NORWEGIAN SCHOOL OF SPORT SCIENCES

Anders Mellbye

Weight loss methods and symptoms of eating disorders in Norwegian combat sports athletes

A cross-sectional study

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Abstract

Purpose: To explore weight loss methods, eating disorder (ED) symptoms, explanatory factors, and differences in ED symptoms across gender, experience levels, and disciplines among a diverse sample of adult Norwegian combat sports athletes.

Methods: Self-reported data from a larger cross-sectional study was utilized. Participants responded to an electronic questionnaire on health, competition, eating, and sport-specific behaviors. The Eating Disorder Examination - Questionnaire (EDE-Q) was included to assess ED symptoms among the participants.

Results: The final data material consisted of 187 participants. In total, 88% of the participants had practiced some form of weight regulation in the last 12 months. Restricting energy intake, increasing exercise levels, and restricting carbohydrate intake were the most common weight loss methods practiced by both male and female combat sports athletes. Of the combat sports athletes viable for analysis (166), 46% displayed symptoms of EDs, whereas 49% and 40% were observed among the male and female groups, respectively. Significant differences in ED symptoms were found across gender and experience level, whereas no significant differences were observed across combat sports disciplines. Combat sports exercise volume and body mass index (BMI) were significant explanatory factors for ED symptoms among the athletes.

Conclusion: The study sheds light on the prevalence of weight regulation practice among Norwegian combat sports athletes, highlighting the predominance of what can be regarded as safe weight loss methods. However, a considerable proportion of the athletes displayed symptoms of ED, whereas a higher proportion was found among the male athletes compared to the female athletes. As such, these results warrant a need for action regarding early identification of disordered eating behavior, as this may safeguard combat sports athletes mental and physical health. The findings provide further insight of potential groups which may be at an increased risk of ED symptoms and identifies possible explanatory factors for these behaviors.

Norwegian summary (Abstrakt)

Hensikt: Å undersøke vektreduksjonsmetoder, symptomer på spiseforstyrrelser, forklaringsvariabler, og forskjeller i symptomer på spiseforstyrrelser på tvers av kjønn, erfaringsnivå, og kampsportgrener blant et bredt utvalg voksne kampsportutøvere.

Metode: Selvrapportert data fra en større kvantitativ studie ble benyttet. Deltakerne besvarte et elektronisk spørreskjema som omfattet helse, konkurranse, spise, og idretts-spesifikk atferd. For å kartlegge symptomer på spiseforstyrrelser ble spørreskjemaet The Eating Disorder Examination – Questionnaire (EDE-Q) inkludert.

Resultater: Datamaterialet besto av 187 deltakere. Totalt hadde 88% av deltakerne praktisert en vektreguleringsmetode i løpet av de siste 12 månedene. Begrense energiinntak, øke treningsmengde, og begrense karbohydratinntak var de vanligste vektreduksjonsmetodene blant mannlige og kvinnelige kampsportutøvere. Av utvalget kampsportutøverne som ble godkjent for analyser (166), ble 46% identifisert med symptomer på spiseforstyrrelser, med henholdsvis 49% blant de mannlige og 40% blant de kvinnelige utøverne. Signifikante forskjeller i symptomer på spiseforstyrrelser ble funnet på tvers av kjønn og erfaringsnivå. Ingen signifikante forskjeller ble funnet på tvers av kampsportgrener. Kampsportspesifikk treningsmengde og kroppsmasse indeks ble identifisert som signifikante forklaringsvariabler for utøvernes symptomer på spiseforstyrrelser.

Konklusjon: Studien belyser andelen som benytter vektreguleringsmetoder blant norske kampsportutøvere, og fremhever overvekten av utøvere som utøver trygge vektreduksjonsmetoder. Samtidig er det en alarmerende andel som viser symptomer på spiseforstyrrelser, hvorav en høyere andel ble funnet blant mannlige utøvere, sammenlignet med kvinnelige utøvere. Dermed legger resultatene grunnlag for tiltak knyttet til tidlig identifisering av forstyrret spiseatferd, da dette kan bidra til å sikre kampsportutøvernes mentale og fysiske helse. Funnene bidrar til økt innsikt blant mulige risikogrupper for symptomer på spiseforstyrrelser og identifiserer mulige forklaringsvariabler for disse atferdene.

Table of contents

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1. Introduction

Combat sports have gained massive popularity worldwide and continue to attract growing interest and participation (Batra, 2019; Blomqvist Mickelsson et al., 2020; Bueno et al., 2022). As a result, combat sports are attracting the interest of individuals across a wide spectrum of ages and backgrounds, thereby leading the way for an array of new athletes emerging into the sports (Kotarska et al., 2019; Origua Rios et al., 2018; Schwartz et al., 2021). Considering the physical nature of the sports and their potential for affecting mental health in a positive manner (Bird et al., 2019), these findings are encouraging. Particularly in light of the global challenges of physical inactivity and mental health (Wainberg et al., 2017; World Health Organization, 2019), combat sports may propose a promising direction of holistic well-being. On the other hand, combat sports are operating with weight classes in competition, which could bring numerous challenges on the athletes health and performance (Crighton et al., 2016; Lakicevic et al., 2022). A high prevalence of rapid weight loss methods (RWL) is observed among the sport, which may include potentially harmful procedures (e.g diuretics, sweat suits, diet pills). This weight loss culture could have serious consequences for novice athletes coming into the sports, as well as the more experienced athletes (Artioli et al., 2016). Reports of RWL practice increasing the risk of cardiovascular issues, low bone mineral density, brain injury, heat illness, hormonal imbalances, suppressed immune function, and psychological challenges among combat sports athletes are alarming (Franchini et al., 2012; Gann et al., 2015; Lakicevic et al., 2020). Moreover, the current body of research is limited regarding gender differences in weight loss strategies utilized. As male and female athletes possess different risk factors and subsequent health implications (Lin et al., 2018; Walton et al., 2021), studies that expand current knowledge are of importance.

Another challenge of these weight loss methods is the constant attention on body mass control which may contribute to developing an unhealthy body image and disordered eating (DE) behavior (Berkovich et al., 2019; Gann et al., 2015; Khodaee et al., 2015). Previous reports indicate that female athletes in weight-class sports are among the highest risk groups for developing DE (de Borja et al., 2021; Sundgot-Borgen et al., 2013a; S. Thomas et al., 2021). This is of serious concern, due to the potential of

developing a clinical ED (Stoyel, Stride, et al., 2021), which may have severe health consequences for the athletes (Reardon et al., 2019; Smink et al., 2012; Wells et al., 2020). Moreover, it has been suggested that these challenges are equally relevant among male athletes (Chapman & Woodman, 2016). There is limited research which has investigated this issue specifically in male combat sports athletes (Burke et al., 2018). As such, it is important to acknowledge the need for conducting further research in this field, which has been highlighted on numerous occasions (Bratland-Sanda & Sundgot-Borgen, 2013; Karrer et al., 2020; Thompson & Sherman, 2014). Additionally, there are indications of a considerable underreporting of ED cases among male athletes, which adds on to the complexity of this challenge (Eichstadt et al., 2020).

Furthermore, indications of weight loss methods being more aggressive in higher-level athletes, as well as certain disciplines have been reported (Çolak et al., 2020; da Silva Santos et al., 2016; Ng et al., 2017). Since this has the potential of leading to DE behaviors, it is crucial to identify potential groups that are at an increased risk across experience levels and disciplines. Given the complex etiology of DE (Wells et al., 2020), it is imperative to identify explanatory factors that contribute to the development of these conditions. Several risk factors and symptoms are known to explain individuals eating behaviors and related thoughts and emotions (Anderson & Petrie, 2012; Pallotto et al., 2022). Though, limited knowledge exists regarding the distinct explanatory factors among the diverse population of combat sports athletes (Gonçalves et al., 2021). To fill the current research gap and advance the combat sports arena, it is necessary to identify potential areas for improvement and initiate preventive work. Hence, setting a rationale for investigating these aspects among a diverse range of combat sports athletes. Increasing the understanding in this area is essential for facilitating progress in both organized and non-organized combat sports and provide optimal conditions for the current and future athletes.

1.1 Aims

The primary aim of this study was to assess weight loss methods and symptoms of EDs among adult Norwegian combat sports athletes. Further, the study aimed to examine if there were any significant differences in symptoms of EDs across gender, combat sports discipline, and level of experience. Finally, the study sought to identify explanatory factors associated with symptoms of EDs among Norwegian combat sports athletes.

1.2 Research questions

The thesis addressed the following research questions:

A. “Which weight loss methods do male and female (<18 years) Norwegian combat sport athletes utilize?”

B. “What is the prevalence of symptoms of EDs among male and female Norwegian combat sport athletes, and are there significant differences in symptoms of EDs across gender, experience level, and combat sport disciplines?”

C. “Does gender, ED history, exercise volume, experience level, and weight regulation strategies act as significant explanatory factors for ED symptoms among combat sports athletes?”

2. Theoretical background

2.1 Combat sports – An introduction

The term “combat sports” refers to a class of contact sports and martial arts in which athletes engage in one-on-one physical combat (Matthews et al., 2019). The winner of the competition is determined by specific criteria depending on the ruleset of the combat sport (Barley, Chapman, Guppy, et al., 2019; Matthews et al., 2019). The distinction of the different combat sports is usually divided into three main categories; striking, grappling, or mixed style disciplines (Barley & Harms, 2021). In striking sports, the combatants incorporate skills ranging from only punches to a combination of punches, kicks, elbows, and knees (Silva Rodrigues Jaspe et al., 2011). Further, grappling sports usually involve gripping, take-downs, ground combat, chokeholds, and joint locks (Ratamess, 2011). The mixed-style disciplines involve a combination of striking and grappling techniques and are known for requiring a diverse skill set (Tack, 2013).

There is a wide range of ways to victory within the different disciplines (Bueno et al., 2022), such as an opponent voluntarily surrendering or getting unconscious by a submission hold (e.g. joint lock or choke) or strike (e.g. kick or punch), execution of a specific technique (e.g. pinning an opponent to the mat in wrestling), stoppage from the referee, coaches, or doctors (e.g. determining it is unsafe to continue the bout), the totaling of points, or by the judge's subjective decisions (Barley, Chapman, Guppy, et al., 2019).

In terms of prevalence and popularity, there is an increased interest and participation in different combat sport disciplines. In more recent times, mixed martial arts (MMA) seems to be one of the most popular and fastest-growing combat sports in the world (Andrade et al., 2019; Bueno et al., 2022; Folhes et al., 2022). Together with boxing, MMA has millions of followers worldwide (Barley & Harms, 2021; Reale et al., 2018). One of the newer forms of combat sports, Brazilian jiu-jitsu (BJJ), has been growing in attendance and popularity on a worldwide basis as well (Blomqvist Mickelsson, 2020a). In addition, judo, boxing, and taekwondo constitute about 20% of the Olympic gold medals (Barley & Harms, 2021; Reale et al., 2017; Schwartz et al., 2021).

With the increased popularity of a variety of different combat sport disciplines, an array of new athletes is emerging into the sport. Consequently, an increased number of

athletes at lower levels are being reported (Di Placido, 2020; Duarte et al., 2022; Schwartz et al., 2021). Furthermore, there seems to be an increase in individuals practicing some form of combat sport recreationally, where the attraction for practice is the well-being and health benefits associated with the sport (Biernat et al., 2018; Origua Rios et al., 2018; Pedrini & Jennings, 2021).

2.1.1 Combat sports – Health benefits and challenges

It is well established that performing physical activity regularly provides numerous health benefits across the lifespan (Bahr et al., 2009; Janssen & LeBlanc, 2010; Reiner et al., 2013; Torstveit et al., 2018; Warburton & Bredin, 2019). Thus, given the physical nature of combat sports, regular practice can result in several positive health effects for this group of individuals. The health benefits of practicing combat sports seem to apply to anyone, regardless of what age they start (Barley & Harms, 2021; Blomqvist Mickelsson, 2020a; Origua Rios et al., 2018). Improvements in body balance, cognitive function, and muscular, skeletal, cardiovascular, metabolic, and neurological status have been reported (Duarte et al., 2022; Origua Rios et al., 2018). Further, regular practice has demonstrated positive effects on mental health variables, such as shaping psychophysical well-being, reduction of anger and aggression, improving self-confidence, increasing life quality, and a higher sense of safety (Chinkov & Holt, 2016; Kotarska et al., 2019; Lafuente et al., 2021; Schwartz et al., 2021).

Although regular practice of combat sports comes with several benefits, it is reported various health challenges, such as acute and chronic injuries in the upper or lower extremities, head trauma, and unfavorable consequences regarding acute weight loss methods (see 2.2.3) (Braid, 2019; Hammami et al., 2018; Lambert et al., 2022). Further, the nature of the sport demands unique and different movement patterns depending on the combat sport discipline (Hinz et al., 2021). Hence, each style comes with its own range of potential injuries. Most prone to injury is the full-contact combat sports (e.g. boxing, muay thai, MMA) (Koutures & Demorest, 2018), where the highest risk of injury is reported in competitive training and contact-based sparring (fight simulation) (Del Vecchio et al., 2018; Demorest et al., 2016; Lystad, 2015).

2.1.2 Performance demands

Performing combat sports require high levels of physical fitness (Barley, Chapman, Guppy, et al., 2019), where the nature of the sport often consists of intermittent activity with bouts containing explosive high-velocity and high-force actions (James et al., 2016). Most combat sports require a high level of technique, tactical skills, and physical capabilities, such as muscular strength and force production, in addition to other aerobic and anaerobic qualities (Andrade et al., 2019; Andreato et al., 2017; Bueno et al., 2022; James et al., 2016). Furthermore, most disciplines demand a high level of flexibility and mobility, as these are important factors for optimal performance due to the common positions of both "striking" and "grappling" sports (Franchini & Herrera-Valenzuela, 2021). These factors might become even more relevant for the higher-level athlete (James et al., 2016). However, it is important to note that each discipline requires its own set of rules and technical actions, thus the physical characteristics and demands will vary depending on the sport (Ambroży et al., 2021; Tabben et al., 2014).

Although these physical requirements are important components for success in combat sports, the literature also identifies psychological aspects as important factors for sports performance (Andrade et al., 2016; Di Corrado et al., 2021). Psychological variables such as confidence, determination, and mental toughness have been identified as important parameters for success in combat sports (Andreato et al., 2022; Bueno et al., 2022), whereas higher levels of these parameters have been reported among elite combat sport athletes (Chen & Cheesman, 2013). Additionally, full-contact combat sports require a certain level of aggression from the athletes (Andrade et al., 2020). However, athletes need to be able to control the levels of aggression for optimizing performance in competition (Bueno et al., 2022), as excessive amounts of aggression have resulted in unfavorable outcomes for the athletes previously (Rosario et al., 2014).

Further, competition in combat sports requires maximal effort from the athlete, resulting in a great deal of mental stress and physical tiredness (Bali, 2015). Fighting involves general excitation that constantly stimulates the nervous system, leading to increased anxiety and stress levels for the combatants (Piskorska et al., 2016). As athletes need to be able to handle these psychological aspects, qualitative research has highlighted the importance of self-regulation and the ability to control emotions as key skills for performance (Andreato et al., 2022; Crilly et al., 2018; Pettersson et al., 2013).

2.2 Weight regulation

Weight regulation can be regarded as the fluctuation of an individual's body weight, either through weight loss or weight gain (Ashtary-Larky et al., 2020). It is considered favorable to achieve low levels of body fat while maintaining lean body mass in a variety of sports (Trexler et al., 2014). Accordingly, weight loss seems to be the most common form of weight regulation in combat sports (Reale et al., 2018). The procedure is often separated into two main categories; gradual and rapid weight loss (see Table 1) (Garthe et al., 2011).

Table 1. Characteristics of gradual and rapid weight loss (Garthe, 2011)

Gradual weight loss	**Rapid weight loss**
• Reduced energy intake	• Active or passive dehydration
• Increase in energy expenditure	• Very low energy intake or fasting
• Change of energy distribution in diet	• Use of laxatives, diuretics, vomiting
• Loss of 0.5-1 kg per week	• Increased energy expenditure
• Duration >1 week	• Duration 12-96 hours
= Based on reduction of fat mass	= Based on body fluid loss

2.2.1 Weight regulation in combat sports

Combat sports are considered weight-class sports, which means athletes are divided into weight classes in order to promote fair competition and reduce potential injuries (Barley, Chapman, Blazevich, et al., 2018; Mendes et al., 2013). A common procedure is to lose a significant amount of body weight through the days and weeks leading up to the official weigh-in, before regaining body weight back prior to the start of the competition (Barley, Chapman, & Abbiss, 2019; da Silva Santos et al., 2016; Giannini Artioli et al., 2010; Matthews et al., 2019; Reale et al., 2018). This enables athletes to compete in a weight category below their actual “day-to-day” body weight (Matthews et al., 2019). The aim of this is to gain a perceived physical and mental advantage over the opponent in competition (Gann et al., 2015; Pettersson et al., 2013). Studies have shown

combat sport athletes to decrease their body weight by approximately 2% to 10%, a couple of days prior to the weigh-in (Artioli et al., 2016). In addition, athletes competing in up to three weight classes above the official division weighed in at have been reported (Lakicevic et al., 2021). Consequently, a high prevalence of RWL is being reported (Berkovich et al., 2019; Lakicevic et al., 2020; Mendes et al., 2013), as well as rapid weight gain procedures in some disciplines (Reale et al., 2017). This weight regulation practice is colloquially referred to as "weight cycling" and seems to be present to some degree in every combat sport (Jetton et al., 2013; Matthews et al., 2019).

The highest prevalence of weight cycling has been observed in boxing and MMA (Barley, Chapman, & Abbiss, 2018). However, the magnitude of weight cycling differs between each discipline, in regard to the variety of the sport and competition format, as well as the number of weight classes (Matthews et al., 2019). For instance, in boxing, the competitors often compete in single-bout events and may undergo this practice one to four times each year, and have three to twelve hours between weigh-in and competition start (Jetton et al., 2013). In contrast, judo tournaments often consist of multiple bouts and are held frequently, and can have a time interval of 24 hours between weigh-in and competition start (Lakicevic et al., 2020). This results in athletes having to undertake different weight loss methods based on the duration of the period between weigh-in and competition, and the subsequent rules of the designated sport (see Table 2) (Reale et al., 2017). In addition, weight loss methods are often more aggressive at higher-level competition (Baranauskas et al., 2022; Berkovich et al., 2019; Viveiros et al., 2015).

Table 2. Combat sports characteristics and designated weigh-in procedures (Burke et al., 2021; Reale et al., 2017).

Combat sport	**Weight categories**	**Weigh-in procedures**	**Competition characteristics**
Boxing (amateur/"Olympic Style")	AIBA competition: M= 10, F= 10 Olympic games: M= 8, F= 5	Morning on the first day of competition and morning of every contest day. No less than 3 H between weigh-in and competition	The tournament is contested over different days with 4 to 5 bouts in competition, spread every 2nd day. M= 3×3 min rounds F= 3×3 min rounds
Boxing (professional) Note: Varies by country/association. WBA is provided as an example.	WBA competition: M= 17, F= 16	Procedures vary between association. The official scale is made available to check weight >2 H prior to the official weigh-in.	Title fights: 12 rounds Other fights may vary between 4-12 rounds M: 3 min rounds F: 2 min rounds Athletes usually fight 3-4 times per year.
Judo	All competitions: M= 7, F= 7	Once, evening before competition. Additional random weight checks morning of competition, disqualifying those >5% over the weight division	Tournament contested on a single day: between 4 to 8 bouts. M= 1×4 min round F= 1×4 min round
Kickboxing Note: Varies by association/country, WAKO is provided as an example.	WAKO competition: M= 10, F= 7	Weigh-in the day before the start of competition or the same day the athlete has been drawn to fight. Weigh-ins are commonly 24 H before the start of the fight	Tournament bouts: 3 x 2 min Outside of tournament Single bouts: 5 x 2 min
Muay Thai Note: Varies by association, WBC is provided as an example.	WBC competition: M = 17, F = 11	Once, on the day prior to the contest (24 to 30 H before start of the fight.	Competition bouts: M= 5 x 3 min F= 5 x 2 min
Brazilian jiu-jitsu Note: Varies by association, IBJJF is provided as an example.	Competition with Gi (uniform commonly used in BJJ): M= 10, F= 9	Once, at the same day of competition (20-30 min before start of the bout). Note: Gi competitors are	Multiple bouts on a single or over multiple days. Match length depend on belt level: White belt= 5 min

	No-Gi competition: M= 10, F= 9	required to weigh in wearing the Gi on the scale	Blue belt= 6 min Purple belt= 7 min Brown belt= 8 min Black belt= 10 min
MMA Note: Varies by association, UFC is provided as an example.	Unified weight classes – MMA: 14 classes UFC titles: M= 8, F= 4	Official weigh-in occur on the morning of the day before the fight (26 to 32 H pre-event)	Major “fight nights” each month. Although, fighters normally engage in 2 to 3 fights per year. Duration of the fight varies between title and exhibition fights. Title or main event: M & F= 5 x 5 min rounds Other fights: M & F= 3 x 5 min rounds
Wrestling (Freestyle)	UWW competition: M= 10, F= 10 Olympic Games: M= 6, F= 6	Weigh-in on the morning before competition.	Tournament contested across 2 days: 4 to 8 bouts. M= 2 x 3 min rounds F= 2 x 3 min rounds
Wrestling (Greco-Roman)	UWW competition: M= 10 Olympic games: M= 6	Weigh-in on the morning before competition.	Tournament contested across 2 days: 4 to 8 bouts. M= 2 x 3 min rounds F= 2 x 3 min rounds
Taekwondo	World championship: M= 8, F= 8 Olympic games: M=4, F=4	Once, evening before competition.	Tournament contested on a single day: between 4 to 8 bouts. M= 3 × 2 min rounds F= 3 × 2 min rounds
Karate	Senior competition: M= 5, F= 5 Olympic games: M= 3, F= 3	The official scale is made available to check weight > 1 H prior to official weigh-in. This must take place the day before the start of competition, unless specified otherwise.	Tournament contested on a single day: 6 to 8 bouts. M= 1 x 3 min round F= 1 x 3 min round

H, hour; M, male; F, female; AIBA, international boxing association; WBA, world boxing association; WAKO, world association of kickboxing organizations; WBC, world boxing council muaythai; IBJJF, international Brazilian jiu-jitsu federation; UFC, ultimate fighter championship; UWW, united world wrestling.

2.2.2 Weight loss methods in combat sports

Combat sport athletes use a variety of methods to achieve weight loss (Çolak et al., 2020), where methods such as restricting energy intake (gradual dieting or fasting), reducing total body fluid (decreasing fluid intake, increasing sweat response; e.g. plastic suits, sauna use, heated training sessions), and more extreme practice (diuretics, laxatives, diet pills, enemas, vomiting) are being implemented (Barley, Chapman, & Abbiss, 2018; da Silva Santos et al., 2016; Gann et al., 2015; Giannini Artioli et al., 2010; Jetton et al., 2013). Even though athletes often utilizes a combination of these methods during a weight loss procedure, the most common methods in general is increasing exercise levels and restricting fluid and food intake (Barley, Chapman, & Abbiss, 2018; Çolak et al., 2020; Gann et al., 2015; Reale et al., 2017).

Further, conducting RWL is the preferred way of weight loss among combat sport athletes (Baranauskas et al., 2022; Barley, Chapman, & Abbiss, 2019; Berkovich et al., 2019), where the prevalence varies between 60-90% depending on the discipline (Berkovich et al., 2019; Brito et al., 2012; Giannini Artioli et al., 2010; Kiningham & Gorenflo, 2001; Lakicevic et al., 2021; Reale et al., 2018). In contrast, only applying gradual weight loss methods (GWL) is rare in combat sports (Martínez-Rodríguez et al., 2021). Executing GWL singularly, or in a combination with RWL has been the recommended way of weight loss (Artioli et al., 2016; Baranauskas et al., 2022), due to the possible health complications for the athlete in regard to only implementing RWL (Barley, Chapman, & Abbiss, 2019; Franchini et al., 2012).

2.2.3 Health implications of rapid weight loss

Several unfavorable effects of RWL in regard to Physiological and mental health status seem to be well documented in the literature (Artioli et al., 2016; Çolak et al., 2020; Franchini et al., 2012; Lakicevic et al., 2020). Severe weight loss has resulted in unfavorable effects on athletes well-being (Artioli et al., 2016). First, severe or moderate dehydration has demonstrated an increased risk of acute cardiovascular complications, with ischemic heart disease or stroke being the most noticeable (Barley, Chapman, & Abbiss, 2019). Signs of drastic dehydration altering brain morphology have been reported among healthy individuals previously (Kempton et al., 2009). This could increase the risk of brain injury due to the received strikes to the head in some

disciplines (Crighton et al., 2016). Furthermore, severe dehydration (often caused by thermal exposure) has been shown to increase athletes risk of heat stroke (Artioli et al., 2016). Other health implications associated with undergoing RWL has been; promoting bone loss, hormonal imbalances, reduced immune function, and unfavorable changes to insulin sensitivity (Artioli et al., 2016; Barley, Chapman, & Abbiss, 2019; Turocy et al., 2011). Indeed, previous research has found RWL to influence testosterone, growth hormone, insulin, and cortisol levels (Barley, Chapman, & Abbiss, 2019). This in turn seems to affect adolescent development, blood glucose regulation, and bone mineral density (Lakicevic et al., 2022). Thus, it has been stated that implementing safe weight loss methods is of important concern for the adolescent athlete as well (Demorest et al., 2016). The most serious outcome of conducting RWL has been death caused by dehydration, hyperthermia, and myocardial infarction (Baranauskas et al., 2022; Lakicevic et al., 2020). Death in athletes due to conducting RWL has been reported several times over the last 30 years (Artioli et al., 2016; Barley, Chapman, & Abbiss, 2019), and new cases are still being reported (Burke et al., 2021).

Second, RWL affects the psychological health of athletes. Previous research has revealed decreased short-term memory, vigor, self-esteem, and concentration (Franchini et al., 2012; Gann et al., 2015). Moreover, signs of increased fatigue, depression, rage, isolation, and confusion have also been reported (Franchini et al., 2012; Khodaee et al., 2015). Mental stress seems to be induced by RWL, where the combination of starvation and heat exposure could inflict significant mental strain on the athlete (Barley, Chapman, Blazevich, et al., 2018; Pettersson et al., 2013). However, it should be noted that engagement in weight loss strategies also impacts functions beyond the aim of gaining a physical and/or mental advantage over the opponent. In fact, weight regulation seems to promote sport identity and feelings of commitment, focus, prestige, and belonging, as well as serving as a coping strategy for dealing with stress (Gonçalves et al., 2021; Pettersson et al., 2013).

Lastly, constant attention to body mass control may contribute to developing an unhealthy body image and DE behavior (Karrer et al., 2020). Hence, increasing the risk of clinical EDs However, there remains uncertainty regarding this topic (see 2.3.3) (Barley, Chapman, & Abbiss, 2019). Thus, setting a rationale for future studies to gain

further knowledge. Especially regarding lower-level athletes, as few studies on body image, ED, and DE are conducted on combat sport athletes at lower levels.

2.2.4 Rapid weight loss and performance effects

As weight loss and RWL remain a central part of most combat sports, it is important to understand how this influences performance for the athletes.

Looking at laboratory-based trials and the effects of RWL on athlete performance, the findings in the literature seem to be uncertain. Different test procedures on athletes repeat effort performance (which is highly relevant for the majority of combat sports) have shown positive and negative results of executing RWL (Artioli et al., 2010; Barley, Iredale, Chapman, et al., 2018; Gann et al., 2015; Mendes et al., 2013). Additionally, mixed results have been reported on other aerobic and anaerobic performance variables (Brechney et al., 2022; Bueno et al., 2022). It does appear that when larger magnitudes of weight are lost over a short time duration (<5 hours) there is a subsequent negative effect on high-intensity exercise performance (Barley, Chapman, & Abbiss, 2019). Although, when the same magnitude of weight is lost over a longer time duration (2-5 days) using a combination of different methods (caloric restriction and body fluid loss), no negative effect on high-intensity exercise performance is observed (Mendes et al., 2013; Yang et al., 2018).

In regard to competitive performance, previous research that has correlated weight regulation strategies and competitive outcome, reports that a greater magnitude of weight loss and following ability to regain weight have been a significant factor for competitive success (Barley, Chapman, & Abbiss, 2019; Coswig et al., 2019; Reale et al., 2016). However, there remains some uncertainty regarding this topic, as the literature has reported contradictory findings (Brechney et al., 2021; Zubac et al., 2018). It should be noted that performance in combat sports relies on multiple factors besides the ones associated with weight cutting, including athletic ability, skill level, game plan, conditioning, and psychological factors (e.g stress, self-confidence, determination) (Gann et al., 2015). Therefore, evaluating to what extent weight loss have on competitive outcome is challenging (Brechney et al., 2022).

2.3 Disordered eating

There are several different clinical diagnoses for EDs. However, in this thesis, the aim is to assess symptoms of EDs and/or DE in combat sport athletes. Thus, attention will be directed toward the fundamental psychological and behavioral symptoms of EDs, and not the different clinical EDs themselves.

Eating pathology is often viewed and understood as a continuum model, ranging from energy balance and a healthy body image, to DE, to a clinical ED (see Figure 1) (Sundgot-Borgen & Torstveit, 2010). The EDs are serious psychiatric disorders that are defined by eating-related behavior (e.g. binge-eating, dieting), psychological symptoms (e.g. body image issues), and physical symptoms (e.g. severe weight loss) (Chapman & Woodman, 2016; Reardon et al., 2019; Russon et al., 2019). Symptoms associated with EDs are considered subclinical when the behaviors are present, but occur less frequently or intensely to be regarded as clinical (Anderson & Petrie, 2012). As such, the term DE includes these abnormal eating behaviors that do not meet the diagnostic criteria for a clinical ED, as DE is not recognized as a condition in the diagnostic manual for mental disorders (DSM-5) (American Psychiatric Association, 2013). In other terms, DE can be defined as "behavior where the individual might have abnormal eating patterns, utilize extreme weight regulation methods, and be obsessed with food, body, and dieting" (Nattiv et al., 2007). These DE behaviors are considered clear risk factors for developing clinical EDs (Mancine et al., 2020). Making it crucial to identify these behaviors at an early stage given the potential negative health outcomes of DE (See 2.3.3) (Wilson & O'Connor, 2017).

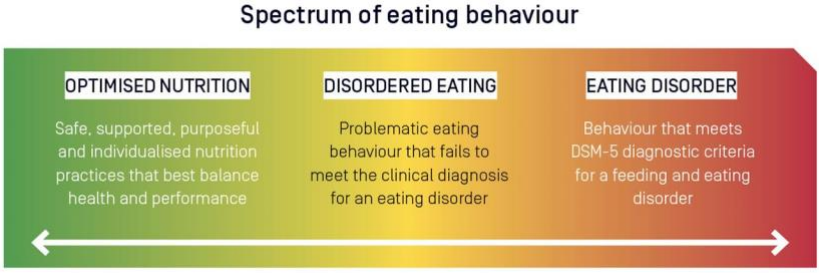

Figure 1: *The spectrum of eating behavior, ranging from optimized nutrition to DE to a clinical ED* (Wells et al., 2020).

However, as the etiology of DE is complex, identifying, evaluating, and managing DE is complicated (Wells et al., 2020), and some of the behavioral and psychological symptoms of DE can be challenging to address (Stoyel, Stride, et al., 2021).

2.3.1 Symptoms of disordered eating

Disordered eating encompasses a wide range of dysfunctional eating patterns, such as fasting, dieting, vomiting, binge-eating, over-eating, and taking diet pills and laxatives (Mancine et al., 2020; Wilson & O'Connor, 2017). The effects of these eating patterns can be shown in physical symptoms, including severe fluctuations in weight, stomach complaints and pain, menstrual dysfunction, feelings of dizziness or tiredness, fainting, unfavorable changes in skin and/or hair, and dental complications (caused from vomiting) (Ferreiro et al., 2011; Liao et al., 2010). Psychological health is affected by these behaviors as well. This could result in individuals showing signs of psychological distress, anxiety, and depression (Wilson & O'Connor, 2017). Regarding other behavioral signs of DE, a preoccupation with food and weight (eating and managing weight could become the main focus in everyday life), limiting a variety of different foods and/or limiting a whole category of food (only considering specific categories of food safe to eat), withdrawing from social eating activities, and/or performing specific food rituals have been reported as common patterns of DE (Brechan & Kvalem, 2015; O. Rø et al., 2020; Sahlan et al., 2021)

Symptoms of EDs unsurprisingly involve similar behavioral patterns as DE (Sharps et al., 2022). Although, the magnitude of these symptoms can be regarded as more extreme (see Table 3) (Mitchison & Mond, 2015). In addition, it should be noted that the different types of EDs (e.g. anorexia nervosa, bulimia nervosa, binge-eating disorder) come with their own set of distinctive symptoms (Galmiche et al., 2019). Thus, this adds on to the challenges associated with assessing ED symptoms (Russon et al., 2019).

Furthermore, exercise in excessive amounts and/or compulsive cognition is a central symptom through the spectrum of DE to ED (Bratland-Sanda et al., 2015). However, it is also a fundamental part of sports, making it challenging to distinguish pathological from "regular" exercise in athletes (Stoyel, Stride, et al., 2021).

Table 3. Characteristics of eating disorders and disordered eating (Reardon et al., 2019).

Eating disorders	Disordered eating
• Restricting, binging, or purging often occur multiple times per week	• Pathogenic behaviors used to control weight (e.g., binging, use of diet pills, purging) may occur but not with regularity
• Obsession with thoughts of food and eating occur much of the time	• Thoughts of food and eating do not occupy most of the day
• Eating patterns and obsessions preclude normal functioning in life activities	• Functioning usually remains intact
• Preoccupation with "healthy eating" leads to significant dietary restriction	• There may be a preoccupation with "healthy eating" or significant attention to caloric or nutritional parameters of most foods eaten but intake remains acceptable
• Excessive exercise beyond what´s recommended may be explicitly used as a frequent means of purging calories	• While exercise may not regularly be used in excessive amounts to purge calories, there may be a cognitive focus on burning calories when exercising

2.3.2 Disordered eating in sports

There is a higher prevalence of DE in athletes compared to the non-athlete population (Bratland-Sanda & Sundgot-Borgen, 2013; Karrer et al., 2020; Smink et al., 2012; Sundgot-Borgen & Torstveit, 2004). Studies have shown athletes are more likely to present with DE behaviors instead of a clinical ED (Bonci et al., 2008; Reardon et al., 2019; Sundgot-Borgen & Torstveit, 2004). For athletes, DE often occurs due to the desire to achieve a body ideal specific to the sport and relieve a sport-specific body dissatisfaction (Torstveit et al., 2008)

The estimated prevalence of DE in athletes seems to be ranging from 0 to 19% in male athletes and 6 to 45% in female athletes (Reardon et al., 2019; Wells et al., 2020). However, it is challenging to specify the exact prevalence due to the different populations of athletes studied (different ages, gender, sports, level of competition), and different definitions of DE utilized in studies (Mancine et al., 2020). Further, there are differences in terms of prevalence and risk of DE across different categories of sports (Pallotto et al., 2022). Athletes in weight-sensitive sports (weight-class sports, gravitational sports, aesthetically judged sports) have been shown to be the group with the highest prevalence and risk of DE behavior (Chapman & Woodman, 2016; Stoyel, Stride, et al., 2021). This is compared to athletes in sports where leanness is a less important performance factor (Karrer et al., 2020; Kong & Harris, 2015; Sundgot-Borgen & Torstveit, 2004).

One of the main challenges for athletes regarding eating behavior and performance is the constant movement across the spectrum of eating behavior (Figure 1) (Wells et al., 2020). The athletes can be anywhere on the spectrum at any time over their career and within different stages of their training block (off-season, pre-season, injured period) (Wells et al., 2020). Additionally, risks of severe health and performance implications increase when DE falls into a clinical ED (Stoyel, Stride, et al., 2021). Thus, early detection of DE behavior can be crucial for the athlete's health.

2.3.3 Disordered eating in combat sports

Even though combat sport athletes likely fall into a high risk of DE behavior, there is limited research in this field. Previous research finds that a high percentage of combat sport athletes are concerned about their food intake and body mass (Anderson & Petrie, 2012; Costarelli & Stamou, 2009; Mancine et al., 2020) resulting in frequent dieting and caloric restriction (Martínez-Rodríguez et al., 2021). A previous study on wrestlers weight loss methods reported that 10-20% of the sample were unable to control their food intake, which is a classic symptom of DE (Franchini et al., 2012; O. Rø et al., 2020). This number increases to 30-40% after competition (Franchini et al., 2012). In addition, the constant attention on the athletes body mass control is likely to increase the risk of developing a problematic body image, and as a result increase the risk of DE behavior (Barley, Chapman, & Abbiss, 2019). Furthermore, combat sport athletes may be underweight, normal weight, or overweight regardless of DE behavior (Wells et al., 2020), and often associate weight-cutting practices with sport identity (Pettersson et al., 2013). Hence, there could be challenges in detecting DE behavior in this group of athletes (Reardon et al., 2019).

One of the clearest triggers for DE in combat sports is the frequent weight cycling and dieting (Gonçalves et al., 2021). In addition, other sport-specific risk factors, such as personality traits (e.g. perfectionism), the impact of coaching behavior, rules and regulations in the sport, early start of sports-specific training, and traumatic events have previously been reported as risk factors for developing DE behavior in athletes (Arthur-Cameselle & Baltzell, 2012; Bar et al., 2016; Bratland-Sanda & Sundgot-Borgen, 2013; Mountjoy et al., 2018). As such, these risk factors could be highly relevant in combat sports as well. Identifying and managing these variables can be crucial for the preventive work of DE behavior among combat sport athletes. Although, this is a field where further research is needed.

2.3.4 Health and performance implications of disordered eating for combat sport athletes

Disordered eating can have detrimental effects on the athlete's health and performance. Typical DE behavior (e.g binge eating, excessive exercise, vomiting) can affect nearly every system of the human body (Joy et al., 2016). However, medical complications associated with DE depend on multiple factors, such as the severity of the behaviors, frequency, duration, type of weight loss method used, and age of the athlete (Rosendahl et al., 2009; Sundgot-Borgen et al., 2004). Health outcomes of DE can be dehydration, gastrointestinal complications (dental, bleeding, ulceration, bloating, constipation), electrolyte imbalances, nutritional deficiencies, and mental health complications (personality disorders, anxiety, depression, self-harm, substance abuse) (Wells et al., 2020). In addition, clinical EDs have the highest mortality rates regardless of any mental health condition (Smink et al., 2012).

Regarding performance, DE can potentially increase the risk of illness and injury, interfere with consistency, and decrease training quality, thus indirectly hindering competition goals (Mountjoy et al., 2014). Further, DE can inflict performance in terms of acute effects on competition day, and/or as a result of inadequate energy intake for the bout and/or event (resulting in decreased strength, endurance, coordination, concentration, and mood) (Karrer et al., 2020; Mountjoy et al., 2014). Additionally, the stress of constantly suppressing hunger, grueling over body mass, and fear weight gain can be mentally taxing on the athletes (Sundgot-Borgen & Torstveit, 2010) and inflict performance negatively (Joy et al., 2016).

One of the main concerns for athletes regarding DE behavior is the potential risk of relative energy deficiency in sports (RED-S) (Mountjoy et al., 2014), where DE can result in RED-S and vice versa (Mountjoy et al., 2018). Thus, the concept of RED-S can be regarded as playing an important role in the explanation of the health consequences of DE (Karrer et al., 2020). The syndrome of RED-S refers to "impaired physiological function including but not limited to, metabolic rate, menstrual function, bone health, immunity, protein synthesis, cardiovascular health caused by relative energy deficiency" (Mountjoy et al., 2014). The etiological factor of RED-S is low energy availability (LEA), which is a mismatch between energy intake and exercise load, leaving inadequate energy to support the body´s needs (Mountjoy et al., 2014).

Undergoing LEA in conjunction with DE behavior can lead to a suppression of physiological functions (Figure 2) (Mountjoy et al., 2014). Thus, impairments of bone health, menstrual function, hematological, endocrine, and metabolic status, psychological well-being, growth and development, and gastrointestinal, cardiovascular, and immunological systems can be negatively affected (Figure 3) (Mountjoy et al., 2018). In addition, the long-term complications of LEA and DE behavior for the adolescent athlete may be especially critical, as this may hinder the development of peak bone mineral density, height, and reproductive and neurological development (Bratland-Sanda & Sundgot-Borgen, 2013; Sundgot-Borgen et al., 2013b; Wells et al., 2020).

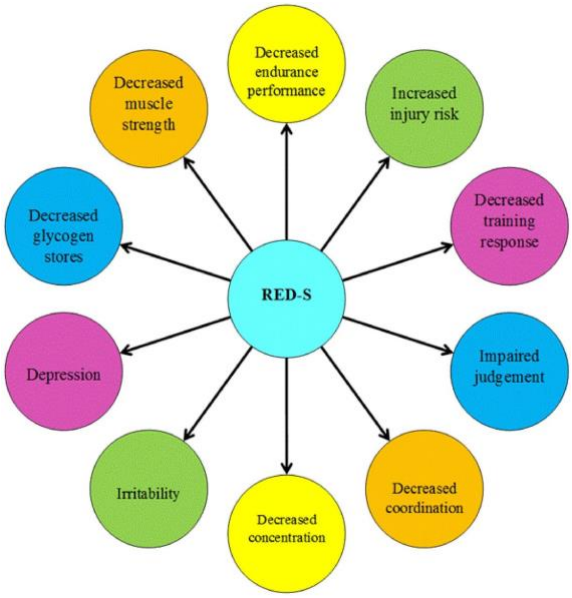

Figure 2: Potential performance effects of RED-S (Mountjoy et al., 2014)

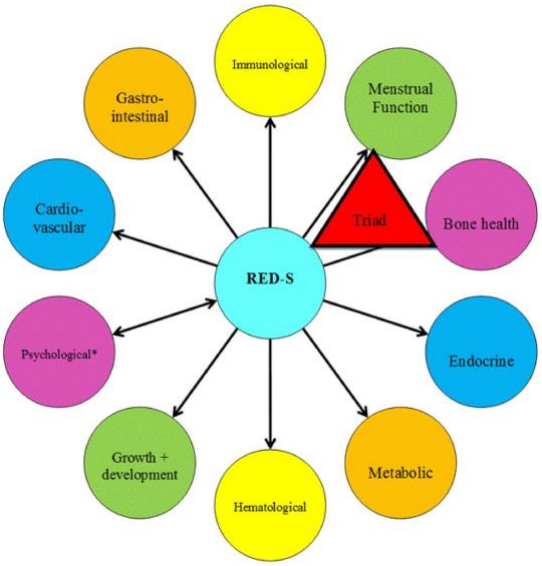

Figure 3: Health consequences of RED-S (Mountjoy et al., 2014)

3. Method

3.1 Design

This master thesis is based on a cross-sectional study with self-reported questionnaire data obtained between February 2023 and March 2023.

3.2 Sample & recruitment

The study aimed to include all eligible adult combat sports practitioners in Norway. Participants were invited to complete a web-based questionnaire.

Recruitment was performed in two ways. First, combat sports clubs were contacted through phone and e-mail by the research team. The research team met leaders, trainers/coaches, and athletes to present and inform them about the project. An informational flyer with a scannable QR-code for participation in the project was handed out in the gyms upon physical meeting (see Appendix 4). Further, an open link to the questionnaire was sent to the combat sport clubs to be shared on the club's webpage and member pages on social media, and email to athletes. Second, an open and shareable link to the questionnaire was posted on social media (Facebook, Instagram)

and in Facebook groups for different combat sports athletes. The link led the athletes to an information letter (see Appendix 3), informed consent (see Appendix 3), and the questionnaire (see Appendix 5). Athletes who consented to participate were able to proceed to the questionnaire. The questionnaire was answered electronically through SurveyXact (by Ramboll Management).

In total, 383 clubs were contacted through phone, mail, or physical meeting. Additionally, two weeks after first time of approach, a reminder mail was sent out to the clubs that had not responded upon first contact.

3.2.1 Inclusion criteria

Participants had to be a registered member at a Norwegian combat sport club, ≥18 years of age, and have a proficient level of Norwegian writing skills. Finally, the participants had to practice a combat sport at least once per week.

3.3 Measurements

3.3.1 Demographical variables

To assess demographical information, the questionnaire included items regarding the participants sex, age, educational level, marital status, club/gym affiliation, height, and weight. Furthermore, questions regarding the participants combat sports background and competition level were also included in the questionnaire (see Appendix 5).

3.3.2 Weight regulation behavior

A questionnaire for assessing athletes' routines and methods in relation to weight regulation was previously developed at “Olympiatoppen” by Ina Garthe and Jorunn Sundgot-Borgen (Garthe, 2005) (see Appendix 5). The questionnaire was developed on the basis of a previously validated questionnaire for wrestlers (Brownell et al., 1987), scientific literature (Sundgot-Borgen & Torstveit, 2004), researchers in the field, and individuals in the combat sports environment. The questionnaire contained 45 questions that accounted for anthropometric goals, general information about competition

participation and weight class, methods for weight reduction, routines in relation to competition/weigh-ins, athletes' relation to food, body, weight, and informational sources. Further, questions regarding the athletes' methods of weight gain were implemented as well. The questionnaire was pre-tested on five athletes (close to the national team level) and two coaches before the survey started. Based on the feedback from the pre-test, no changes were necessary.

The questionnaire utilized for the current study was modified by the research team due to updated scientific literature and advice from experienced combat sports athletes. Questions about whom the athletes turn to for information and guidance related to weight regulation behavior were implemented. These questions were used in a previous Norwegian study of female combat sports athletes (Mathisen et al., 2022).

3.3.3 Symptoms of eating disorders

The Norwegian version (O. Rø et al., 2010) of the EDE-Q 6.0 (Fairburn & Beglin, 2008) was included in the questionnaire to assess core behavioral and psychological symptoms of EDs (see Appendix 6)

The EDE-Q is a 28-item self-reported questionnaire that is derived from the semi-structured interview Eating Disorder Examination (EDE) (Fairburn et al., 2008). The EDE-Q has four clinically derived sub-scales, where each of these consists of five to eight items (22 items in total) (Dahlgren et al., 2017). The subscales are the following: Dietary restraint, Weight concern, Eating concern, and Shape concern, these are used to calculate a global EDE-Q score. The EDE-Q asks about the frequency of different types of thoughts, and feelings related to weight and figure in the last four weeks (28 days) on a seven-point Likert scale (0-6) where 6 represents high occurrence (every day/markedly), and 0 represents no occurrence of behavior (no days/none at all). The average score of these sub-scales is what constitutes the global score. (O. Rø et al., 2015).

Previously the EDE-Q has shown good validity and reliability scores as a measure for assessing symptoms of EDs (Berg et al., 2012; Calugi et al., 2017). This finding has been reported in athletes as well (Lichtenstein et al., 2022). Further, the Norwegian translation of the questionnaire has demonstrated convergent validity with the EDE-

interview (Dahlgren et al., 2017; O. Rø et al., 2010), which is considered to be the "gold standard" for assessing ED psychopathology (Berg et al., 2012). The global EDE-Q score had a good internal consistency in our sample, with a Cronbach´s alpha of 0.92 and 0.93 in male and female participants respectively.

The cut-off value for the EDE-Q global score has been recommended to be set at 2.50 for females, and 1.68 for males (Ø. Rø et al., 2015; Schaefer et al., 2018). This study utilized these cut-off values as well, meaning a score over 2.50 for females or 1.68 for males was defined as displaying symptoms of EDs.

3.4 Data analysis

All raw data were transferred and analyzed in IBM SPSS version 24.0 (SPSS inc, Chicago, IL). Tables and figures were constructed in Microsoft Excel for MacBook, 2023, version 16.72. All data were visually inspected, and assumptions of normal distribution were tested using the Shapiro-Wilk test. Continuous data are presented as mean and standard deviation (SD), while categorical data are presented as the number of observations (n) and proportions (%). The significance level was set to $P = .005$. Prevalence of weight loss methods practiced was conducted through descriptive frequency analyses. Gender differences were tested using the independent sample t-test on continuous data and the chi-square test on categorical data. Between-group differences in EDE-Q score across experience level and combat sport disciplines were examined with one-way analysis of variance (ANOVA) including the Bonferroni posthoc test. A hierarchical linear regression was performed to examine potential explanatory variables for EDE-Q global score. The dependent variable was the global EDE-Q score. The inclusion of the independent variables was carried out through a systematic four-step procedure, outlined as follows; Step: 1 age, gender, and previous or current ED diagnosis. Step 2: exercise and experience level variables (weekly combat sport exercise volume, exercise volume in other activities, beginner, intermediate, advanced, and professional). Step 3: weight regulation variables (RWL (no/yes), GWL (no/yes), weight loss period before competition, largest weight cut before competition, and age of reducing body weight for the first time). BMI was included in the fourth step.

To address non-normal residual score contributions, bootstrapping using a wild sampling method with unstandardized residuals as value variables were performed. The number of bootstrapping samples was set to 1000 including bias-corrected and accelerated 95% confidence intervals. Results are presented as the standardized beta weight and 95% confidence intervals.

3.5 Ethics

The study was approved by the Norwegian Center for research data (ID 973469; Appendix 1) and by the Norwegian School of Sport Sciences Ethical Committee (ID 254; Appendix 2). Individuals that implied interest in participation were informed about the study through written explanation and the individuals that wanted to participate signed informed consent before starting the questionnaire (see Appendix 3). No direct personally identifiable information was collected, as the participants were instructed to make a username that was not linked to the actual name in case they wanted to withdraw their consent. Further, the participants age was converted to percentiles and information regarding participants previous competition placement was categorized into sub-groups before data analysis. Information about IP address and time of survey completion was deleted immediately to ensure that participants could not be identified.

The overall theme of the study and the subsequent topics in the questionnaire could have been experienced as sensitive for certain individuals. Answering topics and reflecting on their own feelings towards body, weight, shape, and food may have been challenging for some participants. Although, previous research has shown that body image assessments do not seem to harm individuals' body image (Jarman et al., 2021). The participants were offered to talk to the project group if necessary. In addition, information about first-line services that could assist with guidance and support regarding sensitive topics was provided.

4. Results

4.1 Participant characteristics

In total, 325 participants had completed or partially completed the questionnaire when the data collection ended. However, 137 of these participants were excluded due to ending the questionnaire before answering the needed variables for this study´s research questions. Further, one individual was excluded due to privacy and confidentiality. As this individual chose the gender “other” which only contained one individual. Thus, there was a possibility of the individual being recognized in the combat sports environment. As such, the final data material consisted of 140 males and 47 females.

Participants characteristics, proportion of competitive athletes, proportion practicing weight regulation, and proportion with current or previous ED diagnosis are presented in Table 4. Significant gender differences were found for height, body mass, BMI, and self-reported ED.

Table 5 displays the prevalence of the participants' combat sport experience level and primary combat sport discipline. In the full sample, the majority were advanced practitioners. Further, BJJ was the most practiced combat sport in the total sample.

NORWEGIAN SCHOOL OF SPORT SCIENCES

Table 4. Demographic data of the participants. Values are presented as mean (± SD) if not otherwise stated.

	Male *n*=140	**Female** *n*=47	**Total sample** *n*=187	**P-value** male vs female
Age, years	34.5 (± 11.0)	36.8 (± 13.9)	35.0 (± 11.8)	.278
Height, cm	180.9 (± 6.9)	164.6 (± 6.2)	176.9 (± 9.7)	.001**
Bodymass, kg	85.4 (± 14.6)	66.0 (± 15.2)	80.6 (± 16.9)	.001**
BMI, kg/m^2	26.0 (± 3.9)	24.3 (± 4.7)	25.6 (± 4.2)	.013*
Experience, years	9.4 (± 9.0)	8.4 (± 8.2)	9.1 (± 8.8)	.451
Combat sport exercise volume, hours per week	5.5 (± 3.0)	4.8 (± 2.7)	5.3 (± 2.9)	.160
Exercise volume, other activities, hours per week	4.0 (± 2.5)	3.5 (± 2.3)	3.9 (± 2.5)	.184
Practicing weight regulation last 12 months, yes, %, (*n*)	89.3 (125)	85.1 (40)	88.2 (165)	.227
Previous or current ED, self-reported, yes, %, (*n*)[a]	7.5 (10)	30.4 (14)	13.9 (24)	.001**
Competing, yes, %, (*n*)	59.3 (83)	70.2 (33)	62.0 (116)	.182
Weight loss period before competition, days[b]	50.6 (± 61.0)	44.6 (± 32.9)	48.3 (± 54.9)	.792
Largest weight cut before competition, kg[b]	6.7 (± 4.5)	4.6 (± 2.7)	6.2 (± 4.3)	.112
First time reducing body weight for competition, age[b]	23.6 (± 10.0)	22.4 (± 9.7)	23.1 (± 9.8)	.767

BMI = Body mass index, ED = eating disorder, [a] 8 participants excluded due to missing answers, [b] 71 participants excluded due to not-competing, * Significant $P < .05$ between male and female, ** Significant $P < .01$ between male and female

Table 5. Prevalence of combat sports discipline across combat sports experience level (genders combined). Values are presented as percentages of the number of observations.

	Beginner (*n*=27)	**Intermediate** (*n*=69)	**Advanced** (*n*=71)	**Professional** (*n*=20)	**All levels** (*n*=187)
Kickboxing (*n*=11)	0	0	54.5	45.5	5.9
Muay Thai (*n*=35)	11.4	54.3	25.7	8.6	18.7
BJJ (*n*=51)	27.4	39.2	31.4	2.0	27.3
Judo (*n*=9)	0	44.4	55.6	0	4.8
Taekwondo (*n*=28)	28.6	25.0	35.7	10.7	15.0
MMA (*n*=13)	0	7.7	76.9	15.4	6.9
Other (e.g boxing, karate) (*n*=40)	2.5	45.0	37.5	15.0	21.4

BJJ = Brazilian jiu-jitsu, MMA = mixed martial arts

4.2 Prevalence of weight loss methods among male & female combat sport athletes

The proportion of athletes reporting weight loss methods is presented in Table 6. Restricting energy intake, increasing exercise levels, and restricting carbohydrates was the most common methods utilized the past 12 month among males. Restricting energy intake, restricting carbohydrate intake, and increasing exercise levels was the most frequent reported methods among females. In total, 15,5% of the participants reported not having engaged in any form of weight regulation in the last 12 months.

Table 6. Prevalence of weight loss methods utilized across gender. Values are presented as percentages based on the total number of observations.

	Male (*n*=140)	**Female** (*n*=47)	**Total sample** (*n*=187)
Restricting energy intake	48.6	48.9	48.7
Carbohydrate restriction	37.9	40.4	38.5
Fat restriction	18.6	21.3	19.3
Fluid restriction	18.6	17.0	18.2
Fasting	20.7	10.6	18.2

Skipping meals	16.4	12.8	15.5
Special diet	7.9	2.1	6.4
Increased exercise	41.4	36.2	40.1
Plastic suit	15.7	10.6	14.4
Sauna	26.4	19.1	24.6
Diuretics	5.0	0.0	3.7
Laxatives	2.1	4.3	2.7
Diet pills	0.7	0.0	0.5
Vomiting	0.0	0.0	0.0
Other (e.g water loading, sodium restriction)	5.7	8.5	6.4
Have not engaged in weight loss	15.0	17.0	15.5
Practicing RWL[a]	45.8	33.3	42.2
Practicing GWL[a]	53.0	51.5	52.6

[a]71 participants were excluded from analysis, as this variable only included competing athletes.

4.3 Prevalence of eating disorder symptoms and differences across gender and experience level in combat sport athletes

Of the total sample, 21 participants (11%) were excluded from all ED symptoms analyses, as these participants had not completed the EDE-Q items in the questionnaire. Thus, 166 participants were viable for analysis.

Table 7 represents the participants mean EDE-Q global score and proportion over EDE-Q cut-off value across gender and experience levels. A significant difference was found across genders in the global score, and a significant higher proportion over EDE-Q cut-off value was found among the male participants. Further, a significant difference in EDE-Q global score was observed between groups of combat sports experience level ($F(3, 162) = 3.97$, $P = .009$), and between male and female beginner athletes.

Table 7. Participants global EDE-Q score and proportion above the EDE-Q cut-off across genders and experience levels. Values are presented as mean (± SD) and as percentages based on the total number of observations.

	Male	**Female**	**Total sample**	**P-value**	**OR**
	n= 123	*n*=43	*n*=166	male vs female	
EDE-Q global score	1.9 (± 1.0)	2.3 (± 1.3)	2.0 (± 1.1)	.040*	-
Proportion above recommended cut-off [a], %, (*n*)	48.8 (60)	39.5 (17)	46.4 (77)	.434	.756
Experience levels					
Beginner	16.7	38.9	10.2	.041*	2.44
Intermediate	36.7	22.2	15.7	.576	.833
Advanced	35.0	33.3	16.3	.404	.765
Professional	11.7	5.6	4.8	.819	.891

OR = odds ratio, * Significant *P* <.05 between male and female, [a]EDE-Q cut-off male/female = 1.68/2.50

4.3.1 Symptoms of eating disorders across combat sport disciplines

No significant differences were found in EDE-Q global score between groups of combat sport disciplines (F (6, 159) = 1.55, *P* = .164). Table 8 presents the proportion of participants over the EDE-Q global score cut-off value across combat sport disciplines.

Table 8. Proportion of participants over EDE-Q global score cut-off across combat sport disciplines. Values are presented as percentages based on the total number of observations.

	Male	**Female**	**Total sample**	**P-value**	**OR**
	(*n*= 123)	(*n*=43)	(*n*=166)	Male vs female	
Kickboxing	3.3	5.6	1.8	.267	.463
Muay Thai	21.7	16.7	9.6	.567	1.26
Brazilian jiu-jitsu	25.0	38.9	13.3	.765	1.11
Judo	5.0	0.0	1.8	.823	.840
Taekwondo	13.3	22.2	7.2	.749	1.15
Mixed martial arts	10.0	5.6	4.2	.414	1.64
Other (e.g boxing, karate)	21.7	11.1	9.0	.373	3.40

OR = odds ratio, EDE-Q cut-off male/female = 1.68/2.50.

4.4 Contributing factors to the variance in symptoms of eating disorders among combat sport athletes

The results of the hierarchical regression analysis for the variance in combat sports athletes global EDE-Q score is presented in Table 9. The only significant explanatory factors for EDE-Q global score were combat sports exercise volume and BMI (*P*=.032, *P*=<.001, respectively) in the final step of the model. The final model explained 36.7% of the variance in EDE-Q global score.

Table 9. Bootstrapped hierarchical linear regression analysis of variables explaining the variance in combat sport athletes' (*n*=166) global EDE-Q score.

	Step 1 *B* 95%CI	**Step 2** *B* 95%CI	**Step 3** *B* 95%CI	**Step 4** *B* 95%CI
Age	.013 -.021|.047	.015 -.020|.050	.017 -.021|.055	-.022 -.058|.014
Gender	-.226 -.974|.521	-.219 -.958|.520	-.003 -.740|.734	.517 -.138|1.172
Previous or current ED, self-reported	.338 -.650|1.327	.103 -.894|1.100	.160 -.852|1.172	-.044 -.891|.800
Combat sport exercise volume		.049 -.073|.171	.002 -.122|.126	**.130 .011|.248**
Exercise volume, other activities		-.080 -.226|.065	-.037 -.184|.110	-.035 -.157|.087
Experience level (1-4)		.424 -.055|.904	.300 -.204|.804	.184 -.238|.605
Rapid weight loss methods (yes/no)			.016 -.764|.795	.022 -.670|.625
Gradual weight loss methods (yes/no)			-.396 -1.143|.351	-.188 -.815|.439
Weight loss period before competition, days			.002 -.005|.008	.004 -.002|.009
Largest weight cut before competition, kg			.001 -.004|.185	-.003 -.092|.086
First time reducing body weight for competition, age			.002 -.034|.039	.004 -.026|.034
BMI, kg/m^2				**.168 .092|.244**
F	.411	1.649	1.767	20.055[a]
Adjusted R^2	-.034	.004	.079	.367 [b]

ED= eating disorder, BMI= body mass index,[a] *P* <.05, [b] *P* R^2 *Change*= <.05, B; standard coefficient*;* 95%CI, confidence interval. Significant ($p \leq 0.05$) beta weight and CI are highlighted in bold.

5. Discussion

The primary aim of this study was to investigate weight loss methods utilized and symptoms of EDs among adult male and female combat sports athletes. In addition, the study aimed to examine if there were any significant differences in symptoms of EDs across gender, experience level, and combat sports discipline. Finally, the study aimed to identify explanatory factors for global EDE-Q scores among combat sports athletes.

The main findings of this study show that 88% of adult Norwegian combat sports athletes have practiced weight regulation in the last 12 months. The most common weight loss methods among both male and female athletes were restricting energy intake, increasing exercise levels, and restricting carbohydrate intake. Further, 46% of the athletes viable for analysis (*n*= 77 of 166) had symptoms of EDs. Between genders, the results show that 49% of the males, and 40% of the females had symptoms of EDs. Significant differences in ED symptoms were found across gender, and experience levels. No significant differences in ED symptoms were found across combat sports disciplines. Combat sports exercise volume and BMI were identified as significant explanatory factors on ED symptoms among the athletes. However, the results should be interpreted with caution due to the limitations of the current study. This chapter will provide a reflection and discussion of the findings, as well as the limitations for the interpretation of the results. Finally, practical implications and recommendations for future studies will be provided.

5.1 Demographic data

Significant differences were found in certain physical characteristics between the genders, whereas the difference in height and body mass was expected due to the physiological differences between the genders (Szadvári et al., 2023). Otherwise, the physical characteristics of the participants seem to be in line with previous studies on Nordic combat sport athletes (Alsarve & Tjønndal, 2020; Garthe, 2005; Mathisen et al., 2022; Pettersson et al., 2013).

A relatively high BMI was observed in both genders, where the males were in general classified as overweight (Weir & Jan, 2023). Possibly due to a high amount of muscle mass in the participants. As previously show into consideration (Jeukendrup & Gleeson, 2019). The sample's previous training experience (9.1 years) and current exercise regime (9.2 hours per week), as well as being a population group that likely has a high interest in exercise and health, is supporting the claim of the sample's high BMI being a result of high muscle mass. In addition, previous research in combat sports athletes has demonstrated similar BMI values across different experience levels as well (Brito et al., 2012; Castor-Praga et al., 2021; Kotarska et al., 2019). The significant difference in ED history between the genders is in line with the prevalence of EDs in female athletes reported previously (Bratland-Sanda & Sundgot-Borgen, 2013; Mancine et al., 2020; Pallotto et al., 2022). However, 30% of the female group reporting current or previous ED is alarming and builds upon the challenges with EDs in weight-class sports (Artioli et al., 2016; Crighton et al., 2016; Sundgot-Borgen et al., 2013b)-

Regarding disciplines, BJJ was the most practiced combat sport among the full sample, and between genders. Although, it should be noted that Muay Thai was the third most prevalent discipline among the sample. To the author´s knowledge, there exist few studies on Norwegian BJJ and Muay Thai athletes, especially across different experience levels. As these two disciplines are among the newer and faster-growing combat sports across the world (Blomqvist Mickelsson, 2020a; Mohamad et al., 2017; Myers et al., 2013), providing quantitative data on these athletes' physical and mental health can be of high importance for future studies. Finally, most athletes reported to be of advanced or intermediate experience level (38% and 37%, respectively). Even with 14% of the sample being beginner athletes, the study's sample can overall be regarded as being an experienced sample.

5.2 Weight loss methods among Norwegian combat sport athletes

In total, 88% of the combat sports athletes in this sample practiced some form of weight regulation. Though, small differences were observed between genders, the results indicate that the proportion of weight loss practices is similar among female and male athletes. This is in line with previously reported studies on combat sports athletes weight regulation prevalence (Barley, Chapman, & Abbiss, 2019; Brito et al., 2012; Çolak et al., 2020; Lakicevic et al., 2020). However, it is important to note the differences between the samples examined. The sample of the current study includes a wide range of athletes with different experience levels, whereas previous studies have mainly investigated weight loss methods among competitive athletes (Berkovich et al., 2019; Martínez-Rodríguez et al., 2021; Viveiros et al., 2015). Even though a relatively small number of the sample was beginner athletes, the results of this study provide insight into beginner athletes weight regulation behaviors. However, limitations regarding the representativeness of the sample should be acknowledged. As small sample sizes do impact the generalization of the results (Tipton et al., 2017)

Further, restricting energy intake, increasing exercise levels, and restricting carbohydrate intake were found to be the most common weight loss methods. This is in line with previous studies on combats sports athletes weight loss methods (Giannini Artioli et al., 2010; Park et al., 2019; Štangar et al., 2022). Although, in two recent studies on male and female elite sambo athletes, sauna use, plastic suit training, and skipping meals were found to be the most common practices (Figlioli et al., 2021; Todorović et al., 2021). It is plausible that this is a result of the different disciplines examined, and the fact that this present study also included non-competing beginner athletes. Furthermore, preferred weight loss methods differed between males and females. Female athletes seemed to favor energy-restricting methods compared to the males, which preferred increasing exercise levels for weight loss. However, these gender differences were relatively small. Additionally, the literature indicates that both male and female athletes resort to gradual dieting and caloric restriction in similar prevalence (Ashtary-Larky et al., 2020; Gann et al., 2015; Park et al., 2019). A possible explanation could be that males have shown to be more motivated by performance-related factors (e.g improving strength and power) in their weight loss strategies

(Chatterton et al., 2017), whereas females participants might engage in weight loss methods for more appearance-related reasons (de Borja et al., 2021). However, this is a sample consisting of athletes, where performance is likely to be a high motivator among both genders (Garthe et al., 2011).

One of the more surprising results was the higher proportion of athletes practicing GWL compared to RWL. This contradicts the previous findings in the literature (Hillier et al., 2019; Ng et al., 2017; Reale et al., 2018). In addition, a relatively low proportion of the athletes practiced the more harmful weight loss methods (e.g diet pills, laxatives, diuretics). As practicing RWL and conducting more extreme weight loss methods presents one of the major challenges in combat sports (Crighton et al., 2016), these results can be regarded as an indication of combat sports athletes moving toward a healthier approach to weight loss. However, these results should be interpreted cautiously, given that the different weigh-in procedures across the combat sports disciplines results in distinct weight loss strategies (Reale et al., 2017). As a higher proportion of disciplines with shorter weigh-in procedures are included in the present study, this likely affects the results in weight loss practice. Additionally, 71 participants were excluded in this part of the analysis, in which questions regarding RWL and GWL could only be answered by competing athletes (69% of the sample), thus, resulting in a reduced sample size.

Finally, the age at which the athletes started to cut weight for the first time before a competition was somewhat surprising. As the athletes of this sample started their weight-cutting practices as adults, with 24 and 22 years among the males and females, respectively. These results differs compared to the results obtained by previous studies, in which athletes seem to start at a younger age (Artioli et al., 2010; Figlioli et al., 2021; Kons et al., 2022). However, it should be noted that these studies have investigated RWL only and included more experienced level athletes, which in turn could result in an earlier start of a competition career. Though, this can be regarded as step toward a healthier weight management practice as well, given that adult athletes might be more aware of potential dangers related to severe weight loss practice (Lakicevic et al., 2022).

5.3 Prevalence of symptoms of eating disorders

One of the more alarming results from this study is the high proportion of athletes scoring above the EDE-Q cut-off value, as 46% of the sample were identified as showing symptoms of EDs. However, it should be noted that 11% of the total sample had not completed the EDE-Q section of the questionnaire, thus these results do not represent the total sample, which can be regarded as a limitation. It is challenging to say if the proportion would be higher or lower if the total sample was included. Although, a somewhat high proportion was expected due to combat sports being a weight-class sport, which has previously been shown to be a group of high risk for DE (Mancine et al., 2020; Sundgot-Borgen et al., 2013). Nevertheless, based on previous research examining ED symptoms in athletes (Anderson & Petrie, 2012; Chapman & Woodman, 2016; Kristjánsdóttir et al., 2019), the high proportion among this study's sample was surprising. Several explanations are plausible, such as the limited studies (to the author's knowledge) that solely investigate combat sports and DE, whereas combat sports often are included among other weight-sensitive sports (Burke et al., 2021), which again could result in low sample sizes. Additionally, it is challenging to compare prevalence data due to the different methodologies utilized for measuring symptoms of EDs across studies. For instance, classification tools/instruments, definitions of EDs/DE, and diagnosis manuals often vary across studies (Dahlgren et al., 2017).

Previous studies on ED symptoms utilizing self-reported data have shown athletes to underreport their designated DE behavior (Karrer et al., 2020; Rousselet et al., 2017; Sundgot-Borgen & Torstveit, 2004). An explanation for this may be the exercise and dieting routines that often come as a natural part of sports, resulting in athletes not seeing an issue with their DE behaviors. Regarding the current study´s sample, this could be highly relevant, as combat sport athletes have previously reported the "making weight" process to promote a feeling of sport identity (Pettersson et al., 2013). Building further upon this point, 14% of the total sample self-reported that they have a current or have had an ED, which is vastly lower than the percentage that shows symptoms of EDs based on the EDE-Q cut-off value. It could be a challenge in identifying one´s own degree of problematic behavior. As it can be assumed that these athletes surround themselves in an environment where dietary restrictions and excessive exercise volume can be recognized as positive behavior. One could speculate that the individuals who are

already displaying some degree of symptomatic ED behavior, likely attracts to a sport which legitimizes these behaviors. Hence, this may be a reason that certain individuals turn out to have high EDE-Q scores without realizing that there is a problem with the more extreme weight and dietary behaviors.

It would be interesting to see the proportion of ED symptoms in this sample with the inclusion of a clinical interview. In a Norwegian study examining ED prevalence in adolescent athletes and nonathlete controls, the researchers found that nonathlete controls displayed a higher prevalence of DE behavior than the athlete group when solely self-reported data was utilized, however, when a clinical interview (EDE) was conducted, a higher prevalence of DE behaviors was observed among the athletes compared to the non-athletic control group (Martinsen & Sundgot-Borgen, 2013). As such, it would strengthen the current study methodologically with an inclusion of a clinical interview. In addition, it could provide deeper insight into the athlete's psychological and behavioral patterns.

Finally, a big variety in sample sizes is observed between studies investigating ED symptoms in athletes (Liao et al., 2010; Rousselet et al., 2017). As this study´s sample size can be regarded as relatively small, cautiousness does need to be taken regarding the representativeness of these results. The differences in competition or training season among the competing athletes should be acknowledged. As an athlete in competition season may have had an increased risk of portraying DE behaviors, due to the diet restrictions and intensified training regimen which is often seen in preparation for combat sports bouts (Bueno et al., 2022). Thus, it would be interesting to see the prevalence differences between a sample in competition versus an off-season sample. To practically conduct this could be challenging however, as some disciplines do not have distinct periods for off and on season (Barley & Harms, 2021).

5.4 Differences in symptoms of eating disorders across gender, experience level, and combat sport disciplines

5.4.1 Symptoms of eating disorders across gender

The results revealed a noteworthy gender difference in the proportion exceeding the EDE-Q cut-off value, with a higher proportion observed among male combat sports athletes compared to their female counterparts. This contradicts the findings from the literature investigating the prevalence of DE behavior between genders, as a higher prevalence among female athletes is frequently reported (Bratland-Sanda & Sundgot-Borgen, 2013; Krebs et al., 2019; Milligan & Pritchard, 2006; Reardon et al., 2019; Wells et al., 2020).

However, the results do build upon previous research noting that male athletes in weight-sensitive sports are at an increased risk of ED symptoms (Chapman & Woodman, 2016; Karrer et al., 2020). A recent systematic review, investigated the prevalence of DE in male athletes, and found combat and contact sports to be among the athlete group with the highest display of DE behaviors (Karrer et al., 2020). As such, the higher proportion of ED symptoms among male combat sports athletes is a finding that warrants further examination.

One possible explanation for this result is the difference in EDE-Q cut-off value utilized across studies. As an example, the present study operates with the cut-off values of 1.68, and 2.50 for males and females, respectively, as this was seen reasonable due to recommendations from recent reports (Ø. Rø et al., 2015; Schaefer et al., 2018), whereas a recent study of Icelandic athletes investigating prevalence of ED symptoms, found a prevalence of 18% and 25% among male and female athletes (Kristjánsdóttir et al., 2019). The study applied the same measurement instrument (The EDE-Q 6.0) as this study, however, the researchers set the cut-off value at ≥4 for both genders. Similar populations are included, yet the differences in cut-off values turns to a vast difference in prevalence data. It should also be noted that the EDE-Q has been validated in female athletes, though, not in male athletes (Lichtenstein et al., 2021). As such, limitations of the instrument in detecting ED symptoms among male participants could be prevalent, hence, these results should be cautiously interpreted.

Another possible explanation is the male Western sociocultural model of aesthetic standard which includes a lean and muscular physique, which is challenging to reach without exercising and dieting (Ahmadpanah et al., 2019; Karrer et al., 2020). It could be assumed that male athletes experience the same sociocultural pressure to achieve the male body ideal, as well as the pressure from performing well (Sundgot-Borgen & Torstveit, 2010). Building upon this is the possible pressure to meet the optimal paradigm of the athlete's designated sport, whereas the athletes may not match or feel like they match the ideal (Sundgot-Borgen & Torstveit, 2010). One should also take the increasing proportion of body dysmorphic disorder (excessive preoccupation with a perceived defect in one´s appearance) among males into consideration, as this is associated with an array of psychiatric morbidity (Blashill et al., 2020). Body image dissatisfaction is a central theme among all these factors. This is problematic, as previous research has shown body image dissatisfaction to be among the strongest predictors of EDs in athletes (Reardon et al., 2019). Overall, the accumulated pressure and possible body image dissatisfaction of all these factors may be impacting the high proportion of ED symptoms among this study's sample.

It would be interesting to include a thorough assessment of the sample's psychological health as well, whereas these male athletes might experience psychological stressors, such as performance anxiety or competition pressure. A previous study on combat sports athletes psychological health found that certain psychological variables (e.g stress, cognitive appraisal) were related to DE behavior (Gonçalves et al., 2021). Hence, this could be a relevant factor to take into consideration for the competing athletes in this sample.

Finally, a difference between the male and female athletes EDE-Q scores was observed. However, as the genders operate with different cut-off values and a low sample size in the female athletes was observed, consideration should be taken to what practical implications these results contribute.

5.4.2 Symptoms of eating disorders across experience level

Differences in ED symptoms across combat sports experience levels were observed in this sample, whereas the highest proportion above EDE-Q cut-off value was found among the advanced combat sports athletes. This is a somewhat expected result, as the

literature seems to report more aggressive weight loss practice and DE behavior among higher-level athletes (Barley, Chapman, & Abbiss, 2018; Connor & Egan, 2019; Franchini et al., 2012). However, it should be noted that the literature on this specific topic is limited, especially regarding samples consisting of both competing and non-competing athletes. As such, it is challenging to compare these results to previous findings. However, the results may suggest that as athletes progress from beginner to upward experience levels, there could be changes in factors that contribute to the development of ED symptoms. This may be attributed to a combination of psychological, physiological, and sociocultural variables that develops as athletes gains more exposure and experience within the sport (Stoyel, Stride, et al., 2021).

The beginner athlete group were found to have a lower proportion of ED symptoms in comparison to the intermediate and advanced level athletes. This may be explained by factors such as lower training demands, less pressure to meet weight-related goals, and lower exposure to the sports weight management culture (Castor-Praga et al., 2021; Stoyel, Delderfield, et al., 2021). As the advanced level athletes were found to be the group with the highest proportion of ED symptoms, these athletes may meet increased expectations, higher training demands, and longer exposure to weight-related pressures (Walter et al., 2022). Thus, resulting in a higher probability of developing DE behaviors (Pallotto et al., 2022). In addition, previous research has shown experienced level athletes to possess high levels of perfectionism (Stoeber, 2011), whereas perfectionism have been proved to correlate with DE behavior (Gwira et al., 2021; Wade & Tiggemann, 2013). As such, this could have been a common personality trait among this study's sample.

Another factor to take into consideration, is the reports of combat sports athletes identifying their coaches as their most influential informational sources regarding dietary and weight-making practices (Berkovich et al., 2019; Martínez-Rodríguez et al., 2021; Park et al., 2019). Since the more experienced level athletes are more likely to have a support team (e.g coaches nutritionists) around them (Dijkstra et al., 2014) there is a possibility of this support team having limited knowledge on healthy weight management practices and dietary strategies, resulting in contributing to the athletes DE behaviors (Macpherson et al., 2022). This could be the case among the more experienced athletes in this study´s sample as well. Finally, the relatively low sample

size in the beginner and professional groups should be mentioned. As the intermediate and advanced groups include over double the sample size, this probably has affected the proportion scoring over EDE-Q cut-off value across the groups in this sample. As such, these results should be interpreted cautiously.

5.4.3 Symptoms of eating disorders across combat sports disciplines

There were no differences in athletes' EDE-Q scores across combat sports disciplines or in proportion above EDE-Q cut-off value across disciplines and genders. These results are somewhat surprising, as boxing and MMA have been reported as the disciplines with high prevalence and magnitude of RWL (Barley, Chapman, & Abbiss, 2019). Hence, an increased possibility of displaying DE behaviors (Khodaee et al., 2015). However, these results must be interpreted cautiously, as dividing the athletes into their designated disciplines made for low samples in the different discipline groups.

There is limited research investigating ED symptoms across combat sport disciplines exclusively. Although, Thomas et al (2021) investigated the relationship between weight-cutting habits and the risk of developing the female athlete triad (defined as an interrelationship of menstrual dysfunction and LEA (with or without DE), and decreased bone mineral density) (Torstveit & Sundgot-Borgen, 2005). Further, the researchers conducted analysis across combat sports disciplines, where MMA athletes displayed a significantly higher risk of the female athlete triad, in comparison to kickboxing and boxing athletes (S. Thomas et al., 2021). Even though examining risk for the female athlete triad differs from measuring symptoms of EDs, some similarities can be drawn to the current study. The proportion of MMA athletes over the EDE-Q cut-off value in this sample did not significantly differ from the other disciplines. Although, one should take the low sample of MMA athletes included into the equation, as a higher sample size may have revealed a higher proportion of MMA athletes with ED symptoms.

BJJ athletes were observed to be the discipline with the highest proportion of ED symptoms. This may be explained by this being the group with the highest number of participants across the disciplines. Thus, having the highest statistical power among the disciplines as well (Madjarova et al., 2022). As BJJ is among the fastest-growing combat sports globally (Blomqvist Mickelsson, 2020a), providing insight into these athletes eating and dieting behavior, may be regarded as a strength of the current study.

5.5 Explanatory variables in symptoms of eating disorders

The study's final aim included identifying possible explanatory factors for ED symptoms among the combat sports athletes. Participants' BMI and combat sports exercise volume were the only explanatory variables for global EDE-Q score. Gender, ED history, exercise volume, experience level, and weight regulation strategies did not act as explanatory variables. This was surprising, as it was expected that some of the factors included would be found as significant factors based on the literature and potential risk factors for displaying DE behaviors (Burke et al., 2021; Ferreiro et al., 2011; Pallotto et al., 2022; Stoyel, Stride, et al., 2021; Sundgot-Borgen et al., 2013b). Either way, the final model explained 36.7% of the variance in ED symptoms.

These results do however need to be interpreted cautiously, due to low statistical power and the potential for overestimation of the explained variance regarding the relatively small sample size. Furthermore, the possibility of other variables among the study's dataset being able to explain the variance to a higher degree should be pointed out. Though, given the time for the current study, the factors included were regarded as being the most relevant based on the current literature.

Considering the impact of athletes' weekly combat sports exercise volume and BMI on the variance of EDE-Q global score, several explanations are possible. Comparable studies are limited, however, Mathisen et al (2022) conducted a regression analysis on similar thematic (ED symptoms, utilizing the EDE-Q). In addition, the researchers examined a similar population (female Norwegian combat sports athletes), thus making it somewhat comparable to the current study. However, the researchers found lower total exercise volume to be among the significant explanatory factors for ED symptoms, which do contradict the findings of the current study. One possible explanation may be obsessive behavior regarding the participants designated combat sports discipline, as a dedication to the discipline could turn into obsessive behavior, which again could result in problematic eating behavior (Levinson et al., 2019). Additionally, it could be that a high percentage of the included athletes were in their respective competition season, hence, the stricter dietary and exercise regimen could be picked up by the EDE-Q. The possibility of compulsive exercise among some participants could be a viable explanation as well, which is a part of the symptomatic picture in EDs (Dittmer et al.,

2018). As BMI was identified as an explanatory factor, it could be that some participants who exercise with compulsive cognition and has a high BMI value are exercising with the motive of changing their physique and/or as a way of handling their feelings, which have been reported to be a part of the symptomatic progress for EDs (Holland et al., 2014). If this is the case, it could have severe consequences on the athletes' health and performance, especially regarding the possible syndrome of RED-S (Mountjoy et al., 2014).

Interestingly, gender did not seem to significantly explain the variance in ED symptoms, which as previously mentioned, contradicts the literature regarding females often displaying higher prevalence of ED symptoms (Bratland-Sanda & Sundgot-Borgen, 2013; Kristjánsdóttir et al., 2019; Reardon et al., 2019). This again, builds upon the finding of a higher proportion of ED symptoms observed among the male athletes in this sample, thus, some of the possible explanations accounted for previously may be relevant for this finding as well. Further, it is surprising that none of the weight regulation variables did significantly explain ED symptoms, especially regarding the practice of RWL, which again, is somewhat contradictory to the literature (Artioli et al., 2016; Crighton et al., 2016; Franchini et al., 2012). A possible explanation may be the cultural identity regarding conducting RWL and combat sports among the sample or it could be that the relatively low proportion practicing RWL simply does not provide enough variability to detect potential ED symptoms. Finally, current or previous ED did not significantly explain variance in ED symptoms among the athletes. This is interesting given that having been diagnosed with an ED previously, could impact the current potential psychological and behavioral symptoms of EDs (Jacobi et al., 2011). However, this may be explained by athletes simply being free of previous ED symptoms. Additionally, a relatively low percentage of the sample (14%) reported having an ongoing or previous ED, hence low sample sizes were included in the analysis.

5.6 Strengths and limitations

5.6.1 Study design

Due to the study´s research questions and time restriction, it was decided that utilizing a cross-sectional study design was appropriate. The main strength of cross-sectional studies is that they are relatively quick and inexpensive to conduct. Additionally, it provides potential for assessing large sample sizes, often has a low risk of ethical difficulties, and does provide the ability to examine multiple variables (Wang & Cheng, 2020). However, it is important to take note of the limitations of this design. As the exposure and outcome are simultaneously assessed, there normally is no evidence of a temporal relationship between exposure and outcome (Setia, 2016). Hence, it is challenging to derive causal relationships (Carlson & Morrison, 2009).

This was the case for this study as well. Although combat sports exercise and BMI were identified as significant explanatory factors for explaining ED symptoms, no causality can be determined. In addition, potential confounding variables associated with the EDE-Q global score could have been overseen, as cross-sectional studies could have challenges accounting for all potential confounders (Skelly et al., 2012). Additionally, due to the design, it is difficult to establish the directionality of combat sports and ED symptoms, meaning it is challenging to determine if combat sports practice influences the development of ED symptoms or if individuals with pre-existing symptoms are more likely to participate in combat sports.

5.6.2 Measurements

Regarding the study´s time restriction and research questions, it was considered reasonable to utilize an electronic questionnaire for the data collection. Questionnaires do provide the ability to gather data from a large sample across a large demographic area (R. Thomas Jerry et al., 2015). Additionally, electronic surveys offer advantages in terms of cost-effectiveness, time efficiency, participant anonymity, and allow the participants to respond when they see it suited (given a specific time period) (Dalland, 2012). However, it is important to acknowledge the limitations of utilizing questionnaires as well(Gillham, 2008).

First and foremost, the questionnaire used in this study has not been validated, which can be regarded as a limitation regarding the validity of the results. However, a previous version of the questionnaire has been used in a study of weight regulation methods among athletes in weight-class sports (Garthe, 2005), and a similar version was recently utilized in a study on Norwegian female combat sports athletes (Mathisen et al., 2022). Furthermore, the results of this study rely on self-reported data. This can be regarded as a limitation to the validity of the results as well. As participants may provide socially desirable answers, meaning respondents could overreport more desirable attributes which make them "look good" (Latkin et al., 2017). This should especially be acknowledged regarding this questionnaire's sensitive topics. Although, the research team tried to account for this issue, by not collecting any direct personally identifiable information. Additionally, the participants might not have answered the questions truthfully for other unknown reasons, also known as response bias (Kreitchmann et al., 2019).

An important part of developing a questionnaire is to formulate questions that are clearly understood by the respondents (Gillham, 2008). The participants were provided contact information for the research team in case they needed to seek clarification or explanation for unclear questions. However, it should be noted that some questions could have been misunderstood. As some participants gave feedback on this issue after completion of the questionnaire. This could result in false or incomplete responses, hence, affecting the validity of the results of the current study.

Finally, questionnaires rarely give the participants the ability to provide detailed explanations or context for their responses (Sahlqvist et al., 2011). Therefore, potentially restricting the depth of the data collected. This should be acknowledged for the current study, as the results do not provide a complex understanding of the athletes' weight and eating behavior. However, it should be noted that the research team did implement textboxes on certain items in the questionnaire.

5.6.3 EDE-Q

In light of the study's time schedule and cost limitation, the EDE interview was not included. As this is regarded to be the "gold standard" for assessing EDs (Berg et al., 2012) this could be seen as limitation. However, this study did include the Norwegian

translated version of the EDE-Q 6.0 (O. Rø et al., 2010), which has been shown to be convergent with the EDE-interview (Dahlgren et al., 2017). In addition, good validity and reliability measures of the EDE-Q have been reported previously (Calugi et al., 2017). As such, this can be regarded as a methodological strength of the current study. Though, some limitations should be acknowledged.

The EDE-Q does require the respondents to report on their previous 28 days of eating behavior (Ø. Rø et al., 2015). As such, there is a potential for recall bias (Althubaiti, 2016), where participants may not accurately remember their past 28 days of eating behavior. Thus, the results may provide inaccurate responses. Further, questions regarding body image, weight, and eating behavior could be sensitive to answer for certain participants. Resulting in participants not answering truthfully (Rose et al., 2013).

Finally, there is some uncertainty regarding the accuracy of utilizing the EDE-Q among athlete populations, whereas it may fail to find 6-10% of cases with an ED (Lichtenstein et al., 2022). This could be the case among this study´s sample as well. A sports-specific tool for ED symptom in athletes would probably present higher reliability and validity than the EDE-Q. However, the EDE-Q is usable among athletes as long its limitations are acknowledged (Lichtenstein et al., 2021).

5.6.4 Sample & representativeness

Limitations regarding the study´s sample should be noted. A relatively low adherence to completing the questionnaire should be mentioned. One of the explanations for the low adherence could be the magnitude and length of the questionnaire. The cross-sectional study, which this thesis is a part of, includes a variety of topics of interest, which are needed for answering the study's aim and research questions. Therefore, in total, the questionnaire consisted of 109 items and was calculated to take around 20-30 minutes to complete. Participants were informed about this upon answering the questionnaire. However, the results show that a considerable amount of the participants did not adhere to full completion. As accounted for in the result section of this thesis, 138 participants were excluded due to ending the questionnaire before answering the needed items for the study´s research question, in addition, 21 participants were excluded from the ED symptoms analyses. The research team was provided reports on the questionnaire being

somewhat time demanding to complete. As such, it is likely that the magnitude and length of the questionnaire was a factor for the low adherence. Further, the literature has shown a comprehensive questionnaire to possibly affect the participant's ability to reflect on the items, as participants might wish to “hurry” through the items, this could be highly relevant toward the end of the questionnaire (Dalland, 2012; Gillham, 2008). As accounted for, some participants might have wanted to avoid answering the items on body image or eating behavior, as this can be perceived as challenging (Jarman et al., 2021). Hence, ending the questionnaire before completion. It is important to note that certain activations were implemented in the questionnaire, making it shorter in duration and less comprehensive to complete for certain participants. As an example, non-competing athletes were not directed to the items regarding competition history (e.g tournament placements, belt degree). Thus, challenges regarding the comprehensiveness and duration of the questionnaire are not relevant for all participants among the sample.

As the study did aim to investigate gender differences in weight loss methods and ED symptoms, the gender distribution among the sample should be mentioned. As only 25% of the participants were female combat sports athletes, the generalizability of the results needs to be taken into consideration. Further, the risk of sample selection bias, non-response bias, and self-selection bias should be acknowledged (Alarie & Lupien, 2021; R. Thomas Jerry et al., 2015). Especially self-selection bias could be relevant among this sample, as previous research has reported this as a possible challenge when utilizing surveys as a measurement tool (Greenacre, 2016). Therefore, further consideration should be taken regarding the representativeness of the current study's sample.

Furthermore, the study did aim to reach out to all adult combat sport athletes in Norway. Though, multiple hours were put into getting a comprehensive view of the combat sports clubs in Norway by the research team, this was not accomplished in the recruitment process. Internet was utilized to gather contact information on the clubs. Among some of the smaller clubs however, no contact information was available, thus making it challenging to invite these clubs.

Physical meetings and oral and written explanations of the project were done among some of the bigger clubs within a close geographical area (Oslo, Norway). Although, given the time for the recruitment process, this was challenging to conduct among as

many clubs aimed for. This could have resulted in an increased number of participants, as physical meetings have shown to be an effective recruitment method (Whatnall et al., 2021). It should be noted that the current study likely did manage to gather participants from some of the smaller non-organized combat sports clubs, as such, including a wide variety of Norwegian combat sports athletes across multiple disciplines, which, to the authors knowledge, is a population with limited research conducted on. Therefore, this could be regarded as a strength of the current study.

Overall, The mentioned limitations do inflict the study´s representativeness. As the study aimed to include all adult Norwegian combat sports athletes, it is challenging to conclude that this study's sample represents the adult Norwegian combat sports athlete population. However, it does give an indication of weight loss methods utilized, proportion of ED symptoms, and group differences in ED symptoms among adult Norwegian combat sports athletes.

5.7 Practical implications

The findings of this study have important practical implications for researchers as well as combat sports athletes, coaches, clubs, organizations, and healthcare professionals. Although the study relies on self-reported data, the results provide insight into how combat sports athletes from beginner to professional level, and across multiple disciplines, practice weight regulation, the proportion with ED symptoms, explanatory factors for ED symptoms, and the differences in ED symptoms across groups.

Even though a low proportion of the more harmful weight loss methods and a higher practice of GWL compared to RWL was observed among the athletes, it is important to build upon this positive weigh management findings through the development and implementation of evidence-based guidelines, promoting open communication, and fostering an environment which brings a focus upon healthy attitudes toward weight, body, and eating behaviors. Among the more experienced competitive athletes, the aim should be directed at conducting healthy weight loss practice. Health professionals, coaches, organizations, and other support staff around combat sports athletes should aim for this in a collaborative approach to promote optimal health and performance among the athletes. Ultimately, this does make the combat sports arena a safer and better place

for the younger athletes coming into the sport in the upcoming years (Blomqvist Mickelsson, 2020b).

Given that a substantial proportion of athletes, regardless of gender, displayed symptoms of EDs, it underlines the need for increased education and awareness. Athletes should be educated about the potential risks of DE behavior and the importance of adapting sustainable and balanced approaches to weight regulation and dietary behavior. Additionally, coaches and sports practitioners should be educated to identify and address potential signs of ED symptoms, ensuring an environment that supports healthy practice. It is important to note that these results support the claims that actions are needed regarding the weight class structure of the sports (Artioli et al., 2016; Crighton et al., 2016; Lakicevic et al., 2022), whereas the combat sports arena would likely benefit to strive toward a cultural shift where these weight loss practices are reserved the more experienced adult athletes. As an example, a young intermediate athlete should not be having to conducting these potentially drastic and harmful weight loss procedures, nor having to be around a culture with a constant focus on body, weight, and dietary behavior, just because it is a "part of the culture".

Further, the results build upon the challenges regarding DE in male athletes (Chapman & Woodman, 2016). Recognizing that the genders may require different forms of support and likely displays different symptomatic behavior is crucial. Tailored interventions should be directed toward identifying the specific challenges among the gender groups in managing their weight and promoting healthy behaviors. Further, as BMI and combat sports exercise volume were identified as significant factors associated with ED symptoms, it emphasizes the importance of regular monitoring and screening among athletes. Coaches and other support staff working with the athletes should aim for implementing regular screening of the athlete's, mental health, weight management practices, and exercise levels. As early identification is crucial in facilitating timely interventions and preventing further progression of DE behaviors.

Finally, the process of weight regulation has been associated with sport identity among combat sports athletes (Pettersson et al., 2013), therefore, this culture is likely present in the combat sports environment for years to come. As such, there should be a continued focus on advancing the identification and understanding of DE behavior, promoting healthy weight management practices, enhancing the education of coaches and support

staff, and strive for an open community that cultivates healthy behavior and optimal performance. Additionally, a shift is needed on the weight loss culture in these sports. This may take years of systematic targeted work to accomplish. It would however ensure a positive cultural shift in the combat sports arena.

5.7.1 Suggestions for future research

There are limited longitudinal studies exploring temporal relationships between weight regulation practice and the specter of eating behavior among combat sports athletes. This could provide valuable insight into determining the causal pathways of weight, DE behavior, and other potential risk factors, as, such, be of crucial importance regarding preventive work among athletes. Further, it could be of high value to assess eating behaviors, weight regulation practice, and body image among the increasing number of beginner and recreational practitioners (Duarte et al., 2022), which may exercise combat sports for health benefits mainly, as this is a population that few studies have investigated. Additionally, Burke et al (2018) and Karrer et al (2020) have noted a variety of suggestions in their respective studies for future research regarding current challenges among male athletes, RED-S, and DE. As the current study indicates a higher proportion of ED symptoms among male combat sports athletes, this is a field where increased knowledge is of high importance.

While the results showed BMI and combat sports exercise volume as significant explanatory factors for global EDE-Q scores, there are likely additional factors that influence ED symptoms among combat sports athletes. Therefore, future studies could explore psychological variables and other physical variables that provide a more comprehensive understanding of the etiology of EDs in this population of athletes. Furthermore, qualitative studies including combat sports athletes' own perceptions of the RWL and DE problematics, as well as their suggestions for improving the current challenges in the sport could provide valuable insight for coaches, researchers, and health professionals. Finally, it would be interesting to see a study conducted with similar aims as the current study, though, with an even distribution of gender and an increased sample size. Hence, improving the generalizability of the results.

6. Conclusion

In conclusion, the results from the present study identify restricting energy intake, increasing exercise levels, and restricting carbohydrate intake to be the predominant weight loss methods among male and female combat sports athletes.

A considerable proportion of combat sports athletes (46%) displayed symptoms of EDs. Significant differences in symptoms of EDs were observed across gender and experience levels. However, no significant differences in ED symptoms were found across combat sports disciplines.

Gender, ED history, experience level, and weight regulation strategies did not act as significant explanatory factors for ED symptoms among combat sports athletes. Though, weekly combat sports exercise volume and BMI were identified as significant explanatory factors for ED symptoms among combat sports athletes.

The results should be interpreted cautiously due to the methodical limitations of the study.

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List of Tables

List of Figures

Abbreviations

ANOVA	Analysis of variance
BJJ	Brazilian jiu-jitsu
BMI	Body mass index
DE	Disordered eating
DSM-5	Diagnostic and statistical manual for mental disorders
ED	Clinical eating disorder
EDE	Eating Disorder Examination Interview
EDE-Q	Eating Disorder Examination Questionnaire
GWL	Gradual weight loss methods
LEA	Low energy availability
MMA	Mixed martial arts
RED-S	Relative energy deficiency in sports
RWL	Rapid weight loss methods
SD	Standard deviation

Appendix

Appendix 1. Approval from the Norwegian center for research data

Appendix 2. Approval from the Norwegian School of Sport Sciences Ethical Committee

Appendix 3 Informational letter & consent form

Appendix 4. Informational flyer

Appendix 5. Questionnaire

Appendix 6. The EDE-Q 6

Appendix 1. Approval from the Norwegian Center for research data

Sikt

Meldeskjema / Helse og prestasjon hos norske kampsportutøvere / Vurdering

Vurdering av behandling av personopplysninger

Referansenummer
973469

Vurderingstype
Standard

Dato
16.12.2022

Prosjekttittel
Helse og prestasjon hos norske kampsportutøvere

Behandlingsansvarlig institusjon
Norges idrettshøgskole / Institutt for idrettsmedisinske fag

Prosjektansvarlig
Jorunn Sundgot-Borgen

Prosjektperiode
01.08.2022 - 31.12.2025

Kategorier personopplysninger
Alminnelige
Særlige

Lovlig grunnlag
Samtykke (Personvernforordningen art. 6 nr. 1 bokstav a)
Uttrykkelig samtykke (Personvernforordningen art. 9 nr. 2 bokstav a)

Behandlingen av personopplysningene er lovlig så fremt den gjennomføres som oppgitt i meldeskjemaet. Det lovlige grunnlaget gjelder til 31.12.2025.

Meldeskjema

Kommentar
OM VURDERINGEN
Personverntjenester har en avtale med institusjonen du forsker ved. Denne avtalen innebærer at vi skal gi deg råd slik at behandlingen av personopplysninger i prosjektet ditt er lovlig etter personvernregelverket.

Personverntjenester har nå vurdert den planlagte behandlingen av personopplysninger. Vår vurdering er at behandlingen er lovlig, hvis den gjennomføres slik den er beskrevet i meldeskjemaet med dialog og vedlegg.

VIKTIG INFORMASJON TIL DEG
Du må lagre, sende og sikre dataene i tråd med retningslinjene til din institusjon. Dette betyr at du må bruke leverandører for spørreskjema, skylagring, videosamtale o.l. som institusjonen din har avtale med. Vi gir generelle råd rundt dette, men det er institusjonens egne retningslinjer for informasjonssikkerhet som gjelder.

TYPE OPPLYSNINGER OG VARIGHET
Prosjektet vil behandle alminnelige personopplysninger og særlige kategorier av personopplysninger (helseopplysninger) frem til 31.12.2025.

LOVLIG GRUNNLAG
Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 nr. 11 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse, som kan dokumenteres, og som den registrerte kan trekke tilbake.

For alminnelige personopplysninger vil lovlig grunnlag for behandlingen være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 a.

Behandlingen av særlige kategorier av personopplysninger er basert på uttrykkelig samtykke fra den registrerte, jf. personvernforordningen art. 6 nr. 1 a og art. 9 nr. 2 a.

OPPLYSNINGER OM TREDJEPERSONER
I spørreundersøkelsen stilles det spørsmålet "Kjenner du til om andre i ditt treningsmiljø bruker illegale prestasjonfremmende midler

eller rusmidler for å øke prestasjon eller treningskapasitet (for eksempel steroider, medikamenter, eller illegale rusmidler)?" og det gis deltagerne mulighet til å legge til kommentar. Vi anbefaler derfor at det legges til hjelpetekst som minner deltageren om å ikke oppgi personidentifiserende opplysninger om andre individer.

PERSONVERNPRINSIPPER
Personverntjenester vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen:
- om lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke viderebehandles til nye uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet.

DE REGISTRERTES RETTIGHETER
Vi vurderer at informasjonen om behandlingen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18) og dataportabilitet (art. 20).

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER
Personverntjenester legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

Ved bruk av databehandler (spørreskjemaleverandør, skylagring, videosamtale o.l.) må behandlingen oppfylle kravene til bruk av databehandler, jf. art 28 og 29. Vi legger til grunn at bruk av databehandleren (SurveyXact) avklares med NIH og informasjonsskriket er tatt stilling til av NIH.

For å forsikre dere om at kravene oppfylles, må prosjektansvarlig følge interne retningslinjer/rådføre dere med behandlingsansvarlig institusjon.

MELD VESENTLIGE ENDRINGER
Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til oss ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilken type endringer det er nødvendig å melde:
https://www.nsd.no/personverntjenester/fylle-ut-meldeskjema-for-personopplysninger/melde-endringer-i-meldeskjema

Du må vente på svar fra oss før endringen gjennomføres.

OPPFØLGING AV PROSJEKTET
Vi vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet i tråd med den behandlingen som er dokumentert.

Kontaktperson hos oss: Callan Ramewal

Lykke til med prosjektet!

Appendix 2. Approval from the Norwegian School of Sport Sciences Ethical Committee

Jorunn Sundgot Borgen
Institutt for idrettsmedisinske fag

OSLO 14. november 2022

Søknad 254 – 101122 – Helse og prestasjon hos norske kampsportutøvere

Vi viser til søknad, prosjektbeskrivelse, spørreskjemaer, informasjonsskriv, innsendt melding til NSD, dialog med NSD og REKs vurdering om at prosjektet faller utenfor helseforskningsloven.

I henhold til retningslinjer for behandling av søknad til etisk komite for idrettsvitenskapelig forskning på mennesker, har komiteen i møte 10. november 2022 konkludert med følgende.

Vurdering

Det overordnede formålet med studien er å undersøke vektregulering og bruk av prestasjonsfremmende midler og hvordan dette oppleves av norske kampsportutøvere. Sekundære mål er å undersøke forklaringsmekanismer for forstyrret spiseatferd kroppsbilde og bruk av prestasjonsfremmende midler. Resultatene kan bidra med kunnskap om hvordan man kan unngå at kampsportutøvere begynner å bruke skadelige prestasjonsfremmende midler samt forebygge at utøvere får et vanskelig forhold til kropp, mat og vekt som følge av vektregulering. Komiteen finner prosjektets formål som viktig og med stor samfunns- og idrettsfaglig nytte.

Når det gjelder spørreskjemaet som planlegges benyttet i studien finner komiteen at dette er er relativt omfattende og der en stor andel av dataene som skal samles inn er å betrakte som særskilt sensitivt om følsomme temaer. Komiteen er derfor av den klare oppfatning at prosjektet forutsetter en forsvarlig organisering og at det etableres nødvendige tekniske tiltak som sikrer konfidensialitet for forskningsdeltakerne. Dette gjelder også vurdering av om hvorvidt gitte variabler kan kategoriseres i grupper som «beste plassering i nasjonale og internasjonale konkurranser» på samme måte som det skal gjøres med alder.

Selv om det i studien ikke skal samles inn direkte personidentifiserende opplysninger, så vil en sammenstilling av bakgrunnsopplysningene som skal samles inn imidlertid kunne identifisere deltakerne. Komiteen legger i den anledning til grunn, jf ovennevnte vurdering, at variablene er nødvendig for formålet med prosjektet. Det viser her blant annet til kartlegging av karaktertrekk som kjønn, alder, sivilstatus, utdanningsnivå viktig for å se på sammenhengen mellom karaktertrekk og vektreguleringsatferd, forhold til kropp, vekt og mat og bruk av prestasjonsfremmende midler og eventuelle forskjeller innenfor de ulike kampsportene og dermed også viktig for å besvare forskningsspørsmålene. Komiteen

NIH NORGES IDRETTSHØGSKOLE

Besøksadresse: Sognsveien 220, Oslo
Postadresse: Pb 4014 Ullevål Stadion, 0806 Oslo
Telefon: +47 23 26 20 00, postmottak@nih.no
www.nih.no

vurderer således at bakgrunnsopplysningene som relevante, men ber prosjektleder vurdere om at innhenting av opplysninger knyttet til direkte besteplassering nasjonalt og internasjonalt kan grovkategoriseres slik det skal gjøres med alder.

Videre opplyses det at Survey Exact skal benyttes til innhenting av data og til å oppbevare spørreskjema og besvarelser. Når databehandlingen er sluttført vil undersøkelsen lukkes og dataene overføres til SPSS lagret på sikker server iht NIHs rutiner for informasjonssikkerhet, herunder at prosjektleder avklarer med de ansvarlige for informasjonssikkerhet at Survey Exact er godkjent for bruk i prosjekter med bruk av denne type data. Med hensyn til prosjektmedarbeidere som forutsettes å ha tilgang til forskningsdata, så forutsetter komiteen samtidig at det for to prosjektmedarbeidere, henholdsvis en gjesteforsker og masterstudent, inngås en avtale om taushetsplikt og at de som prosjektmedarbeidere med tilgang til data på NIH server også vil være underlagt NIHs instruksjonsmyndighet.

Når det gjelder informasjonsskrivet til deltakerne har komiteen følgende vurderinger:

- Det bør foretas en gjennomgang av bruk av forkortelser med tanke på at deltakerne skal forstå hva de eventuelt samtykker til
- Tidsbruken for å fylle ut skjema bør vurderes på nytt, i det komiteen mener at de angitte 20 minutter er for kort tid gitt omfanget av spørsmål.
- Det bør i samtykke angis at med prestasjonsfremmende midler menes både legale og illegale.
- At dato for når data slettes endres i tråd med NIHs krav om oppbevaring i 5 år etter prosjektslutt for etterprøvbarhet og kontroll.

Komiteen ser videre av informasjonsskrivet at deltakerne gis mulighet til å trekkes seg underveis og inntil dataene er slettet ved at de lager sitt eget brukernavn ved innsendelse av spørreskjema. Her minnes det om at data som inngår i en analysefil ikke nødvendigvis må slettes. For at deltakerne imidlertid skal ha reell mulighet til å trekke seg, bør de gis anledning til å lage sitt eget brukernavn som ledd i spørreundersøkelsen og slik at dette gir mulighet for å identifisere dem i rådataene.

Avslutningsvis finner Komiteen det som helt avgjørende å vise til prosjektleders ansvar for å sikre deltakernes konfidensialitet som ledd i publisering av resultater fra studien. Der det ikke foreligger eksplisitt samtykke fra deltakerne, så påhviler det prosjektleder et særskilt ansvar for å påse at ingen av deltakerne kan gjenkjennes i publikasjonen. Dette innebærer at prosjektleder, der dette er nødvendig, må sørge for at data aggregeres på en slik måte at det verken direkte eller indirekte er mulig å identifisere noen individer i måten datasettet presenteres på. Dette gjelder både ved publisering og annen formidling av resultater fra prosjektet.

Vedtak

NIH NORGES IDRETTSHØGSKOLE

Besøksadresse: Sognsveien 220, Oslo
Postadresse: Pb 4014 Ullevål Stadion, 0806 Oslo
Telefon: +47 23 26 20 00, postmottak@nih.no
www.nih.no

På bakgrunn av forelagte dokumentasjon finner komiteen at prosjektet er forsvarlig og at det kan gjennomføres innenfor rammene av anerkjente etiske forskningsetiske normer nedfelt i NIHs retningslinjer. Til vedtaket har komiteen lagt følgende forutsetning til grunn:

- *At vilkår fra NSD følges*
- *At prosjektleder vurderer om «beste plassering i nasjonale og internasjonale konkurranser» kan grov kategoriseres på samme måte som det skal gjøres med alder*
- *At innsamling og lagring av data for prosjektet, herunder bruk av Survey Exact er i samsvar med NIHs retningslinjer*
- *At det innhentes taushetserklæringer fra gjesteforsker og masterstudent, herunder at det i avtalen sikres at medarbeidere uten ansettelsesforhold underlegges NIH instruksjonsmyndighet*
- *At det ved publisering av resultater fra prosjektet ikke er mulig å identifisere enkelt personer*
- *At deltakerne lager sitt eget brukernavn ved innsendelse av spørreskjema slik at de har mulighet til å trekkes seg underveis og før dataene slettes*
- *At informasjonsskrivet endres i tråd med komiteens merknader*

Komiteen gjør oppmerksom på at vedtaket er avgrenset i tråd med fremlagte dokumentasjon. Dersom det gjøres vesentlige endringer i prosjektet som kan ha betydning for deltakernes helse og sikkerhet, skal dette legges fram for komiteen før eventuelle endringer kan iverksettes.

Med vennlig hilsen

Anne Marte Pensgaard

Professor Anne Marte Pensgaard
Leder, Etisk komite, Norges idrettshøgskole

NIH NORGES IDRETTSHØGSKOLE

Besøksadresse: Sognsveien 220, Oslo
Postadresse: Pb 4014 Ullevål Stadion, 0806 Oslo
Telefon: +47 23 26 20 00, postmottak@nih.no
www.nih.no

Appendix 3. Informational letter & consent form

NORGES IDRETTSHØGSKOLE

Forespørsel om deltakelse i prosjektet:

«Helse og prestasjon hos norske kampsportutøvere»

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å få mer kunnskap om helse, prestasjon og vektregulering blant voksne utøvere som trener og konkurrerer i kampsport i Norge. Slik kunnskap er i dag manglende i Norge. Vi håper prosjektet skal kunne gi ny kunnskap om erfaringer, strategier og metoder knyttet til vektreduksjon og bruk av prestasjonsfremmende midler. Tidligere forskning indikerer at vektregulering kan by på utfordringer for noen utøvere og at bruk av prestasjonsfremmende midler forekommer hyppig. Prosjektet vil derfor også kartlegge omfanget av utfordringer nært knyttet til vektreduserende adferd og bruk av prestasjonsfremmende midler som kroppsbilde og forstyrret spiseatferd. Kunnskap fra prosjektet vil derfor være til direkte til nytte for både utøvere, trenere og støtteapparat. Prosjektet ledes av Norges Idrettshøgskole. Representanter fra kampsportmiljøet har vært og er aktivt med i utarbeidelsen og gjennomføringen av prosjektet. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Hensikt
Målet er at resultatene kan bidra til å unngå at kampsportutøvere begynner å bruke skadelige prestasjonsfremmende midler og får et vanskelig forhold til kropp, mat og vekt som følge av vektregulering. Vi antar at dette vil være til nytte både for deg og andre utøvere, samt for fremtidige kampsportutøvere.
Det overordnede målet med denne studien er å undersøke vektregulering og bruk av prestasjonsfremmende midler og hvordan dette oppleves av norske kampsportutøvere. Sekundære mål er å undersøke forklaringsmekanismer for forstyrret spiseatferd kroppsbilde og bruk av prestasjonsfremmende midler.

Hvem er ansvarlig for forskningsprosjektet?
Norges idrettshøgskole er ansvarlig for prosjektet.

Hvorfor får du spørsmål om å delta?
Representanter fra kampsportmiljø har vært og er aktivt med i utarbeidelsen og gjennomføringen av prosjektet. Alle voksne utøvere (≥18 år) som er tilknyttet en kampsportklubb i Norge får tilbud og forespørsel om å delta.

Hva innebærer det for deg å delta?
Hvis du velger å delta i prosjektet, innebærer det at du vil få ett nettbasert spørreskjema om erfaringer knyttet til vektregulering, kroppsbilde og spiseforstyrret adferd. Dette tar om lag 20 minutter. Spørsmålene handler om ulike erfaringer og symptomer du kan oppleve i sammenheng med vektregulering og bruk av prestasjonsfremmende midler. Spørreskjemaet inneholder enkle spørsmål om kroppsvekt, vektreguleringsmetoder, forhold til egen kropp, vekt, mat og bruk av prestasjonsfremmende midler. Dine svar fra spørreskjemaet blir registrert elektronisk.

Det er frivillig å delta.
Det er frivillig å delta i prosjektet og prosjektet samler ikke inn noen direkte personidentifiserbare opplysninger som navn, bosted, fødselsdato og klubbtilhørighet. Allikevel kan det være at kombinasjonen av enkelte opplysninger kan sannsynliggjøre hvem som har svart på spørreskjemaet. Det er kun prosjektgruppen som har tilgang til datasettet og som har tilgang på individuelle svar. Resultatene fra studien vil kun bli presentert på gruppenivå og ingen individuelle svar rapporteres. Det betyr at ingen skal kunne lese publikasjoner elle resultater fra denne studien og kjenne igjen at det er du som har svart. Du har rett til å be om innsyn (kopi), retting og sletting av opplysninger vi behandler om deg. Du vil da høre fra oss innen en måned. Vi vil gi deg en god begrunnelse hvis vi mener at du ikke kan identifiseres eller rettighetene ikke kan utøves. Du har også rett til å klage til Datatilsynet om hvordan vi behandler dine opplysninger."
Siden vi ikke innhenter direkte personidentifiserbar informasjon (som navn, fødselsnummer eller epostadresse) ber vi deg om å lage et unikt brukernavn du kan oppgi om du ønsker å trekke ditt samtykke og besvarelse. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle dine svar vil da bli slettet. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger
Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Prosjektleder Kethe M. E. Svantorp-Tveiten vil i tillegg til prosjektmedarbeidere ha tilgang til data. Datamaterialet vil bli innelåst på NIHs lokaler og de elektroniske data vil bli lagret på forskningsserver ved NIH. Resultatene fra prosjektet vil brukes til fagformidling for å heve kunnskapen om kampsport og helse i befolkningen, i populærvitenskapelige artikler, i en masteroppgave og til artikler som vil publiseres internasjonale forskningsstidsskrifter. Ingen av resultatene vil fremstilles på en slik måte at du som deltaker vil kunne identifiseres av andre.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?
Alle data slettes etter prosjektets slutt 31.12.2025
Hvis du har spørsmål til studien, eller ønsker å vite mer om eller benytte deg av dine rettigheter, ta kontakt med prosjektgruppen:

- NIH ved Kethe M. E. Svantorp-Tveiten (ketsva@ntg.no)
- Jorunn Sundgot-Borgen (jsborgen@nih.no)
- Masterstudent Anders Melbye (anders.melbye@gmail.com).

Ved forhold som handler om personvern kan du også kontakte personvernombud ved Norges Idrettshøgskole: Rolf Haavik (personvernombud@nih.no)

Ikke send taushetsbelagte opplysninger per e-post.

Med vennlig hilsen
Prosjektansvarlig Kethe M. E. Svantorp-Tveiten, NIH
Professor Jorunn Sundgot-Borgen, NIH
Masterstudent Anders Melbye

NORGES IDRETTSHØGSKOLE

Elektronisk samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet *«Helse og prestasjon hos norske kampsportutøvere»* og har fått anledning til å stille spørsmål. Jeg samtykker til:

- ☐ å besvare spørreskjema om helse og prestasjon hos norske kampsportutøvere.

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet

Jeg samtykker:

☐ Ja
☐ Nei

Appendix 4. Informational flyer

Er du kampsportutøver?

I regi av Norges idrettshøgskole utføres det et forskningsprosjekt hvor formålet er å få mer kunnskap om helse, prestasjon, og vektregulering blant voksne utøvere som trener og konkurrerer i kampsport i Norge. Bidra til verdifull forskning for idretten.

Prosjektet innebærer:

Å besvare et elektronisk spørreskjema - Dette tar om lag 20 min å fylle ut.

Vi søker deg som:

Er over 18 år, medlem i en norsk kampsportklubb, og har tilstrekkelig nivå i skriftlige norskkunnskaper.

Interessert i å delta?

Ønsker du å delta eller mer informasjon om prosjektet? Scan QR-koden eller ta kontakt med ketsva@ntg.no

Lenke til undersøkelsen: https://www.survey-xact.no/LinkCollector?key=NWP21W2ASJ12

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Appendix 5. Questionnaire

NORGES IDRETTSHØGSKOLE

Spørreskjema:
Helse og prestasjon hos norske kampsportutøvere

Velg deg et kallenavn som ikke er knyttet til ditt faktiske navn og som inneholder minst åtte tegn og to tall (husk å skrive ned dette til senere slik at du ha mulighet for å trekke ditt samtykke og din besvarelse senere)
.....

Kjønn
- ☐ Mann
- ☐ Kvinne
- ☐ Annet (med kommentar)

Alder: .....

Sivilstatus
- ☐ Singel
- ☐ I forhold
- ☐ Samboer
- ☐ Gift

Høyeste fullførte utdanning
- ☐ Grunnskole
- ☐ Videregående med fagbrev
- ☐ Videregående med studiekompetanse
- ☐ Årsenhet på høgskole/universitet
- ☐ Bachelor (3-årig utdannelse i høgskole/universitet)
- ☐ Mastergrad (2-årig utdannelse etter bachelor)
- ☐ Doktorgrad
- ☐ Annet (spesifiser):_____

Sysselsetting (flere valg mulige)
- ☐ Student
- ☐ Fulltidsansatt
- ☐ Deltidsansatt
- ☐ Arbeidsledig
- ☐ Ufør
- ☐ kampsportutøver på heltid

Informasjon om kampsportutøvelse

Primære kampsportgren:
- ☐ Kickboksing
- ☐ Thaiboksing/Muy Thai
- ☐ Brasiliansk jiu jitsu
- ☐ Judo

- ☐ Takewondo
- ☐ Bryting
- ☐ Newaza
- ☐ Sambo
- ☐ Mixed Martial Arts
- ☐ Annet/Kommentar:_____

Hvilket erfaringsnivå har du?

- ☐ Nybegynner
- ☐ Viderekommen
- ☐ Avansert
- ☐ Proff

For personer som praktiserer kampsport med gradering:
Hvilket belte/farge er du gradert til i din primære kampsport?
Kommentar_____

Hvor mange år har du praktisert denne kampsporten (trekk fra lengre opphold over 6 mndr):
Kommentar_____

Informasjon om konkurranser og plasseringer

Konkurrerer, eller har du konkurrert i din primære kampsport?

- ☐ Ja
- ☐ Nei

Hvis ja:
Hvilket nivå konkurerer/konkurrerte du på?

- ☐ Klubbnivå
- ☐ Nasjonale konkurranser (eks NM)
- ☐ Internasjonalt nivå (eks EM/VM)

Hvis aktuelt; I hvilken divisjon konkurrerer/konkurrerte du på?

- ☐ Nybegynner
- ☐ Intermediate
- ☐ Advanced
- ☐ Ikke aktuelt

Hvis aktuelt: I hvilken beltegrad (farge) konkurrerer/konkurrerte du i?

- Kommentar_____

- ☐ Hvor mange timer per uke trener du kampsport?
  _____

☐ Hvor mange timer per uke driver du med annen type trening (eks utholdenhet, styrke, bevegelighet…)

_____

6) Hva er din beste plassering nasjonalt i løpet av din idrettskarriere?

Nivå/beltegrad-.....

Plassering.....

Hva er din beste plassering internasjonalt i løpet av din idrettskarriere?

Nivå/beltegrad-.....

Plassering.....

Har du deltatt i superfights eller arrangerte kamper som ikke inngår i turnering?

☐ Ja
☐ Nei

Hvis ja:

☐ Resultat_____

Hvor mange konkurranser har du deltatt i de siste fem årene nasjonalt og internasjonalt)? ☐☐

Informasjon om vekt og vektregulering

Høyde (cm)?..... ☐☐☐

Varierer kroppsvekten din i og utenfor konkurranse?

☐ Ja
☐ Nei

Hva har vært din laveste kroppsvekt de siste 5 årene?

.....

Hva har vært din høyeste kroppsvekt de siste 5 årene?

.....

Hvor mye kan din kroppsvekt variere i kg i løpet av sesongen (mellom stevner/konkurranser)?

.....

Har du selv bestemt; vektklassen du skal konkurrere i/har konkurrert i, eller har andre (f.eks trener/helsepersonell/fysiolog) bestemt din vektklasse?

- ☐ Jeg har bestemt vektklasse selv
- ☐ Jeg har ikke bestemt vektklasse selv

Ønsker du å gå i en annen vektklasse?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Hvis ja; på forrige spørsmål

- ☐ I en høyere vektklasse
- ☐ I en lavere vektklasse

Har du bevisst endret kroppsvekten din for å konkurrere i en lavere eller høyere vektklasse enn din vanlige/normale kroppsvekt?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Benytter du deg av langsiktig vektreduksjon når du skal ned i vekt før en konkurranse eller en konkurranseseong? (Dvs. langsom reduksjon med 1 kg eller mindre redusert per uke)

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Hvis ja på langsiktig vektreduksjon (forrige spørsmål) – hvor mange kilo går du vanligvis ned i vekt?

.....

Benytter du deg av kortsiktig vektreduksjon når du skal ned i vekt før konkurranse? (dvs. hurtig reduksjon med mer enn 1 kg redusert per uke basert på væsketap)

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Hvis ja på hurtig reduksjon på forrige spørsmål-Hvor mange kilo går du vanligvis ned før konkurranse?

.....

Over hvor lang tidsperiode pleier du å redusere vekten før konkurranse ? (antall dager)

.....

Hvor mange kilo er det meste du har gått ned i vekt før en konkurranse?

.....

Hvilke metoder bruker du for å redusere vekten din? Du kan svare på flere svaralternativ her

- ☐ Trene mer/hardere
- ☐ Drikke mindre
- ☐ Badstue
- ☐ Vanndrivende midler
- ☐ Svettedrakt
- ☐ Spiser mer karbohydrater
- ☐ Spiser mindre
- ☐ Slankepiller*
- ☐ Spesiell diett*
- ☐ Faste
- ☐ Avføringsmidler
- ☐ Oppkast
- ☐ Annet

*Beskriv type diett/slankepiller du har brukt

....

Dersom du ønsker å øke vekten din, hvordan vil du gå frem for å øke vekten? Du kan svare på flere svaralternativ her

- ☐ Spise mer
- ☐ Spise oftere
- ☐ Trene mindre utholdenhet
- ☐ Trene styrke
- ☐ Spise større måltider
- ☐ Spise mer protein
- ☐ Spise mer karbohydrater
- ☐ Annet

Bruker du andre metoder for å gå opp eller ned i vekt? Skriv gjerne utfyllende her:

.....

.....

Bruker du kosttilskudd i vektreguleringsperioden?

- ☐ Ja
- ☐ Nei

Hvis ja – Hvilke(t) kosttilskudd?

.....

Hvor mange ganger i året prøver du å gå ned i vekt?

.....

Hvor gammel var du første gang du endret kroppsvekten din (med vilje)?

.....

Hvor gammel var du første gang du endret kroppsvekten din for å gå i en annen vektklasse enn din egentlige kroppsvekt?

.....

Har du opplevd press fra din idrett til å oppnå et visst kroppsideal?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Hvis ja på forrige, hvem har du opplevd dette fra? Du kan svare på flere svaralternativ her

- ☐ Trenere/coacher
- ☐ Dommere
- ☐ Foreldre/Familie
- ☐ Lagkamerater
- ☐ Meg selv
- ☐ Sosiale Medier
- ☐ Venner
- ☐ Andre i idretten

Hvis ja, på forrige, opplever du/har du opplevd at dette presset påvirker ønske om å endre på eget fysisk utseende? (Vekt, holdning, figur, utseende)

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Føler du at vektpining (presse kroppen ned i vekt) går ut over prestasjonen din?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Hvis ja på vektpining (presse kroppen ned i vekt) - Hva opplever du at reduseres?

Du kan svare på flere svaralternativ her

- ☐ Koordinasjon og teknikk
- ☐ Kraft og eksplosivitet

- ☐ Utholdenhet
- ☐ Motivasjon og kamplyst
- ☐ Sosiale relasjoner
- ☐ Generell fysisk form
- ☐ Energi til å gjøre andre ting i hverdagen
- ☐ Selvfølelse
- ☐ Kroppsbilde
- ☐ Humør
- ☐ Skole
- ☐ Arbeidsliv
- ☐ Annet.....

Har du merket andre følger eller konsekvenser av vektpining? Hvis ja (andre følger), hvilke(n)?

....
....
....

Har du fått noen råd om hva du bør gjøre før konkurranse for å sikre prestasjonen din? Råd om kosthold, vektregulering

- ☐ Ja
- ☐ Nei

Hvis ja; (ang råd) av hvem?

- ☐ Venner
- ☐ Trener
- ☐ Lege
- ☐ Ernæringsfysiolog
- ☐ Sosiale medier/blogger
- ☐ Internett
- ☐ Annet.....

Synes du hjelpen du fikk om kost og vektregulering var tilfredsstillende?

- ☐ Ja
- ☐ Nei

Hvilke rutiner har du for mat-og drikkeinntak dersom du skal konkurrere innen 5 timer? Du kan svare på flere svaralternativ her

- ☐ Drikker vann
- ☐ Drikker sportsdrikke
- ☐ Drikker energidrikke
- ☐ Spiser en spesiell type mat
- ☐ Spiser et lett måltid
- ☐ Spiser et større måltid
- ☐ Spiser ingenting
- ☐ Annet.....

Utdyp gjerne nærmere her: Feks typer mat og drikke

.....

.....

Opplever du selv at du har et avslappet forholdt til mat, egen kropp og vekt i sesong (perioder med mange kamper/turneringer)?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Opplever du selv at du har et avslappet forhold til mat, egen kropp og vekt utenfor sesong?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Hvor ofte tenker du på vekt og slanking ila sesongen (perioder med mange kamper/turneringer)?

- ☐ Aldri
- ☐ Noen ganger
- ☐ Ofte/alltid

Hvor ofte tenker du på vekt og slanking utenfor sesong (perioder med mange kamper/turneringer)?

- ☐ Aldri
- ☐ Noen ganger
- ☐ Ofte/alltid

Har du opplevd perioder med lyst/sterkt behov for å spise store mengder mat (overspising) *i* sesong?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Hvis ja - når?

- ☐ Dagene før konkurranse
- ☐ Rett før konkurranse
- ☐ Etter konkurranse

Har du noen gang følt at du har spist så mye at du har kastet opp?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Har du i perioder av ditt liv følt at du har mistet kontroll over ditt matinntak?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

Opplever du, eller har en lege eller helsepersonell sakt at du har en spiseforstyrrelse?

- ☐ Ja
- ☐ Nei
- ☐ Vet ikke

Har du hatt en spiseforstyrrelse tidligere?

- ☐ Ja
- ☐ Nei
- ☐ Vet ikke

Føler du at du har et støtteapparat hvor du kan henvende deg og få hjelp til vektregulering?

- ☐ Ja
- ☐ Nei

Hvis nei - er dette ønskelig?

- ☐ Ja
- ☐ Nei

Ønsker du å vite mer om vektregulering og kosthold?

- ☐ Ja
- ☐ Nei

Hvis ja - hva er du interessert i å vite mer om? (flere valg mulige)

- ☐ Langsiktig vektreduksjon
- ☐ Kortsiktig vektreduksjon
- ☐ Glykogenlagring før konkurranse
- ☐ Mat -og væskeinntak etter innveiing
- ☐ Matinntak før konkurranse
- ☐ Mat -og væskeinntak etter konkurranse/trening
- ☐ Spiseforstyrrelser
- ☐ Energiinntak og helse
- ☐ Kosthold og skader
- ☐ Kroppsbilde
- ☐ Annet.....

Utdyp gjerne her om det er noe annet du skulle ønske å vite mer om:

.....

.....

Kosttilskudd

Hvor mange dager per uke benytter du deg av følgende kosttilskudd (tenk tilbake siste 28 dager)

- Proteintilskudd (pulver)_____
- BCAA_____
- Kreatin_____
- Beta-Alanin_____
- Beta-hydroxy beta-methylbutyrate_____
- Koffein (piller, pulver)_____
- «Fat burners»_____
- «Pre workout» tilskudd_____
- «Weight gainers»_____
- Andre kosttilskudd (ikke multivitaminer, tran, omega 3 etc.)
    - Komemnter andre:_____

- Bruker du andre prestasjonsfremmende midler ikke listet ovenfor?
    - ☐ Nei
    - ☐ Ja

      Hvis ja: hva_____

Hvorfor benytter du deg av disse prestasjonsfremmende kosttilskuddene eller midlene?

	Helt uenig	Delvis uenig	Hverken enig eller uenig	Delvis enig	Helt enig
Øke muskelmasse	☐	☐	☐	☐	☐
Øke muskelstyrke	☐	☐	☐	☐	☐
Redusere fettmasse	☐	☐	☐	☐	☐
Redusere kroppsvekt	☐	☐	☐	☐	☐
Øke kroppsvekt	☐	☐	☐	☐	☐
Øke utholdenhetsprestasjon	☐	☐	☐	☐	☐
Øke eksplosivitet	☐	☐	☐	☐	☐
Øke energinivå	☐	☐	☐	☐	☐
Redusere mentalt stress	☐	☐	☐	☐	☐
For å forbedre utseende	☐	☐	☐	☐	☐
Restituere bedre	☐	☐	☐	☐	☐
Komme raskere tilbake fra skade	☐	☐	☐	☐	☐
Fordi lagkamerater bruker det	☐	☐	☐	☐	☐

Fordi treneren min anbefaler det	☐	☐	☐	☐	☐

Hvem fikk du tips/råd fra om å begynne med eller bruke prestasjonsfremmende midler?

- ☐ Venn(er)
- ☐ Treningspartner(e)
- ☐ Sosiale medier/blogger
- ☐ En trener eller andre i trenerapparatet
- ☐ Lege/helsepersonell

Hvor mange ganger den siste måneden (28 dager) har du vært tydelig beruset (alkohol)

- ☐ Ingen ganger
- ☐ Mindre enn en gang i uken
- ☐ En gang i uken
- ☐ 2-3 ganger i uken
- ☐ 4-5 ganger i uken
- ☐ 6-7 ganger i uken

Kjenner du til om andre i ditt treningsmiljø bruker illegale prestasjonfremmende midler eller rusmidler for å øke prestasjon eller treningskapasitet (for eksempel steroider, medikamenter, eller illegale rusmidler)?

- ☐ Ja
- ☐ Nei
- ☐ Usikker

  Kommentar (frivillig): _____

Opplever du at antidopingarbeidet står sentralt ved ditt gym/kampsportsenter?

- ☐ Ja
- ☐ Nei
- ☐ Vet ikke

Hvilke tiltak/kampanjer/retningslinjer kjenner du til at ditt gym/kampsportsenter har når det kommer til illegale og legale rusmidler og doping?

.....
.....

Appendix 6. The EDE-Q 6.0

Instruksjoner: Dette spørreskjema handler kun om de siste fire ukene (28 dager). Les hvert spørsmål nøye. Svar på alle spørsmålene.

Spørsmål 1 til 12: Tegn en sirkel rundt det tallet til høyre som du synes passer best. Husk at spørsmålene kun handler om de siste fire ukene (28 dagene).

	På hvor mange av de siste 28 dagene …	Ingen dager	1-5 dager	6-12 dager	13-15 dager	16-22 dager	23-27 dager	Alle dager
1	Har du bevisst prøvd å begrense mengden mat du spiser for å påvirke din figur eller vekt (uavhengig av om du har klart det eller ikke)?	0	1	2	3	4	5	6
2	Har du i lengre perioder (8 våkne timer eller mer) ikke spist noe i det hele tatt for å påvirke din figur eller vekt?	0	1	2	3	4	5	6
3	Har du prøvd å utelukke noen typer mat du liker, for å påvirke din figur eller vekt (uavhengig av om du har klart det eller ikke)?	0	1	2	3	4	5	6
4	Har du prøvd å følge bestemte regler for hva eller hvordan du spiser (f.eks. en kalorigrense) for å påvirke din figur eller vekt (uavhengig av om du har klart det eller ikke)?	0	1	2	3	4	5	6
5	Har du hatt et klart ønske om å ha tom mage for å påvirke din figur eller vekt?	0	1	2	3	4	5	6
6	Har du hatt et klart ønske om å ha en helt flat mage?	0	1	2	3	4	5	6
7	Har du opplevd at tanker om mat, spising eller kalorier har gjort det veldig vanskelig å konsentrere deg om ting du er interessert i (f.eks. å arbeide, følge en samtale eller lese)?	0	1	2	3	4	5	6
8	Har du opplevd at tanker om figur eller vekt har gjort det veldig vanskelig å konsentrere deg om ting du er interessert i (f.eks. å arbeide, følge en samtale eller lese)?	0	1	2	3	4	5	6
9	Har du hatt en klar frykt for å miste kontroll over spisingen din?	0	1	2	3	4	5	6
10	Har du hatt en klar frykt for at du kan gå opp i vekt?	0	1	2	3	4	5	6
11	Har du følt deg tykk?	0	1	2	3	4	5	6
12	Har du hatt et sterkt ønske om å gå ned i vekt?	0	1	2	3	4	5	6

Spørsmål 13 til 18: Fyll inn passende antall i boksene til høyre. Husk at spørsmålene kun handler om de siste fire ukene (28 dagene).

	I løpet av de siste fire ukene (28 dagene)…	
13	I løpet av de siste 28 dagene, hvor mange ganger har du spist det andre ville betraktet som en uvanlig stor mengde mat (omstendighetene tatt i betraktning)?	……..
14	Ved hvor mange av disse episodene hadde du en følelse av å ha mistet kontrollen over spisingen din (mens du spiste)?	……..
15	I løpet av de siste 28 dagene, hvor mange DAGER har slike episoder med overspising forekommet (dvs. der du har spist uvanlig store mengder mat og hatt en følelse av å miste kontrollen mens du spiste)?	……..
16	I løpet av de siste 28 dagene, hvor mange ganger har du kastet opp for å kontrollere din figur eller vekt?	……..
17	I løpet av de siste 28 dagene, hvor mange ganger har du brukt avføringsmidler for å kontrollere din figur eller vekt?	……..
18	I løpet av de siste 28 dagene, hvor mange ganger har du følt deg drevet eller tvunget til å trene for å kontrollere din vekt, figur eller fettmengde, eller for å forbrenne kalorier?	……..

Spørsmål 19 til 21: Tegn en sirkel rundt det tallet som du synes passer best. Vær oppmerksom på at i disse spørsmålene brukes begrepet "overspisingsepisode" om å spise det andre ville synes var en uvanlig stor mengde mat i den situasjonen du var i, samtidig med en følelse av å ha mistet kontroll over spisingen.

19	I løpet av de siste 28 dagene, hvor mange dager har du spist i hemmelighet (i skjul)? …tell ikke med overspisingsepisoder.	Ingen dager	1-5 dager	6-12 dager	13-15 dager	16-22 dager	23-27 dager	Alle dager
		0	1	2	3	4	5	6
20	Hvor mange av de gangene du har spist, har du hatt skyldfølelse (følt at du har gjort noe galt) fordi det kan påvirke din figur eller vekt? …tell ikke med overspisingsepisoder.	Ingen av gangene	Noen få ganger	Færre enn halv-parten	Halv-parten	Mer enn halv-parten	De fleste gangene	Hver gang
		0	1	2	3	4	5	6
21	I løpet av de siste 28 dagene, hvor bekymret har du vært for at andre mennesker ser deg spise? …tell ikke med overspisingsepisoder.	Ikke i det hele tatt		Litt		Ganske mye		Veldig mye
		0	1	2	3	4	5	6

Spørsmål 22 til 28: Tegn en sirkel rundt det tallet til høyre som du synes passer best. Husk at spørsmålene kun handler om de siste fire ukene (28 dagene).

	I LØPET AV DE SISTE 28 DAGENE……	Ikke i de hele tatt		Litt		Ganske mye		Veldig mye
22	Har vekten din påvirket hvordan du tenker om (bedømmer) deg selv som person?	0	1	2	3	4	5	6
23	Har figuren din påvirket hvordan du tenker om (bedømmer) deg selv som person?	0	1	2	3	4	5	6
24	Hvor opprørt ville du bli hvis du ble bedt om å veie deg en gang i uken (ikke mer, ikke mindre) de neste fire ukene?	0	1	2	3	4	5	6
25	Hvor misfornøyd har du vært med vekten din?	0	1	2	3	4	5	6
26	Hvor misfornøyd har du vært med figuren din?	0	1	2	3	4	5	6
27	Hvor mye ubehag har du følt ved å se kroppen din (f.eks. når du ser figuren din i speilet, reflektert i et butikkvindu, ved klesskift, eller når du bader eller dusjer)?	0	1	2	3	4	5	6
28	Hvor mye ubehag har du følt ved at andre ser figuren din (f.eks. i offentlige omkledningsrom, når du svømmer, eller når du har på deg trange klær)?	0	1	2	3	4	5	6

Hva er din nåværende vekt? (vennligst anslå så godt som mulig) ……

Hvor høy er du? (vennligst anslå så godt som mulig) ……

Hvis kvinne: Har noen menstruasjoner uteblitt de siste 3-4 månedene? ……
Hvis ja, hvor mange? ……..
Har du brukt p-piller, p-plaster, p-ring, eller lignende? ……

Ønsker du noen å prate med etter å ha besvart dette skjeamet?
Ta kontakt med Jorunn Sundgot-Borgen (jorunnsb@nih.no) eller Kethe Svantorp-Tveiten (kmengen@nih.no)

Du kan også ta kontakt med:

- Mental helses hjelpetelefon 116123 eller chat https://mentalhelse.no/fa-hjelp/hjelpetelefonen
- Doping kontakten, telefon 81550200 eller chat https://www.antidoping.no/forebygging/dopingkontakten
- Rådgivning om spiseforstyrrelser, telefon 94817818 eller chat https://nettros.no/om-ros/kontakt-oss/

Tusen takk for besvarelsen!