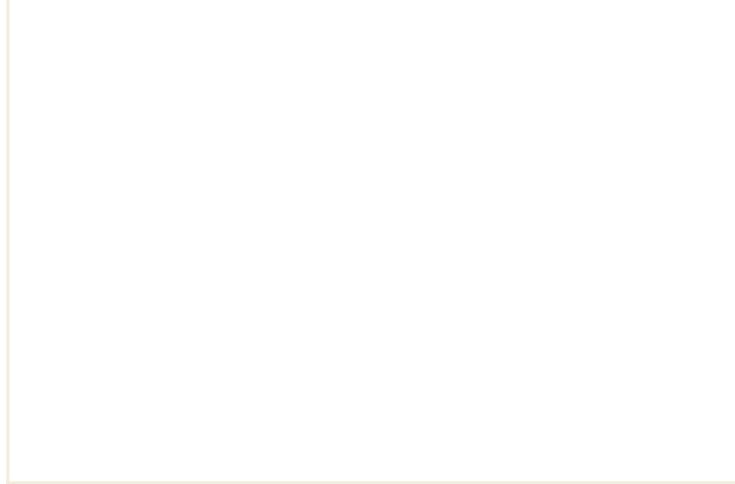
Hvor enig er du i disse påstandene om deg selv?

	Helt riktig	Nokså riktig	Nokså galt	Helt galt
Jeg klarer alltid å løse vanskelige problemer hvis jeg prøver hardt nok	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hvis noen motarbeider meg, så kan jeg finne måter og veier for å få det som jeg vil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Det er lett for meg å holde fast på planene mine og nå mine mål	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler meg trygg på at jeg ville kunne takle uventede hendelser på en effektiv måte	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Takket være ressursene mine så vet jeg hvordan jeg skal takle uventede situasjoner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg kan løse de fleste problemer hvis jeg går tilstrekkelig inn for det	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg beholder roen når jeg møter vanskeligheter fordi jeg stoler på mestringsevnen min	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Når jeg møter et problem, så finner jeg vanligvis flere løsninger på det	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hvis jeg er i knipe, så finner jeg vanligvis en vei ut	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Samme hva som hender så er jeg vanligvis i stand til å takle det	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Treners effekt på utøvers utvikling og prestasjon

Hvis du nylig har byttet trener kan du oppgi svar med utgangspunkt i din forrige trener.

	Svært enig	Enig	Litt enig	Hverken eller	Litt uenig	Uenig	Svært uenig
Treneren min har vært avgjørende for min utvikling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler at treneren min ser hele meg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg har en god relasjon til treneren min	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg anser treneren min som kompetent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Treneren min og jeg jobber målrettet mot de samme målene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



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