



Crossfit and sports psychology

Elite Crossfit athletes' opinions on mental toughness
– a qualitative interview study

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Independent work at undergraduate level 93:2022
Sports Science and Sports Coaching program 2020-2023
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Abstract

The aim of the present study was to review the elite Crossfit athletes' opinions of the importance of mental toughness to achieve optimal performance. A number of other research studies looking at psychological factors such as grit and mental toughness supports the idea that elite athletes should develop their mental capacity to improve their individual performance.

The method and research design consists of a qualitative interview study where four elite crossfit athletes have been interviewed. The athletes participated in a semi-structured interview about mental toughness, the attributes of what it means to be a mentally tough athlete and if it is important to be mentally tough to become successful in the sport of Crossfit. A semi-structured interview is where a list of questions are prepared at the same time as giving the interviewee room to elaborate and raise issues that the researcher may have missed (Clarke & Braun, 2013). The interviews were then analysed through a thematic analysis. The participants that were included in this study consisted of Swedish elite Crossfit athletes.

The results were divided into four themes which were: control commitment, challenge and confidence. These themes are from the 4 C model which is the definition of mental toughness by Clough et al. (2002). Challenge seems to be something that motivates the athletes to reach higher and something they also seek out. All the athletes agreed that commitment and confidence was crucial for having success in the sport and they also mentioned that mental toughness was important to be able to perform at your absolute best. The feeling of being in control was also mentioned as something that they strived for in the competition environment.

The interview results together with the presented existing research indicates that according to elite Crossfit athletes, mental toughness is very valuable for a professional Crossfit athlete to both develop and maintain to become and stay successful in the sport. This could be valuable information for both coaches and athletes in the sport.

Sammanfattning

Det övergripande syftet med denna studie var att granska Crossfit-elitidrottarens åsikter om vikten av mental toughness för att uppnå optimal prestation. Ett antal andra olika forskningsstudier som tittar på psykologiska faktorer som grit och mental toughness stödjer tanken att elitidrottare bör utveckla sin mentala förmåga för att förbättra sin individuella prestation.

Metoden och forskningsdesignen består av en kvalitativ intervjustudie där fyra elit Crossfit atleter har intervjuats. Atleterna deltog i en semistrukturerad intervju om mental tuffhet, egenskaperna för vad det innebär att vara en mentalt tuff idrottare och om det är viktigt att vara mentalt tuff för att bli framgångsrik i sporten Crossfit. En semistrukturerad intervju är där en intervjuguide förbereds samtidigt som intervjupersonen får utrymme att utveckla sina svar och lyfta frågor som forskaren kan ha missat (Clarke & Braun, 2013). Intervjuerna analyserades sedan genom en tematisk analys. Deltagarna som ingick i denna studie bestod av fyra svenska elit Crossfit atleter.

Resultaten delades sedan in i fyra teman: kontroll, engagemang, utmaning och självförtroende. Dessa teman är enligt 4 C-modellen vilket är Clough et al., (2002) definition av mental toughness. Utmaningar verkar vara något som motiverar idrottarna att sträva högre och något de också söker sig till. Alla idrottare var överens om att engagemang och självförtroende var avgörande för att nå framgång i sporten och de nämnde också att mental toughness var viktigt för att kunna prestera på topp som atlet. Känslan av att vara i kontroll nämndes också som något man strävade efter i tävlingssammanhang.

Intervjuresultaten tillsammans med den befintliga forskningen indikerar att mental toughness enligt elit Crossfit atleter, är mycket värdefullt för en elit Crossfit-atlet att både utveckla och bibehålla för att både bli och förbli framgångsrik inom sporten. Detta kan vara värdefull information för både coacher och atleter i sporten.

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1. Introduction and background of the problem

1.1 *Mental toughness and definition*

Mental toughness is one of the most important psychological characteristics to develop for an athlete that wants to reach success in elite sports, especially if we're listening to athletes, coaches and applied sports psychologists (Crust, 2007). It is also said that mental toughness is the ability to cope effectively with both pressure and adversity while also maintaining a high degree of performance (Crust, 2007). A mentally tough athlete also recovers quickly from setbacks with an increased determination to succeed, being more resilient and refusing to quit. They are also more competitive both with self and others and have a high degree of self-belief that they can control outcomes (Clough et al., 2002). Individuals with higher mental toughness have a greater ability to bounce back stronger and perform better following negative feedback than an individual with lower mental toughness (Clough et al., 2002). They do also perform better in cognitive tasks (Crust, 2007).

The mental toughness definition that will be used in this study is based on the 4C model by Clough et al. (2002). "Mentally tough individuals tend to be sociable and outgoing; as they are able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakeable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity." (Clough et al., 2002, p.38). This definition comprises the 4 C model which outlines four different characteristics and these consist of: control, commitment, challenge and confidence. Each of these characteristics can be coached and developed to improve the mental toughness overall.

Control: An athlete with a high sense of control feels like they are in control over both their life and their emotions. They feel like they can control the outcome over their work and the environment which they work in. They do also believe to a higher extent that they have control over their life (Clough et al., 2002).

Commitment: An athlete with a high level of commitment has a greater tendency to successfully carry out any task they have committed themselves to. A committed athlete also works with goals and goal setting is also a way of improving commitment. Commitment linked with confidence and self-belief makes a person more likely to stick to the plan and persist, even when things get challenging (Clough et al., 2002).

Challenge: Challenges might include things like competing in a new environment and doing something for the first time. Mentally tough athletes can view these types of challenges as a possibility for growth and sees opportunities rather than obstacles. They view problems and challenges as a chance to self-development (Clough et al., 2002).

Confidence: According to the 4 C model there are two subscales on confidence: confidence in abilities and interpersonal. Abilities describes to which scale an individual believe that they're a worthwhile person and individuals who score high in interpersonal

confidence are often more assertive and forthcoming in social settings. Individuals who score high in confidence have a greater sense of self belief and believe that they are both worthy of success and that they can reach it (Clough et al., 2002).

The 4 C model was chosen because it is a model based on the MTQ48 questionnaire which is the most used mental toughness questionnaire in sports. According to Crust and Swann (2011) there is also evidence that support the validity and reliability of the MTQ48 questionnaire and how well it measures mental toughness. It also provided me a with a good base for my interview guide.

1.2 Background of the problem

Crossfit is a very challenging sport and it requires the athletes to be very allround trained, physically fit but also mentally fit to be able to push through challenging workouts. The overall aim of the present study was aimed to review the elite Crossfit athletes' opinions of the importance of mental toughness to achieve optimal performance. Is mental toughness something that the athletes are focusing on and is it required to become successful in the sport of Crossfit?

The author of the study finds it fascinating that some people are capable of pushing their body to its absolute limit when others would have given up a long time ago. The author trains Crossfit as a recreational activity and works at a Crossfit gym. The findings in this study could further develop knowledge in this area, which could be useful for both Crossfit athletes and coaches in Crossfit.

1.3 Background and description about Crossfit

Crossfit is a high-intensity functional training that was created by Greg Glassman in the year of 1995. There are Crossfit boxes located in 155 countries and over 14.000 Crossfit affiliates (Crossfit, 2023). Crossfit is an intense form of training, and the primary goal is to develop a general but also broad and inclusive fitness. Greg Glassman has previously stated: "our speciality is not specializing. Combat, survival, many sports, and life reward this kind of fitness and, on average, punish the specialist" (Paine, 2010, p.1). In the study by Petz (2021) it is mentioned that crossfit is both a relatively new and fast growing sport but there is still a need for more research done in the field of sports psychology specifically in psychological characteristics in the individual performance of the athlete.

Crossfit is made of three fitness standards and the athletes are held to those to determine their individual level of fitness. The first standard includes the ten general physical skills. These ten skills include: strength, cardiovascular/respiratory endurance, stamina, flexibility, power, speed, coordination, agility, balance and accuracy. So by this standard the athletes are only as fit as they are competent across all of the ten skills. As earlier mentioned if someone wants to get good at Crossfit it is important that they train very broad. This is the second standard and it's all about performing well at a wide range of different physical tasks. In Crossfit this gets called the "hopper" and this refers to if one would put every imaginable physical task into a hopper, spin it around and then pull out one on random, the athletes level of fitness would get measured on their ability to perform good on any of the tasks that may get pulled from the hopper. The third and

last standard takes the athletes ability to perform well in all metabolic pathways which refers to the phosphagen, glycolytic and oxidative pathway. Crossfit is said to be the “sport of fitness” and it is a sport that takes both the community, competition and also fun of the sport into account, by keeping score, timing all of the workouts, having clear rules and standards (Paine, 2010).

The Crossfit Games is the highest-ranking competition that takes place every year, this was also an inclusion criterion for the athletes included in this study. The athletes included in the study have competed at the Crossfit Games either as an individual athlete or as a part of a team. The man and woman that wins the Crossfit Games will get awarded the title “Fittest on Earth”. Before an athlete can compete in the Games they have to qualify, to be able to do that they have to do the Crossfit Open which is an international online qualifier that takes place in Crossfit affiliates all over the world. The Open takes place over five weeks and the participants get four days to complete each week’s workout. The athlete also must record the workout and have a certified judge that records the score. The most common way to record the score is by the repetitions completed. The athletes are ranked after every workout and the athletes that ranks the highest after five weeks will advance and get the chance to the quarter finals. After the quarter finals the athletes that ranks the highest will go the semi-finals and it is firstly after placing highly in the semifinals that the best athletes will get invited to the Games. It is hundreds of thousands of athletes that competes in the Crossfit Open each year, but it is very competitive and less then 1 % of the participants will qualify (Mangine et al., 2020).

2. Previous research

Over the last few decades there has been a lot of research done on mental toughness in both Crossfit and many other different sports. This is of great importance both for the future of sports and to get a better understanding of the purpose and the participants' answers in this particular study (Cowden, 2017; Liew et al., 2019). Things that have been looked at will be outlined in this part of the study, but it includes different definitions of mental toughness, the attributes and description of the mentally tough athlete, differences between individual athletes and athletes’ part of a team, importance of mental toughness and how it is developed. There are still gaps in the research like a congruent definition of mental toughness and there is not a lot of previous research done about Crossfit athletes. My hope with this particular study is to fill a part of that research gap and that the findings in this study could help with developing a better understanding of the importance of mental toughness for the elite Crossfit athlete.

2.1 Definition

Within previous literature the conceptualization, measurement and definition of mental toughness is without consensus between the researchers according to the study by Liew et. al (2019). This seems to be a common conclusion in similar studies. So, there are many different definitions of mental toughness and for this study I have chosen to go with the earlier mentioned, 4 C model. The 4C's model outlined by Clough et al. (2002) is one of the most popular models in sport science research.

2.2 Description of the mentally tough athlete

Clough et al. (2002) describes a mentally tough athlete as someone who tends to be both outgoing and sociable but also stay calm during pressured situations. They also tend to be more competitive than the regular person and not as anxious. This mirrors the work by Cowden (2017) who found there is a link between mental toughness and higher competitive standards, achievements levels and performance outcomes. Furthermore, a mentally tough person also believes in themselves and that they can control their own destiny (Clough et al., 2002).

Findings in the study by Golby and Sheard (2004) mentions that elite rugby player that are playing at the highest standard scored higher in mental toughness and the three hardiness traits of control, challenge and commitment. They also mention and suggest focusing on mental toughness and hardiness training to improve the sports performance of the players.

Looking at the study by Nicholls et al. (2009) it seems to not be any significant differences in mental toughness among team- or individual sports athletes, in both contact and non-contact sports. Because there is no difference in mental toughness between sports, that means that previous literature, regardless of it is in rugby or any other sport is likely still relevant for Crossfit. They also mention that could support the fact that mental toughness is a personality trait that is not based on a situation but rather on the athlete him- or herself.

2.3 Importance of mental toughness

In the study by Liew et al. (2019) they first mention that mental toughness has been stated by both coaches and athletes to be one of the most important psychological attributes to acquire for an athlete to become successful in many different sports. They mention how it is the psychological factors that determines who win or loses in a sport. But they also mention that mental toughness probably is the least understood term because of its many different definitions.

The psychological skills training has been highly valued in assisting the athletes to develop and maintain effective mental skills (e.g., decision making and external attentional focus) which is important to both reach peak performance, succeed and enjoy the sport they're involved in. This is something that they talk about in the study by Di Corrado et al. (2021). It is also mentioned that mental toughness is considered to be a key factor when it comes to reaching a superior performance in many different domains.

Elite sport puts a high demand on the athletes to excel at optimal levels while reaching peak performance under highly demanding conditions. This puts psychological attributes such as being able to cope under pressure, having self confidence and viewing anxiety related symptoms as rather positive are also now a contributing factor to success in sports according to the study by Jones et al. (2007). The attributes listed can be directly linked back to mental toughness.

2.4 Development of mental toughness

In the study by Connaughton et al. (2008) it is mentioned that there have been many mental toughness programs designed to support the development of the trait for performers. It is believed that mental toughness isn't inherited but a trait that can be developed. To acquire mental toughness though you would need to put in hard work, practice and understand the process. The purpose of the programs has been to develop the certain traits that is believed that a mentally tough athlete has. Traits such as: self-confidence, control – both visual and attention, positive energy, motivation, resilience and concentration to mention a few. Horsburgh et al. (2009) said though that it seems like mental toughness would have a strong genetic component and that would make it easier to improve in certain, but not all areas, of mental toughness.

According to the study by Weinberg et al. (2011) coaches have been using different strategies to build mentally tough athletes. Strategies such as creating a tough physical environment to practice in, providing opportunities where the athlete could learn and practice mental toughness but also a positive mental environment. In the same study the coaches involved seemed to recruit the athletes based on their mental character in addition to their already acquired physical skills. Even though the coaches considered to think they were good at developing mentally tough athletes most of them also desired to recruit athletes that already were mentally tough. The qualities they were looking for were mentioned as “how hard they work “and having a “having a game attitude” (Weinberg et al., 2011).

3. Aim of the study

The overall aim of the present study was aimed to review the elite Crossfit athletes' opinions of the importance of mental toughness to achieve optimal performance. In the study the participants' reflections, opinions and experiences will be the focus along with already existing research done in the field of mental toughness. The findings in this study could further develop knowledge in this area, which could be useful for both athletes and coaches in Crossfit.

4. Method and research design

4.1 Participants

Four Swedish elite Crossfit athletes were contacted (two males and two females) to participate in this study. The athletes were chosen because of their high performance in Crossfit competitions and the age between the athletes ranges from 29-47 years. The criteria to participate in the study was to be considered an elite athlete. The definition of elite was someone who has competed either individual or as a part of a team at the Crossfit Games which is the highest most prestigious competition in the sport of Crossfit.

4.2 Inclusion/exclusion criteria

Because the aim of the study is looking at elite athletes, intermediate and beginner crossfit athletes was excluded from the study.

Table 1 outline the participants demographics. The names are pseudonyms and not their real names to protect the integrity of the athletes. The names will be used in the results to show who said what during the interviews.

Table 1. *Participants demographics*

Athlete	Level	Age	Gender	Interview length
Oliver	International	33	Male	1:38:31 h
Marcus	International	34	Male	1:11:22 h
Jessica	International	47	Female	1:08:52 h
Martina	International	29	Female	0:42:16 h

4.3 Procedure & ethics

All of the research ethics rules was considered before the interview process started. The participants got a fair and comprehensible description of the methods and purpose of the study. The participants also had the opportunity before, during and after the interview to ask questions about the study at any time and also receive truthful and honest answers to their questions. The participants were informed that their participation was voluntary and that they could decline to answer questions and withdraw from the participation at any time and was not going to face any negative consequences (Braun & Clarke, 2013).

Prior to the interviews and data collection the participants were briefed about the ethics and how the data was going to be collected. The participants were also informed that the interview was going to be recorded. The interview took place during one or two different occasions and lasted for 40 – 100 minutes depending on the participant. Before the interviews the participant got an information letter, consent form and they were briefed about the purpose of the study. A consent before starting the process is considered to be crucial with this type of study (Braun & Clarke, 2013). In the information letter they got they were informed what would happen to the data according to the confidentiality requirements and who to contact for more information about the study. All to make sure the participants felt safe through the process of the study. See Appendix 10.2. for the participant consent form and Appendix 10.3. for the athlete information letter.

4.4 Interview guide

The author behind the study compiled a semi-structured interview guide with relevant questions in consultation with a supervisor. After that, two pilot interviews were conducted with two people not connected to the study before the actual interviews with the study's participants were conducted. The interview guide was created based on different themes that were based on the 4 C model by Clough et al. (2002). The guide contained the questions that considered the themes, and this formed the basis of the interview guide (see Appendix 10.4. for interview guide).

The questions included the participants' background, their own view on mental toughness, whether they thought mental toughness is of importance or not, questions about control, challenge, commitment and confidence and other questions. Examples of questions were: *“How would you personally define mental toughness?”*, *“How does an athlete develop mental toughness according to you?”*, *“Do you feel like you are in control of your performance and emotions during a crossfit competition?”*, *“How do you feel when you achieve a big goal?”*, *“Tell me about a time where you felt really committed to crossfit?”*, *“Are you motivated by challenges and if so why?”*, *“What is your view on your own abilities in your sport?”*, *“Do you think that it is important to be mentally tough in crossfit? If so, why and if not why do you think it isn't?”*

During the interviews, the author had a flexible approach to the interview guide, which contributed to the fact that other questions could be added depending on what the participants told during the interview.

The questions was asked in an open ended fashion to give the interviewee space to give detailed responses. It is also good to not have too long questions as this may confuse the participant. A couple of good ways to start questions could be like this; *“Can you tell me about..?”*, *How do you feel about..?”*, *What do you think about..?”* (Braun & Clarke, 2013) questions will be based mainly on the 4 C model (Clough et al. 2002), mentioned in the introduction (mental toughness and definition.)

4.5 Data analysis

The method in this study was based on a thematic analysis with a deductive approach where the themes were formed from the 4 C model about mental toughness and the participants answers to the interview questions.

Thematic analysis is a qualitative method that is able to identify, interpret, present and analyze the themes developed from the collected data (Braun & Clarke, 2013). The thematic analysis is a good way to be able to identify patterns of meaning of the collected data. It is also a flexible method which gives the researcher more flexibility how to go about collecting the data. It is also an easily accessible method which is preferable for a beginner researcher that are aiming to do a qualitative study (Clarke et al., 2016).

The analysis started with transcription of the data to identify different codes and themes to fit under the four different main categories. Then three different sub themes were identified that was placed under the four main themes. After the transcription process the author of the study went through the material a few more times to be sure that any valuable material wasn't missed in the process. Finding interesting quotes were the focus in this step, there after a thematic map over the analysis were formed, this part is important to strengthen the trustworthiness of the analysis. As a last step the considered most important quotes were translated from Swedish to English.

4.6 Trustworthiness

When talking about validity and reliability it is more common to use in quantitative research since it often uses more statistic and numeric data (Golafshani, 2003). In qualitative studies it is more common to talk about trustworthiness.

Trustworthiness is more about open and high qualitative research. It is also about how well the researcher demonstrates that the data analysis has been both precise and consistent over time (Elo et al., 2014). The qualitative researcher must show that the results have been collected in trustworthy manner to become both meaningful and useful for the reader. The trustworthiness of a study increases if the method is documented in a comprehensive way all the way from the preparation phase to the organization and reporting phase. (Elo et al., 2014).

The trustworthiness is also often made up of five criteria's: credibility, dependability, conformability, transferability and authenticity (Elo et al., 2014). To establish credibility the researcher must ensure that the participants included in the study is described in an accurate way. To establish dependability the data must be consistent over time. The establishment of conformability refers to the researchers' findings and interpretations from the data are clearly described. To reach conformability, credibility, dependability and transferability must already be achieved. Transferability refers to how well the results could be transferred to other groups or settings. The last one is authenticity and that refers to how well the researcher shows a wide range of realities. These all five criteria's make up trustworthiness in qualitative research. (Elo et al., 2014).

To work with an experienced supervisor is also a way of increasing the trustworthiness. The more experienced supervisor can help with the analysis process and test out the analytic ideas. This could help you avoid problems in the beginning and release anxiety during the whole process. It is recommended for someone new to thematic analysis to work with a supervisor and to review and reflect with them from the beginning to the end of writing the study. (Clarke and Braun, 2021)

In this study I would suggest that the trustworthiness is relatively high as I have measured what I intended to measure. The results, showed in the next part, are both consistent and goes in line with the previous research in the field of mental toughness. The five criteria's mention in the section above were considered during the study and to increase the trustworthiness, I followed the steps outlined by Braun & Clarke, discussed the analysis with my supervisor. The athletes also received a consent form, an information letter and was briefed how the interview would be conducted before we started the process.

5. Results

Within the results section, the 4C's of mental toughness (Clough et al., 2002) are introduced separately. Specifically, I outline the following aspects relating to each of the 4C's; how it is defined and conceptualized, the perceived importance, and how it can be developed. Control is the pillar that is introduced first, then commitment, challenge and lastly confidence. The quotes and data that was derived from the interviews are placed under the category and sub-category that was considered the best fit.

5.1 Control

All participants describe control as something necessary for being successful in competitions. They relate it to a feeling where they somewhat like to be in control over their own feelings and circumstances while competing. But they also highlight that it is impossible to be in control 100 % of the time because of certain situations and circumstances. One part of control seems to be to have a game plan going into a competition and knowing that you have done everything in your power prior to the competition. Another part seems to be to not put others' perceived expectations on yourself and focus on the task in hand. Down below the results and three sub categories of the definition of control, the importance and how it can be developed is presented.

5.1.1 What is it/definition

Control

The athletes talked about how they do feel in control during competition and that is something that has also improved over time.

For the athletes, control developed over time. For example, Marcus said, *"I think these days I have pretty good control all the time and it feels because I know that sometimes there is a bad period where you are much worse than what you would like yourself to be compared to yourself."* Similarly, Martina said

"..it has taken time. I think a lot is about how you act and react to things and being able to distinguish them. What is a feeling and how will you act on it? And then have the consciousness in how you act on your feelings going further." - Martina

When the athletes described what it felt like to be in control, they said things like,

"..then I remember that it felt so incredibly easy and the only thing I wanted was to just stand and look at the audience, I felt very calm.. Yes it felt awesome then, even if I felt a little tired before..everything felt so damn easy, I could enjoy it to 100%.. but then it was really.. kind of cool, full arena, screaming audience and everything felt so easy.." - Oliver

Additionally, Jessica said this; *"...and there I really felt in control. I guess control is also about having the stamina to push through. During that competition I had the same time on every lap, I could also keep pushing through the workout.. There I really felt that I was in control."* – Jessica

5.1.2 Importance *Control*

When asked about the importance of control for mental toughness the athletes said that it is hard to be in control all the time especially if they are a part of a team, but they also mention how horrible it could feel to not feel in control during competitions. They said things like

"..in a team you let go of the control, that is part of competing in a team. Then you give it away to 3 others, you actually only have a small percentage to say but I think I feel that I am confident enough and have control even then because I feel satisfied with my own abilities, I enjoy competing in a team.." – Oliver

"During Games one year we were going out to swim in the open sea.. and I can't even crawl, it is quite embarrassing. The waves were wild and I thought: there are sharks in this water.. I didn't know what was under me, it was so disgusting! Terrible! I really felt: no no no.. After the swim we were going for a run on the beach. Yes, I was really bad there as well.. the swim was probably only 400 m but it was so wavy.. swimming in the open sea.. I had zero control there.. almost a feeling of panic.." - Jessica

As earlier mentioned, the athletes seemed to agree that it is hard to be in control all the time but that there were not many things that could distract them during their performance. They also linked that to not winning the competition. For example, Jessica said

"If you feel that you are in full control then you won't be first in line either. I think I have 90% control, the other 10% could be that you take a wrong step or fail a lift... so you have to have your game plan ready but then you have to be willing to bet on yourself to win and sometimes you don't have much control." – Jessica

Oliver said this about distractions and control: *"I would say the more people, the more energy I get... I would also say that I get minimally stressed by the fact that there are a lot of people and noises around, I honestly don't know what would distract me.." - Oliver*

5.1.3 How (can you develop and improve) *Control*

The athletes reflected that it can be hard to feel in control all of the time during competition. So what about the times when you feel like you lose control over the situation, what could you do then? According to Oliver it is good to take it step by step and according to Marcus it is good to link one feeling that could be perceived as negative to a more positive one. The athletes said things like

"..that means that within half a minute I had understood that now I will run without energy for 70 km and it's night and I'm alone and then I was like this.. I got a little anxious for a short period.. What should I do now? OK how does the situation really look? What can I get?..then I had one hour or so where I ran completely alone, I took it one kilometer at a time.. that's how I had to deal with it... my way to deal with it was really to microdose in small efforts like this."- Oliver

"..the feeling of nervousness is the same as excitement too, so if you trick yourself from the first time you feel it you can get that feeling by just thinking about it.. I feel like damn this is fun, I still care, this is going to be exciting" - Marcus

It also seems like the athletes work on improving their control long-term and not just in the moment. For example, Martina said

"Largely because I've done everything I'm aware of. I have reflected on feelings that may arise, I reflect on how I act in different situations, so I already know how I react and act on things and that is a way for me to control them, which means that I have control over the situation. And when those strong feelings come, I already know they will come and then I can handle them." – Martina

She also added, *"I think mental toughness is a constant job. You don't work to mental toughness and stop there. It's the same thing with self-esteem, you have to constantly work on it otherwise you lose it, it's not something you kind of just tick off.." - Martina*

5.2 Commitment

Based on the results, commitment also seems to be of high importance for becoming a successful athlete according to the participants of the study. They have different descriptions of the word but seem to have vastly the same meaning. They all talk about the importance of having and following a plan, setting goals and also being dead set on going after those goals. The athletes seem to agree that it is crucial to set good habits and then also to prioritize them.

5.2.1 What is it/definition

Commitment

The athletes talked about how commitment is doing the things you have told yourself you're going to do. Outside circumstances shouldn't matter. For example, Oliver said,

"It's really like this: to be able to do what you've been telling yourself to do for a longer period of time.. Continue to make that decision regardless of whether it's.. dark or cold... you have to want the end goal, it's about being able to look past your other feelings in some way.." – Oliver

Additionally, Marcus said

"..perhaps to be nice and honest with oneself, to be consistent, to know that you put in the time that you tell yourself you should do, follow the plan, and dare to really give it your all when necessary and not be afraid to do the work when it's hard or when you're hurting.." - Marcus

Other things the athletes said about what commitment is to them was things like, *"Prioritization. Prioritize what you are committed to. By that I mean not only in terms of time but also in terms of thought." – Martina*

Having someone to be accountable to is commitment according to Oliver,

"..I'm not the one to turn down challenges, for example this past spring I decided to run 100 miles.. It was decided in one minute without really thinking about my decision.. I saw

an advertisement about the race and sent it to my friend Danne, he sent a picture back: booked and then it was a done deal..” – Oliver

5.2.2 Importance ***Commitment***

Commitment is very important both for mental toughness but also for becoming successful in the sport. One thing that came up was the things about how motivation can't be a reliant factor. For example, Oliver said this

"..I have a bit of a hard time understanding that thing about motivation.. it's more or less about.. so motivation, it's great when it's there but it always comes and goes so I've probably never relied on motivation..because I've always sort of had a goal and I think I'm good at reaching it, so I also always choose goals that I think feel important and fun to me..” – Oliver

Martina also talked about the importance of committing to a goal: *"Goal setting has followed me since I started with Crossfit, I believe in having one big goal and then having many sub-goals."* - Martina

It also seems like being truly committed to Crossfit and being consistent, even with resting when needed, helped the athlete with staying on course. For example, Marcus said this

"..perhaps to be nice and honest with yourself, to be consistent, to know that you put in the time that you tell yourself you should do, like following the plan you have, to dare to go all in when necessary and don't be afraid that it's going to hurt or be hard. I still believe daring to pause is important too, everything depends on how aware you are of things but daring to pause if you feel like you need it.. because I think that is difficult..” - Marcus

Additionally, Jessica said: *"Previously, my goal was that I always wanted to be able to take part in a competition, I wanted to be in such good shape to be able to compete whenever the opportunity presented itself..” - Jessica*

5.2.3 How (can you develop and improve) ***Commitment***

One thing that seemed very important to both be able to improve the commitment is enjoying what you do but also stick to and follow a plan. Oliver said this: *"...I started with crossfit because I thought it was the most fun, I've ever tried. and then it wasn't difficult for me to continue developing in it..it became natural that it became my biggest goal to compete at as high a level as possible..” - Oliver*

Jessica spoke about the importance of a coach and following a plan

"Follow your training program, take care of your diet.. then listen to your coach in all respects, regardless of whether they say you should rest or train more.. commitment is also daring to rest. Dare to listen to your body, that is also a commitment. Another commitment can also be that you have to adapt to your teammates..." - Jessica

According to Oliver setting high goals and following through is important to improve commitment, he said things like

"..I've always set such high goals which therefore require such a high commitment. I remember the first time I was going to run a marathon.. I didn't understand what that meant..in the end, I've learned that if you give your time and commitment - it pays off.. I think that's what I enjoy the most.. seeing that I've been paid for my hard work, that is what gives me the most..stimulation of all.. To feel that I've succeeded in what I have said I will do. That's also why it's so easy to find a new goal for me.." – Oliver

Marcus also talked about the importance of goal setting: *"I feel that I'm quite good at setting goals when it's something close time and also good at adapting mentally and mentally preparing myself for how it feels when you have to grind more." - Marcus*

5.3 Challenge

After the transcription of the interviews, challenges seem to be a huge part of being mentally tough according to all the athletes. The participants use challenges to both motivate themselves and they also seem to agree that Crossfit is a very challenging sport both mentally and physically. It also seems like challenges support commitment. Challenges seem to keep the athletes reaching higher and always striving to become better at their craft. Even though they don't always love to do hard stuff, it seems to be a way of development. Some seem to create challenges for themselves regularly and some aren't as motivated of challenges nowadays as they were before because their goals have changed. But it can definitely be said that the participant definitely looks at challenges in a positive way.

5.3.1 What is it/definition Challenge

The athletes talked about how Crossfit is challenging in every aspect both mentally and physically. According to Marcus challenges is what really drives him

"..the most fun challenges are actually getting better or... I think I have been driven by trying to get better at what I do... because it's fun with development , it is fun like hell, so the challenging thing about Crossfit is getting better at what you're not so good at compared to others, especially if you're going to try to compete." – Marcus

Oliver had his own definition of challenge: *"Definitely the ability to torture yourself because I think that's the difference between winning and losing an incredible number of times." - Oliver*

Challenges seem to be a good trigger for the athletes, no doubt, but according to Jessica it is all about the right challenges

"I mostly get excited about challenges but it depends on what it is: run 20 K? Run a marathon? No thanks! Row a marathon? No thanks! Because it doesn't suit me.. But if I feel like I can actually do this then I think it's quite funny. And that's where the competitive person in me glow up! If I know that I would have a chance, then of course I'm triggered by that, I think that's great fun! – Jessica

Being able to view the challenge from a positive perspective is something Oliver is good at

"Something I've noticed about crossfit competitions is that as soon as it's a running event, you see everyone give a big sigh, 90 percent of the participants at least.. Then I think, "now I've won.." So I've won the event every single time before we even have started..I know that I am ok at running as well or in the crossfit world even good at running.." - Oliver

5.3.2 Importance Challenge

The athletes talked about the importance of challenges to both keep it fun and reaching higher. For example, Oliver said this: *"Challenges really turn me on! If I'm not challenged then I think it might not feel useless but.. like why should I run a marathon slowly? Then I can probably do it fast so I have to work for it.." - Oliver*

Additionally, Marcus added: *"Yes, I think challenge is fun, or rather, I love the right challenges, no, I love all challenges, I think it's so damn fun actually" - Marcus*

Crossfit and challenge seems to go hand in hand and that is probably also one factor why the athletes got attracted to the sport. For example, Oliver said

"..I think that because I like challenges, that's why Crossfit has suited me so well. If you look at it from the right angle, from the right direction, I like to think "oh that looks fun, what a challenge" ..I understand of course that it will be hard and I will have to suffer but then again I like challenges.. you learn a lot if you can look at it positively and then it also becomes easier to handle.." - Oliver

It also seems to be important to be able to view challenges a way of development. Martina said this: *"I am motivated by challenges because it is a way for me to develop. I think challenges kind of fill my life. I constantly create challenges for myself, in work, in life, it's kind of who I am. Without even thinking that I'm doing it.." - Martina*

5.3.3 How (can you develop and improve) Challenge

Having a game plan is crucial to be able to go through challenges and then also improve. Especially according to Martina

"That you have a plan. You have to have a plan and then being able to follow the plan starts with reminding yourself why, I think. That's where the mental toughness is needed, to be able to hold on because even though I'm doing this today, it doesn't mean that I'm automatically much better. Then there will be days when everything sucks and then there will be some success and then it will suck again and then it's success and so on.." - Martina

According to Oliver it is all about having the right mindset

"I think most people could get through a marathon right here and now.. People are capable of that, I think.. But I think people put up so many barriers for themselves..and that's probably what I like to prove to myself and others so much. Break patterns and mindsets.." - Oliver

One thing that also seems important, especially in Crossfit, is preparing for the unknown. For example, this is what Oliver said: *"Crossfit has a classic saying: 'Train for the unknown!' I think it's kind of lovely in a way..."* – Oliver

5.4 Confidence

Even though the athletes didn't always see themselves as confident in all areas it seems to be of high importance to become great in Crossfit. They mentioned that if you don't believe that you are capable you will probably not reach peak performance. They all seem to have a good understanding of their own strengths and weaknesses and where they need to improve. The fact that they feel physically capable to be able to perform well also came up during the interviews. Looking at the results, confidence definitely seems to be very important for reaching higher and performing well during competitions.

5.4.1 What is it/definition

Confidence

According to the athletes confidence seems to be about being aware of your own strengths and limitations and then working on them. For example, Oliver said

"The belief in oneself is a big part of it and also seeing one's limitations. Having self-confidence is seeing one's limitations and grasping them and also believing that this will work and then start working on it.. That is having high self-confidence, I think. Being able to realize one's strengths and weaknesses or whatever you want to call it.." – Oliver

"I think it's self-confidence to be able to go to a competition and know that you will finish last.. It is common to see someone who breaks after three events, who thought that it would go better.. being offended.. thinking that it's someone else's fault. Doesn't take responsibility for his own..: "I'm this good..if it doesn't go this well then it's someone else's fault.." - Oliver

Additionally, Martina said

"So I have many examples of when I felt really confident. But for example workouts where I know I have my outer peak capacity, there I also have a lot of confidence and that's why I can also push myself very very hard because I have such a strong faith and belief in myself that I won't hit the wall.. I believe in my work capacity and then it is clear that I have very high self-confidence in that and that is why I can push myself so very hard because I believe that I can handle it, which is also my absolute strength in Crossfit." - Martina

It also seems like becoming good at something and growing confidence could help with the identity especially according to Jessica

"If you are good at something, you have better self-confidence. And when I started, there weren't that many people who did crossfit. I probably didn't have very good self-confidence before I started Crossfit. I think it was also in combination that I started working with Crossfit. I got better at the training form at the same time as I got better at teaching training. I grew because I was good at something.... It strengthened me a lot,

because I was good at something.. It sounds silly, but I BECAME SOMEONE. Which I haven't been before.." – Jessica

It also can be fleeting and go away when injured. For example, Jessica also said this
"I had a herniated disc in 2012.. Right there and then it felt like my life was over. I identified so much with Jennifer who did crossfit. Who was I then? What should I do now? My confidence and everything went down.. I loved to train and to do crossfit. I felt so good in this role, not because people knew who I was but because I felt so good in it. But then when I got a herniated disc...when I got that news, my whole world just fell apart.." - Jessica

5.4.2 Importance

Confidence

It seems to be important to develop confidence in Crossfit and for becoming more mentally tough. For example, Oliver said: *"I think it's self-confidence to take responsibility for one's own performance. I think that is very important in crossfit, because there are very few people who are good at everything."* – Oliver

Additionally, Marcus said

"Yes, it must be important! It feels like you have to believe in your own capacity.. I believe that I could beat, I don't know, anyone, if I put the time into it, I know that I can get better.. I know that I have the determination to do as much as I can..to do that at the right time is of great value, but most of it is about putting in the right amount of effort long enough and believing that you can make it all the way.." - Marcus

According to Martina confidence seems to be crucial to reach peak performance

"I think that if you have self-confidence in what you do, I think that.. So put it this way, I don't think you can succeed without self-confidence and I think you can perform at the highest level with self-confidence. I think it's really something deep inside you have to feel. I don't think you can reach your absolute full potential if you don't have confidence and believe in yourself that you can do things. Then you will probably never be able to reach that highest peak.." - Martina

One thing that also came up during the interviews was not to compare yourself to other athletes and that social media could perpetuate a false image. Oliver said this about fake confidence

"I think it is common to doubt your ability in advance and think. "Have I done enough?!" With social media, you always see what others are doing and think that no one else is in pain and no one else has been stressed or missed a workout.. I think that a lot that you see on social media is fake and that you get a lot of information which is interpreted in the wrong way.." - Oliver

5.4.3 How (can you develop and improve)

Confidence

The athletes seemed to use various strategies to develop their own confidence. A few things that came up was being realistic with yourself and reminding yourself about the things you are good at. For example, Marcus said this

"Yes, I try to be kind to myself and it feels like I try to be realistic.. you work on what you think you need to work on. Or think you know. You don't really know shit. You think you know until you realize you don't know. You do what you think you know and etc.." – Marcus

Additionally, Martina said

"I remind myself of things I've actually been able to do, like I have lifted this before and then I can or I do use a lot of mantras like that I'm strong enough for this or I can do it this! I believe a lot in talking to myself and that I feed myself with positive thoughts before the negative thoughts creep in.. I know that they will come, so I instead stock up on positive thoughts to push away any negative thoughts." – Martina

Competing more and then reflecting upon your performance also is important according to Oliver. For example, he said this: *"Compete more, that's how I got better, I did like every single competition I could do in Sweden. And then you're guaranteed to fail and you'll succeed and you'll probably relax more and get a better approach.." - Oliver*

And this: *"...then I think you become more confident if you are allowed to reflect and think about what you are not as good at, take responsibility for it...and practice competing too..." - Oliver*

Overall, the results show that the athletes considered that mental toughness is crucial to reach success in Crossfit. The results also indicate that the 4 C model is a suitable definition of mental toughness, especially in this context. All the pillars seem to be important for becoming mentally tough.

I really thought Oliver captured the importance of mental toughness, he said:

"I think you can be as capable as you want physically and technically, in terms of endurance, in terms of strength, but then it is the one who has the best mental capacity who will win in the end." - Oliver

6. Discussion

The overall aim of the present study was aimed to review the elite Crossfit athletes' opinions of the importance of mental toughness to achieve optimal performance. Based on the results of the present study, there are clear indications that the athletes thought of mental toughness as a crucial skill to develop to become successful in the sport of Crossfit. Mental toughness also seems to be a characteristic that the most successful athletes in various sports have developed if we are looking at both the results and existing research. The themes, categories and subcategories that emerged in the results are related to Clough et al. (2002) definition of mental toughness which is explained earlier in this study.

Overall, the results suggest that having mental toughness is beneficial to become competitive in the sport of Crossfit. The results also show that the athletes are driven by challenges and having

some form of control over their own performance. The elite athletes in the study also had a high degree of commitment to Crossfit and their confidence seem to be linked to their individual performance as well as a feeling of improvement and development in the sport.

In this discussion there will be four main headings, the same headings as you can find in the results section. The discussion will be based on existing research and problematization of the interviews with the athletes included in this study.

6.1 Control

All the athletes in this study seemed to both feel in control to a high degree, most of the time, over their performance and agreed on that feeling in control was quite important for being considered a mentally tough athlete. There were some mixed opinions though that came up during the interviews. Both that the feeling of control could depend on if they were confident over their own performance and how important they felt the specific competition was. One of the athletes also mentioned that he had released the feeling of control quite a bit during the last couple of years and didn't stress so much about it anymore. Based on the results my conclusion would be that control is important for both being considered mentally tough but also for athletic performance, but I don't think it is completely decisive for the individual performance as some things cannot be controlled.

Looking at the study by Crust (2007) control is a feeling and belief that one can remain influential over their performance during stressful events – this goes in line with this study and the interviews with the athletes. According to Crust (2007) athletes who exercise control uses both their own skills, imagination and knowledge but it seems to be both a complex process and not a congruent approach.

According to Clough et al. (2002) control goes hand in hand with having a great sense of belief in oneself and believing that one can control its own destiny. The athletes that are mentally tough and are having a high sense of control does seem to also be somewhat unaffected by both adversities and competitions. During the interviews with the athletes this also came up and having self-belief both affects the feeling of being in control at the same time as it also affects the confidence, commitment to the sport and to the degree the athletes decide to approach challenges. The conclusion here would also be that all the 4 C's can be related to each other and affects one another.

Looking at the study by Jones et al. (2007), being mentally tough includes being in control under pressure and remaining both determined, focused and confident. In this study they compare that this also depends on your opponent. I feel like this is somewhat problematic view on mental toughness because this suggests that you must know your opponent before you can both feel or be mentally tough. In this study they also suggest that its mental toughness is having the natural (or developed ability) to cope better than your opponent. This though goes somewhat in line what the athletes in this study said during the interviews. All of them mentioned how their past had shaped them and made them more mentally tough according to themselves.

In the study by Jones et al. (2007) a mentally tough athlete must be able to feel in control over the training preparation and not be controlled by it. They should also feel in control of their destiny and shape it however they want. A mentally tough performer should also be the one in charge over their own training even though they may have and be motivated by a coach.

According to the study by Connaughton et al. (2008) mental toughness seems to be an important factor to success in sports and athletes that lack the feeling of control are considered more mentally weak than an athlete who feels more in control over his or her own performance. The study also mentions that an athlete who feel both powerless and out of control is the exact opposite of being mentally tough. When I compare this to the interviews with the Crossfit athletes included in this study there is some mixed opinions since the athletes sometimes felt out of control but considered themselves to be mentally tough. Control and mental toughness are linked but maybe an athlete doesn't have to be or feel in control a hundred percent of the time to be named mentally tough? This is a problematization I feel needs further investigation and research.

6.2 Commitment

Commitment seems to be important for mental toughness if we look to the results of this study and already existing research. According to the athletes included in this study, commitment is doing the things you are telling yourself that you're going to do, setting a goal and going after it. All of the athletes had at some point in their Crossfit career felt very committed to the sport and this also showed up in their results. They all seemed to agree that commitment was crucial if you wanted to succeed in the sport and become more mentally tough. Commitment is mentioned several times in the existing research included in this study and seem to be an important factor if a person is considered mentally tough or not.

In the study by Crust (2007) it is mentioned that being committed is becoming deeply invested in what you are doing, and that this also makes it less likely for you to give up even in pressured situations. A mentally tough athlete seems to be more committed than a person who is not as mentally tough.

Mentally tough athletes also seem to hold a more energizing state and feeling of motivation while both staying committed and even becoming obsessed with the process. They also seem to prioritize, prepare and plan better than an athlete who isn't considered mentally tough (Clough et al., 2002).

The belief that they can achieve a goal seems to be something that makes a mentally tough performer commit to the process. If they believe there is a chance of success the commitment to the goal achievement is very high. They remain committed to the goal all the way until they have either succeed or surpassed the chance of success (Jones et al., 2007).

Based by the answers and results from the interviews, this seems true as well and some of the athletes mentioned how they felt more committed to a goal when they thought they had a chance of achieving it. Like the saying: "It isn't over until it's over!"

In the study by Clough et al. (2002) they mention that mentally tough performers are deeply committed to their sport and have a greater tendency to seek out alternative ways to further develop and improve their performance. Commitment is in this study described as the ability to commit to a task despite any difficulties that may turn up whilst going after and achieving a goal. This goes in line with similar studies and seem to be a frequent finding amongst the researchers. In the study by Sorensen et al. (2016) it seems like mentally tough athletes have the power to maintain both focus under high stress, control their feelings and circumstances and respond to challenges better than an athlete who is not considered mentally tough. They make sure the job gets done even when it's hard, this is a way of commitment according to me. This is also what Crust & Clough (2011) discovered. They found that mentally tough athletes seem to be more committed, competitive and self-motivated and maintain concentration when put under high stress. This seems to be more common amongst mentally tough performers than those who aren't. This is also related to both setting goals and then achieving them. A similar finding was mentioned in the paper by Lin et al. (2017). In that study they saw that individuals who score high on mental toughness can stay more committed to the process while being under high stress. They are also more confident that they can successfully complete a task.

6.3 Challenge

Challenge seems to be a both motivating factor and something that drives the athletes in this study to reach higher. During the interviews challenge was something that not only the athlete's thought was important for being mentally tough but also something that they seemed to be seeking. Even though not all of them were motivated by all challenges it seemed to be something that have at least been a big part of their active Crossfit career. Based on the results from the interviews challenge seem to be an important factor for mental toughness, especially to be driven and motivated by challenges.

According to Jones et al. (2007) a mentally tough athlete focusses to a high degree to take advantage of the training environment even if it is challenging. They have a positive view on challenges and see them as something they both want to overcome but also something that could improve their individual performance. Someone who is considered mentally tough should be able to handle any environment he/she may be put in. They should also be able to push themselves to their absolute limit and even thrive during hard painful moments. Mentally tough performers should welcome the challenging parts of training and competition. Looking at the results from this study most of the athletes seem to agree and even thrive during difficult moments, this could be a sign of mental toughness and having a growth mindset. In the study by Jones et al. (2007) they also suggest that a mentally tough athlete can be able handled an unpredictable and difficult situation and be able to turn it around. They should be able to adapt to whatever situation they get thrown.

According to the study by Sorensen et al. (2016) it is important for athlete to become mentally strong that they have good role models to learn from. This goes hand in hand with what came up during the interviews where most of the athletes highlighted the importance of having coach and good support system. In the study they suggest that having a supportive environment and home life could set you up for future challenges.

In the study by Connaughton et al. (2008) they highlight that a mentally tough athlete can keep the motivation high even through challenging situations. A mentally tough athlete behaves well under extreme pressure and seem to be able to make the right decisions and really go after their goal. This is like the finding in the study by Gucciardi et al. (2012). Within that study they mention that a mentally tough athlete should be able to both produce a high level of performance, both subjective and objective, on a regular basis despite all the challenges or stressors that may come their way.

An athlete that sees challenges as an opportunity to learn and develop further are seen as more mentally tough. The athletes believes that change is more normal than stability in life and they don't view challenges as a threat. (Crust, 2007) In a later study by Crust & Swann (2013) they also find that it is more possible that a mentally tough athlete seeks out more situations which is more achievement-based and challenging. They are more likely to take risks and go into situations where it may only be a 50 % chance of succeeding. They also mention that mentally tough athletes may view challenges as opportunities rather than threats. This also goes in line with the existing research presented in this paper and the results from the athletes included in this study. Even though risk taking seem to be a good thing speaking to the athletes, I do think it also could lead to possible injuries. Risk taking may lead to an athlete pushing their body a little bit too far and that could cause an injury which could take a while to recover from. So even though I do believe challenges in general is a good thing there is always a risk involved.

6.4 Confidence

According to both existing research and the athletes included in this study, confidence, seems to be crucial when it comes to mental toughness. The belief in oneself is necessary when it comes to staying committed to a goal and believing that one could achieve it as well. Mentally tough performers score relatively high in confidence compared to athletes that aren't considered to be mentally tough. The results in this study points towards that the athletes both would consider themselves mentally tough and having a belief in themselves and their own capabilities. Some of the athletes said that if you don't believe in yourself, you won't probably achieve your most sought-after goal either. All the athletes could agree that confidence was both important but also something that a mentally tough athlete possessed.

Individuals who are more confident have the belief in themselves that they can successfully achieve a goal that they have set up for themselves. This also seem to be more difficult for an individual that may have similar traits but have lower confidence. A confident individual is more persistent and resilient and may also make less errors compared to someone who isn't as confident. If an athlete scores high on confidence they are also more likely to be more assertive, believe that they are worthy of success and less intimidated of difficult situations (Clough et al., 2002).

In the study by Crust (2007) it is mentioned that confidence and having total self-belief that you will succeed was one highly ranked attribute amongst mentally tough soccer players. I do believe this is important in Crossfit athletes and success as well especially if we look at the results and data from this study.

Having both internal and external belief in oneself, that you both feel in control of yourself and the environment, that you believe in yourself and go after your long-term goals with an absolute belief of achieving them seem to be more common amongst more mentally tough performers. (Cooper, 2019) According to the athletes of this study believing in oneself is the same as confidence and it is very important for both mental toughness and getting a successful outcome.

Confidence is mentioned many times as a crucial attribute amongst mentally tough athletes. In the study by Sorensen et al. (2016) confidence in your ability is important for mental toughness and getting to become your best possible self. This together with both focus, prioritization, planning and preparation seems to be very important for mentally tough athletes. Looking at the results from this study this goes in line with many of the answers from the Crossfit athletes.

Jones et al. (2002) mentioned that confidence is an important attribute to possess by athletes if they want to become mentally tough. Having the belief that you can succeed whilst being more consistent, confident and focused during training and competition is more common in mentally tough athletes.

Athletes that are more mentally tough also tend to be more confident even after setbacks rather than an athlete considered more mentally weak. They also tend to be more committed, self-motivated and more competitive. (Crust & Clough, 2011) This goes in line with other studies and this study as well. Confidence seems to be a very important attribute for mental toughness.

According to the study by Horsburgh et al. (2009) individuals that score high on the mental toughness scale have both a high sense of self belief and lower levels of anxiety. So, a higher level of confidence seems to be correlated with higher levels of mental toughness. This goes in line with the results in this study.

Even though mental toughness seems to relate to the 4 C's and the results of this study it can be a difficult subject to define since it both have many different definitions and probably can look different person to person. But based on the results it seems like mental toughness would be beneficial to attain if an athlete would like to become successful in the sport of Crossfit. This though is not set in stone but looking also at the already existing research it seems like athletes who scores high in the different mental toughness tests appear to be more successful than the athletes who have gotten lower scores.

6.5 Limitations of the study

The limitations of the study were a couple. Like already mentioned I have chosen to use one definition of mental toughness, the 4 C model. There are however many other definitions of mental toughness that I could have explored. For example, I could have chosen Jones et al. (2007) definition of mental toughness. Jones describes a mentally tough athlete as someone that has better coping skills than his competitors and is more competitive, focused, in control and confident. If I would have chosen another definition, this could also have meant that the results would have been different, the same with the interview guide.

The method used: qualitative interviews with a thematic analysis would in my opinion be considered suitable for this type of study and one of the strengths. In the interviews the participants were given room to elaborate and share their own experiences with mental toughness and the thematic analysis was based on the data collected from the interviews. It is hard though to conclude how honestly the participants have answered the questions, their perceptions of the questions and how well they understood the questions during the interviews.

The weakness in trustworthiness is that despite the consistency with the results, the human factor could be an issue and the fact that the interviews were translated into English after the transcription process. Another limitation of the study would be that the researcher misinterprets the data in some way but one way I prevented this from happening was to have an ongoing discussion with my supervisor who also is a more experienced researcher. (Clarke et al., 2016).

There was also other interesting data collected from the interviews that did not fit within the scope of this study. This included things like the participants own view on mental toughness, how they grew up, how they worked on improving mental toughness now and what they had done before etc. I would consider this also a limitation of the study.

7. Future research

Future research about mental toughness in Crossfit can advantageously delve into differences between elite and noncompetitive athletes. To see if there are any differences in mental toughness if the athlete is focused on competing or not, it would be interesting to see if it would be possible to identify differences.

Another suggestion for future research could also be to do a qualitative study and follow a few different elite athletes under a longer period and during different competition seasons to be able to identify how important mental toughness is to be competitive in the sport. By following athletes over a longer period increases the possibility of getting a better understanding how mental toughness develops. Generally, there is more research needed in this field and it would also be of value to find a better definition that is more commonly known amongst researchers.

You could extend the research by also looking at resilience, grit, hardiness and relentlessness which seem to be closely related to each other and mental toughness in many different studies (Golby and Sheard, 2004). Since there are so many definitions of mental toughness according to Liew et al. (2019), research in this field might be challenging, however I do believe it would be valuable for both coaches and athletes to grow a better understanding of the term and how it could be achieved.

8. Conclusion

Looking at the results from the interviews mental toughness seems to be important for athletes that want to achieve success in Crossfit. According to the elite athletes in the study Crossfit is both a very physically but also psychologically challenging sport and this could also be one of the reasons why mental toughness would be considered important to possess for an athlete. The sport of Crossfit is very physically demanding and often requires of the athletes to push themselves beyond what they think they are capable of and looking at the already existing research in mental toughness this seem to be the case even there. But, with that said, it can also not be hundred percent correct and more research would be needed to come to such a conclusion.

The results in this study indicates that the 4 C's: control, challenge, commitment and confidence is both important to become successful in the sport but also to be considered mentally tough as an athlete. The 4 C model is not the only definition out there on mental toughness and to state that the 4 C's are absolute crucial for mental toughness would be wrong. But it seems to be four very important attributes if we would base the conclusion only on the results from this study.

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10. Appendix

10.1 Search attachment

Research question:

The importance of mental toughness to achieve optimal performance according to elite crossfit athletes

The main terms form different "blocks" in your search strategy:

<i>Swedish</i>	mental toughness	crossfit atleter	träning	tävling
<i>English</i>	mental toughness	crossfit athletes	practice	competition

Now analyze the main concepts more closely. Find synonyms and subject words (e.g. MeSH terms).

Main concept 1	Main concept 2	Main concept 3	Main concept 4
mental toughness resilience grit relentless hardiness	crossfit athletes athletes performer competitor player contestant	practice training preparation	competition contest event

Report the search history according to the table below

Database:	Search terms, subject words and combinations?	Filters, boundaries in the database	Search string	Number of hits
Google scholar	"mental toughness AND "crossfit"			237
Google scholar	mental toughness in crossfit			1340
PubMed	mental toughness in sports			159
Google scholar	mental toughness elite sport performers			25800
PubMed	mental toughness development in sports			49
Sport discus	mental toughness and development and sports			100
Google scholar	mtq48 mental toughness			671

Comments:

Found most of the relevant articles via google scholar as I couldn't find anything related to crossfit via pubmed or sport discus.

10.2 Participant consent form

Participant Consent Form

Mental toughness in crossfit

Consent form for participants

		Check each box for which you agree/agree
1	I have received written and oral information about the study and have had the opportunity to ask questions. I get to keep the written information.	
2	I agree to participate in the study "Elite Crossfit athletes' opinions on mental toughness"?	
3	I agree that information about me will be handled in the manner described in the information letter.	

Signature

Place and date

Name (write clearly)

10.3 Athlete info letter

Mental toughness in crossfit

Information letter for participants

“The importance of mental toughness to achieve optimal performance according to elite crossfit athletes”

Hi athletes!

In this letter, we describe a new research study on the importance of mental toughness to achieve optimal performance according to elite Crossfit athletes, that is about to start. Read the information carefully before deciding whether you want to participate or not. Please contact me if you have any questions about the study. My contact details are at the end of this letter. The main research body is **The Swedish School of Sport and Health Sciences (GIH)** in Stockholm.

What is the study about?

The purpose and goal of the study is to review the importance of mental toughness to achieve optimal competition performance according to elite crossfit athletes. In the study your reflections, opinions and experiences will be the focus along with already existing research done in the field of mental toughness. The questions will be asked in an open-ended fashion to give you (the athlete) space to give detailed responses.

The results of the study could lead to both athletes and trainers including and focusing more on psychological skills training as a part of the workout regime to improve the overall sports performance.

What does it mean to participate in the study?

Participating in the study means that you will be interviewed and have to answer questions about your experiences of and reflections on your sports. The interview takes approximately 60-90 minutes. If you want to participate in the study, you first need to fill in a consent form to confirm that you know what the study is about and that you are willing to participate. After that, we decide together the time and place for the interview. It can take place on site or via Zoom. If you want to do the interview on site, you can suggest a suitable place; Alternatively, we can arrange one.

Participating is voluntary and does not involve any particular risks

Your participation is voluntary. Participating does not pose any particular risks to you, but reflecting on your training history may remind you of events or topics that you consider sensitive or personal. Therefore, the following is important to know:

- You do not have to answer all the questions asked during the interview.

- You can choose to end your participation at any time without having to give any reason.
- Not participating, or ending your participation, has no consequences. You only need to tell me that you opt out.

No unauthorized persons will be able to see exactly what you have answered

The interviews will be conducted by Johanna Westin, student in sports science at the Swedish school of Sport and Health Sciences. To my help during the study, I will have Charlotte Downing who is my mentor and supervisor during the study. Johanna will analyze and manage the interviews. We take care of your data and store it in a place that no unauthorized person can access. All possible names and similar information will be pseudonymised, which means that when results from the study are presented, it will not be possible to derive the answers to any individual person.

What happens to my data?

The Swedish school of Sport and Health Sciences is responsible for your personal data. In accordance with the EU General Data Protection Regulation (GDPR), we collect the information based on (1) that we have received consent from you, and (2) that the research may provide valuable information of public interest. Data protection officer at the Swedish school of Sport and Health Sciences is Birgitta Edenius (gdpr@gih.se). If you are dissatisfied with how your personal data is processed, you have the right to file a complaint with the Data Inspection Authority, which is the supervisory authority.

How can I get more information?

You are always welcome to contact me, Johanna, if you have questions, want to share the data that is collected about you, or if you want to share the results of the entire project.

Kind Regards,

Johanna Westin

Student and researcher johanna.vestin@student.gih.se

Charlotte Downing

PhD student and supervisor charlotte.downing@gih.se

Personal data controller and address for all researchers and data protection officers:

Gymnastik- och Idrottshögskolan Box 5626
114 86 Stockholm
Phone: 08 – 120 537 00

10.4 Interview guide

Part I: Warm-up question/building report

1.
How would your friends/family describe you?
How and why did you get into crossfit?
What is the best and worst thing about crossfit?

2.
What psychological qualities do you think a successful elite crossfit athlete has?

Part II: Mental toughness and the 4C's

3.
How would you personally define mental toughness?
Do you consider yourself to be mentally tough and if so how? If not, why not?

How does an athlete develop mental toughness according to you? / Where does mental toughness come from?

Describe and talk about the 4C model and its definitions.

4.
Control:
Do you feel like you are in control of your performance and emotions during a crossfit competition? Could you elaborate?
Can you tell me about a time where you felt really in control?
To which extent do you feel in control during competitions?
Can you tell me about a time where you did not feel in control? How do you handle those emotions?
How do you handle and overcome setbacks in your sport?
How do you handle distractions in training and competition environments?
How do you regulate and control your own emotions during training/competition?

5.
Commitment:
What would your definition of commitment be?
(What motivates you as an athlete?)
What is your experience with goal setting?
How do you feel when you achieve a big goal?
Tell me about a time where you felt really committed to crossfit?
Okay, what about a time where you didn't feel as committed?
How do you overcome periods of lower commitment?

6.

Challenge:

How do you view challenges?

In what ways are crossfit challenging?

How do you overcome those challenges?

Can you give me an example of a major challenge you've overcome in crossfit?

Are you motivated by challenges and if so why? If not, what does challenge mean to you?

7.

Confidence:

How is your self-confidence?

How does self-confidence relate to crossfit in your opinion?

What is your view on your own abilities in your sport?

Can you tell me about a time where you felt very confident in crossfit?

Okay, what about a time where you didn't feel confident?

And what could you do to become more self confident?

Part III: Finishing questions

7.

Now in your career, is mental toughness something you are actively working on? If so, how?

Is mental toughness something that you think is important to become successful in the sport?

Do you think that it is important to be mentally tough in crossfit? If so, why and if not why do you think it isn't?

Part IV: Concluding

8.

Have we missed anything important? Is there anything you want to add?

Do you have any questions or comments about the interview itself?

Summarize the interview to see if there is anything that has been misunderstood or missed.