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'Making Weight': The Perception and Impact of Weight Management on Female Boxers

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ABSTRACT

Introduction
Boxing is a weight categorised sport in which athletes are expected to be weighed prior to competition so that the athletes are matched with similar size, strength and power attributes. By obtaining and maintaining a certain weight may result in boxers typically engaging in extreme weight loss practices to 'make weight', irrespective of their overall health and well-being. Therefore, this research aimed to establish the experiences and perceptions of weight management of female boxers how they engage with 'making weight' practices and the impact on their overall well-being.

Methods
In-depth semi-structured one-to-one interview's were conducted with five elite level female amateur boxers over a digital, online platform. A six-stage thematic analysis was used and data collated into themes and sub-themes.

Results
Data identified 5 key themes and consisted of: emotions surrounding weight gain; long-term behavioural impacts; guidance and justifications; comparison to other boxers; and weight management methods. These accounts highlighted the long-term impact engaging in such weight loss methods had on female boxers both physically and psychologically.

Conclusion
Typically, boxers engaged in strict and extreme weight-loss behaviours due to negative emotions surrounding weight gain. Significantly these behaviours and emotions have a long-term impact and continue after retirement from boxing.

Keywords
Female boxers; Weight management; Disordered eating; Weight loss practices.

INTRODUCTION

Boxing is a weight categorised sport in which athletes are expected to 'weigh in' prior to competition and obtaining a certain weight is recognised as a prerequisite of the sport.[1] At all levels of competition, it is common practice for boxers to compete in a weight category which range from ~48-90 kg and above.[2,3] The purpose of weight categories is to compete with an opponent of similar size and consequently similar strength and power, but often the weight category agreed upon is much lower, between 5-10% less than natural body weight.[2,4-7] There are a number of reported methods utilised by boxers in order to 'make weight' and as a consequence weight management is considered a central focus for all boxers especially at the elite level.[6] In most cases, Pettersson et al,[2] recognised that some weight management techniques utilised by combat athletes are considered extreme and dangerous. For instance, highly restricting food or fluid intake and participating in methods to induce dehydration. Engaging in weight loss practices involving dehydrating through the use of hot baths and saunas has been found to cause serious physical harm including the death of 3 collegiate wrestlers in 1997.[2,7,8] Evidence suggests that these practices can have a negative impact on both physiological and psychological factors, where weight loss, exercise, excessive dieting and weight management become the sole focus of boxer's athletic career and can lead to long-term anxiety and concern around weight gain.[9-11] As a consequence, these practices have been found to possibly result in the development of disordered eating and the possibility of being diagnosed with a clinical eating disorder.[1,9]

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Optimal nutrition is recognised as an important aspect of sport performance, especially in weight categorised sport, however, the prevalence of female athletes displaying an imbalance between energy intake and expenditure have been associated with the development of disordered eating.[12] Mancine et al,[13] highlighted that there are certain athletes who are at greater risk of developing disordered eating. This notion is supported by earlier conclusions suggested by Sundgot-Borgen et al[10] where athletes who participate in sports emphasising lean body mass and focus on strict weight categories are at higher risk of developing disordered eating than people in general society. Research suggests that female athletes are more likely to experience difficulties around weight perception and have an increased tendency to engage in dieting behaviours.[14,15] Whilst there is an abundance of research surrounding female athletes developing disordered eating and issues around weight management in sports such as long-distance running, swimming and gymnastics, however relatively little attention has been given to female combat sport athletes.[16]

Boxing has long been a male dominated sport considered the last stronghold of masculinity within the Olympics.[17] However, it has been argued that the sport actually empowers women by blurring the boundaries between female and masculine traits.[16] Furthermore, following the success of athletes such as Nicola Adams at the 2012 London Olympic Games, the number of female boxers in Great Britain increased from 23,300 to 35,100, thus accounting for 18.5% of the overall boxing participation in the UK.[18] Given the growing popularity of female boxing and recognising that there is much evidence that both weight categorised sports and female athletes are at greater risk of developing issues with weight management and possible disordered eating, this is an area which needed further investigation. Therefore, this research aimed to establish the experiences and perceptions of weight management, how they engage with 'making weight' practices and the impact on their overall well-being.

METHODS

Participants and Recruitment

Five female participants were selected *via* purposive sampling but had to meet the needs of an inclusion criteria. The participant inclusion criteria included (i) between the age range of 18-45-years (ii) current or no longer competing amateur boxer (iii) current or former affiliation to a registered amateur boxing club and (iv) experience competing at national level competition. Ethical approval was granted by University of Gloucestershire Research Ethics Committee. All participants were asked to sign an informed consent form and informed of their rights to withdraw if at any point the questions triggered distress or upset. Given the sensitive nature of the research, supportive information including links to professional support were issued to all participants before, during and after the interview process.

Data Collection

Data collection was conducted *via* a one-on-one semi-structured interview with each participant. Each interview lasted roughly 30-minutes over a digital, online platform allowing the researcher to record and save the conversations securely. Data was gathered through an open, reciprocal narrative developed through the rapport built between participant and researcher. A series of 7 open-ended questions with prompts were prepared in order to support the aims of the research and to avoid bias. Following recommendations by McIntosh et al[19] the dialogue of each interview was transcribed as soon as possible after the taking place.

Data Analysis

Data gathered during the interviews was analysed using a six-stage thematic analysis suggested by Braun et al.[20] During the process of transcribing the interviews, the researcher was able to highlight and collate codes into broader themes to identify relevant patterns and to make sense of the shared meaning of an experience.[20] During this stage a number of sub-themes were identified which were not supported with enough evidence to be recognised as a substantial pattern to be considered a significant theme. When redefining key themes, sub themes were eliminated to ensure that all themes tell a coherent and compelling story of the data that addresses the research questions.[21]

RESULTS

Results, established through the thematic analysis of data identified five key themes and consisted of: emotions surrounding weight gain; long-term behavioural impacts; guidance and justifications; comparison to other boxers; and weight management methods (Table 1).

Emotion Surrounding Weight Gain

This theme emerged as multiple interviewees described the emotions associated with weight gain or seeing the number on the scale increase even in minimal amounts. Similarly, to findings of Buckley et al,[22] athletes feared weight increases even though it is considered normal practice to compete below natural body weight thus weight fluctuations are considered part of the sport. However female boxers explained that once competition weight was achieved rather than returning to pre-competition mass participants attempted to maintain a lower weight and over time get lower and lower. FB5 explained that '*I was always fighting to always be at that number never below never above… through boxing I think we naturally or some of us see a number and we are trying to hold that number when we don't need to do that*' (lines 17-18, 22-23). Several athletes mentioned being 'scared' of seeing the number on the scales go up or would 'freak out' and become very upset. FB2 explained that boxing '*changed my perception of what weight I should be' and although they 'probably were never what would be considered overweight I would never want to be that weight now because to me that's overweight so if I go over 10 stone I freak out*' (lines 41-42, 42-44). Whilst FB1 said '*I found very quickly that I would become very upset if it was any different from the time before*' (lines 31-33); referring to the number on the scales. Other negative emotions including stress and hate were all connected to the idea of seeing weight increase. No participant identified a negative association to body image in regards to weight gain. However, it was mentioned that being at competition weight or below meant individuals felt confident and were happy with what they saw in the mirror. Conversely if the

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Table 1. *Overall Themes which Eemerged through Thematic Analysis of the Raw Data*

Themes	Raw Data Example
Emotions surrounding weight gain	*'It like affects me because of how muscly and how different I am I don't really like how I look to be honest I'm not happy about it' (lines 78-79) FB4*
Long-term behavioural impacts	*'I think it has become a really prominent topic rather, it's in the forefront rather than something you just think about sometimes I think it's quite a big subject in my life um and also speaking about it like I can feel this (rubs throat and chest) going like hot because it such a like not sensitive subject but something that I think I have spent so long trying to cover up isn't a thing' (lines 162-167) FB2*
Guidance and justifications	*'No, I never when I was with my old coach he didn't help me at all he just obviously said that's the category you have to go in and you have to get there so I didn't have like any help with it at all I kind of just did it myself' (lines 112-114) FB4*
Comparison to other boxers	*'I'm flat chested anyway and I used to want to remove that completely because I just felt like that was weight I didn't need like I just wished I could not have boobs because they were just unnecessary weight and I always wanted to have a V shape even though I am female' (lines 146-149) FB2*
Weight management methods	*'I didn't eat I had like one meal a day in the evening so I would have like a bit of rice or something but I wouldn't tell my mum so she would make me lunches for college or something and I would throw them in the bin and that's how I ended up cutting weight and it made me really ill because ob-viously I was using the sauna twice a day and running' (lines 42-46) FB4*

number increased athletes referred to themselves as fat or chubby. FB3 explained that being at competition weight '*made me feel good because I knew I was slimmer and I felt fitter and I felt stronger so initially it made me feel really good*' (lines 40-41). However FB3 later explained that even after retiring from competition '*you can't eat what you want because you are going to get fat*'. FB2 also highlighted how losing weight impacted how the individual felt about themselves; '*I had gone that bit lower and it made me feel really confident and I think that was when it started becoming more of a weight obsession than a fitness and boxing thing*' (lines 70-72).

Long-term Behavioural Impacts

A number of participants recognised that although no longer competitively boxing the behaviours associated with weight management such as regularly checking weight, intensely exercising and limiting food intake particularly of certain types of food are still normal practise. Whilst the impact of weight cutting has been documented to include serious risks to health such as brain damage, heart disease and stroke there are also a number of psychological risk factors. Due to the constant attention given to weight and losing weight there is the risk of developing an unhealthy body image.[23] Participants noted how perception changed of what weight was 'good' for them due to boxing and recognised that no longer weighing competition weight results in the belief that the individual is 'fat'. FB2 explained that '*I just know that before boxing I used to sit at around 10 stone and now that weight would terrify me*' (lines 92-93). This participant also explained how '*I use my boxing history as an excuse to continue controlling my weight so I've got to weigh every morning … still continue to do it so I guess boxing has allowed me to get away with it and cover it up*' (lines 101-102, 107-108). Other interviewees also mentioned having to check their weight on a daily basis and constantly giving attention to weight and weight management; FB4 said they thought of weight '*every day like literally every second of every day*' (line 92) and FB1 explained '*that because of the constant weighing and stuff like that it becomes almost an obsession*' (lines 14-15). It has been recognised that the constant focus given to weight increases the probability of eating disorders.[5] Although this research did not diagnose any participant it was noted that several participants recognised that there are issues around weight management in their post boxing lives.

Guidance and Justification

A number of the participants referenced that coaches offered very little guidance and it was left to the individual to figure out how to reach the weight agreed upon with the coach. FB4 said '*he didn't help me at all he just obviously said that's the category you have to go in and you have to get there*' (lines 112-113). Cockburn et al,[24] found that UK sports coaches have inadequate knowledge regarding sports nutrition and were at risk of providing incorrect advice or possibly none at all. Pressure from coaches to lose weight, frequent weight cycling, early start of sport-specific training, overtraining, injury and irresponsible coaching behaviour have all been highlighted as risk factors for the development of disordered eating. Dissatisfaction with body shape or weight as well as dieting are also well-known risk factors.[25] Due to the belief that competing in a lower weight category is beneficial for performance all of the participants in the current research mentioned at least one of these risk factors during the interview. FB1 said she felt '*a massive pressure … it was a big responsibility to try and make weight*' (lines 106, 107). FB2 spoke about how having to lose weight for boxing resulted in the '*start of binge eating for me so like fight eat what you want get told you got to lose weight and then start starving again*' (lines 30-31). FB5 explained how '*we believe that if we are lighter that would make us better, we are always taught that*' (lines 160-161) and went on to state that '*boxing needs to become more educated or educate boxers on what nutrition is ... we need to educate even teaching girls about the menstrual cycle*' (lines 245, 247-248).

As many athletes receive most nutritional knowledge from parents or coaches, a lack of accurate information results in female athletes performing in energy deficits which can have a negative effect on performance and cause health issues connected to the female athlete triad.[26] The lack of support around how the menstrual cycle effects weight and lack of coach's knowledge surrounding this was highlighted by FB3 '*obviously females have periods so that changes your body and you're like why is it always me why am I fluctuating so much what's wrong with me*' (lines 169-170), FB5 '*obviously with weight*

the menstrual cycle is not talked about in gyms by the male coaches' (lines 219-220) and although FB1 did not directly mention periods or menstruation she did explain how '*obviously women carry water around their stomachs and I would be annoyed about that because I felt really bloated*' (lines 131-132) .

Comparisons to other Boxers

Both male and female athletes are subjected to unrealistic body image ideals.[27] However, the participants in this research highlighted how within a male dominated sport like boxing, female athletes often feel inferior to male counterparts. Whilst men are supposed to look strong and muscular women are thought to have to look thin and sexy. Female boxers highlighted how, as there was often a limited number of females in the gym, individuals would often compare themselves to males with the belief, that is what a boxer should look like. FB1 supported this stating that men '*just look so athletic and kind of how you imagine a boxer to be and I didn't look anything like that and I still don't look anything like that so yeah I did find that frustrating … I would almost compare myself to the boys more than to other females boxing*' (lines 132-134, 135-136). Wells et al,[28] suggested that if athletes feel competitive with teammates or training partners the likelihood of manifesting behaviours to make the individual stand out are greater, for example performing extreme exercise routines and diets (disordered eating) in order to achieve the 'best' body composition. Pressure arises in sport as participants feel the need to have the physique that science predicts will equate sporting success.[29] This is supported by some individuals identifying a pressure to compare themselves to other females in lower weight categories. FB4 explained '*I just compare myself to all the other girls … I weigh a lot heavier than people because of my muscle so yeah I think a lot of girls in the lower weight categories like sometimes it upsets me a bit because I feel like I look similar to them but I don't weigh anything like them so it kind of affects me a bit like that like mentally*' (lines 140-141, 84-87).

These comparisons and negative emotions reinforce the idea that attempting to lose more weight is justified because boxers will be stronger and faster at a lower weight and feel happier. It is common practice in sport to compare both physical appearance and sporting ability, influenced by the idea of what an athlete's body should look like.[10] FB2 was quite detailed in comparing her body to a male physique '*I'm flat chested anyway and I used to want to remove that completely because I just felt like that was weight I didn't need like I just wished I could not have boobs because they were just unnecessary weight and I always wanted to have a V shape even though I am female … I like my boy shape I like to have that straight up down I like having muscular arms. Yeah, I have never really thought about it in that sense but yeah, I don't want a feminine shape for myself I quite like it being boyish*' (lines 146-149, 152-154). FB3 also referenced always comparing herself '*even if it was the boys in the gym I was always comparing myself because I was like oh they look so good how do they keep it off … like they're not fat they have full on six packs I haven't got a six pack what the hell is going on with me*' (lines 167-168, 177-178).

Weight Management Methods

This theme consisted of three sub themes which highlighted some of the techniques utilised by female boxers in order to lose weight or maintain weight loss. These included excessive exercise, restricting intake of food and dehydration. Firstly, excessive exercise is understood to be time consuming. However, due to the rigidness of the rules in boxing (weight categories) it is believed to be necessary. Boxers desperate to control weight can become obsessed and incorporate exercise as part of the daily routine regardless of injury or illness.[30] Several of the interview participants spoke about regularly waking up in the very early hours of the morning in order to complete a long distance run before embarking on the daily routine. FB3 explained that '*even if I was at work I would have to get up at 5 am, do a 5-mile run go to work come back eat and then train*' (lines 81-82). Interestingly it was a common feature for the participants to complete multiple training sessions during the day on a regular basis, for example FB5 mentioned '*I was still training 2 or 3 times a day*' (line 70) and FB4 described having to '*come back off my circuit session and I would run for an hour straight on the treadmill on like a 10 pace constantly*' (lines 25-26). Secondly, restricting food intake by cutting out food groups such as carbohydrates and seriously limiting calories was another common theme which emerged in this research. FB3 stated that '*sometimes you would miss meals and you would just drink water*' (line 83), whilst FB4 said '*I didn't eat, I had like one meal a day in the evening … My mum so she would make me lunches for college or something and I would throw them in the bin*' (lines 42, 43-44). FB5 described how '*it just become a numbers game, I was probably eating around 600 calories*' (lines 80-81). Finally, dehydration takes shape in multiple forms including restricting fluid intake, hot baths and induced sweating through exercise and saunas.

It appears that this is considered normal behaviour, even recommended by some coaches FB5 described the '*coach telling you to get on the bike and sweat that weight out*' (line 49) and FB4 told the interviewer how her coach told her to '*put ice on your lips if you need a drink*' (lines 50-51). These comments from coaches raises questions around the nutritional knowledge of those in leadership. Not only has dehydration been found to impair cognitive performance which in turn has a negative impact on sporting performance but it can also have detrimental effects on the heath of athletes.[31] However, due to the perceived advantages of competing in a lower weight category dehydrating is considered necessary in order to cut weight as much as possible and for the athlete to be as big and strong as feasible.[32] FB5 said '*I would do anything just to sweat…so I would have a bath because I liked a bath but I would sit in the bath just to sweat*' (lines 88-89, 99) and FB4 explained '*I ended up like in the sauna twice a day like 45-minutes at a time*' (lines 23-24).

DISCUSSION

This research sought to understand how female boxers experience and perceive weight management, how they engage with 'making weight' practices and the impact of their overall well-being. Thematic analysis was used to capture such understanding and insights where five key themes emerged from the analysis: Emotions surrounding weight gain; Comparisons to other boxers; Long-term behavioural impacts; Weight management methods; and Guidance and justifications.

Emotions Surrounding Weight and Comparisons to other Boxers

In this research the boxers interviewed described feeling 'fat' when

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no longer making competition weight and fearing such weight gain even years after retiring from the sport. Participants described engaging with a myriad of weight loss methods, some considered extreme, in order to 'make weight'. These findings are supported by Sundgot-Borgen et al[1] who reported that 94% of weight categorised athletes intensely dieted prior to competition. Extreme dieting behaviours were considered necessary to conform to the requirements of the sport, ensuring athletes compete at a 'safe' weight whilst optimising performance by potentially gaining a size and strength advantage over opponents.[1] Behaviours such as routinely weighing every morning, performing excessive amounts of exercise throughout the week and missing meals enable athletes to achieve competition weight, which is significantly lower, on average roughly 5%, than normal body mass.[33] Sport-specific pressures like this along with societal pressures have been found to contribute to the development of disordered eating.[34] This research highlighted that female boxers feel pressurised not only to look a certain way but crucially to lose as much weight as possible. Participant's reported comparing the shape of their body and the number on the scales with both other female athletes in lower weight categories and male counter parts. The pressure of having a 'six pack' or constantly weighing below 'normal' walking-around body mass resulted in the development of body dissatisfaction and anxiety over weight gain. These findings support Grogan[35] who referred to interviews carried out between 1994-1996 emphasised that whilst women were delighted to lose 7 lb the thought of putting on that weight resulted in emotions of upset and not wanting to go out.

An intense focus on weight results in obsession, thinking about weight constantly, becoming anxious about weight and utilising various methods such as denying hunger to take control.[1] The pressure to 'make weight' results in boxers experiencing such emotions and extreme actions. Similarly, to De Bruin et al,[36] this research found that boxers like other weight related sport participants perceived their body as fat, became dissatisfied and suffered lower self-esteem. The research also highlights that a fixation on weight rather than just the appearance of the body but the actual number on the scales can lead to higher-levels of dieting behaviours including purging and the use of laxatives, which again supported findings of De Bruin et al.[36]

Long-term Behavioural Impacts

The long-term impacts of making weight stood out in this research as many of the boxers recognised that although no longer competing the desire to remain close to competition weight was high. These emotions stem from the feeling of confidence gained when at competition weight which is common as women associate thinness with confidence.[35] Fear and anxiety were related to no longer weighing competition weight or seeing the number on the scales increase. These negative emotions and perceptions of a 'good weight', together, can drive even retired boxers to continue displaying disordered eating behaviours. Long-term, these emotions result in boxers believing they are fat if weight increases significantly above competition weight becoming dissatisfied with their body. This research highlights that these behaviours and coping with seeing the number on the scales increase were difficult to stop when no longer competing. Other studies by Buckley et al,[37] Grogan[35] and Miles-Chan et al[38] also found that retired boxers struggle with accepting changes in body composition and have unrealistic expectations of weight and physique management. Such findings dispute the hypothesis investigated by Miles-Chan et al[38] that there is a positive relationship between weight cycling and obesity in later life. Past studies recognise that weight cycling is common practice in combat sport although evidence suggests the pattern of regularly losing and regaining weight is detrimental, leading to obesity in later life and increasing cardiometabolic risk.[39,40] However, this research identified that female boxers often attempt to avoid regaining weight lost for competition, and that they were more inclined to continue dieting behaviours, even in later life, in order to remain at a weight perceived to be 'good'. Indeed, participants in this research believe that boxing impacted how they perceived their body image and caused the emotional connection with weight. Boxing was also considered the motivation for engaging in certain behaviours associated with diet and exercise.

Weight Management Methods, Guidance and Justifications

Previous research has recognised that combat sports including boxing utilise various methods for weight loss including an increase and intensification of exercise along with restriction of food and fluids.[5,41,42] This research identified that a myriad of dieting behaviours, including extreme methods, are normalised within a boxing gym. The results also highlighted that these behaviours continued well-into retirement. Dehydration through exercise and the use of saunas were identified as necessary strategies to 'make weight'. However, these behaviours appear to not be utilised in the long-term although regularly restricting fluid intake in order to control weight fluctuations is considered normal behaviour.

The original intention for weight categories is to establish a fair and level playing field ensuring that athletes are safe. However, utilising rigid weight loss methods such as induced sweating enables boxers to gain a performance advantage over the opposition.[41] All participants of this research reported engaging, to some extent, in one or more of these behaviours to lose a sufficient amount of weight to allow for what is believed to be safe and effective boxing participation.[43] It is important to note that 'making weight' is believed to be an integral part of the sport, for example 100% of the Brazilian Olympic team reported losing an average of 5 kg prior to competition.[44] It is also typical that weight loss methods are recommended by coaches as they are considered normal practice within the boxing community. Female boxers recognised that some behaviours may not be considered healthy outside of the context of making weight however, are normalised within combat sports.[8] Whilst it is common practice to incorporate excess amounts of exercise into the day, this research recognised that female boxers practice a myriad of weight loss behaviours not only in order to make a predefined competition weight but in order to continue losing excess weight. Not only does this research suggest that exercise is excessive, but it could also be defined as compulsive (exercising despite illness or injury) and compensatory (to compensate for the effects of food on weight).[45] Goodwin et al,[46] explained that the high-levels of exercise necessary for elite sport participation is considered a risk factor for eating disorders. Furthermore, Holland et al,[45] considered that all three types of

exercise are unhealthy and that compulsive and compensatory exercise have also been found to predict disordered eating and eating disorders. Subsequently, coaches should understand the motivation behind an athlete's training as, although high and possibly excessive levels of exercise may be necessary at the elite level, training though injury or simply in order to sweat (lose weight) may indicate issues surrounding weight.

Overall, it appears that retirement from boxing does not afford the opportunity to escape the sporting pressures of 'making weight' and the associated disordered eating behaviours. Maintaining a lower than natural body mass, and upholding a certain body image, looking a certain way and being a certain size is a pivotal part of the athlete's identity.[47] This research also highlighted the need for boxing coaches to become more educated around nutrition and the menstrual cycle. It is common that the relationship between male coach and female athlete lacks openness so by improving coach knowledge could equip them in the adjustment to training prescription.[48,49] Making weight may be more difficult than first envisaged, with boxers feeling pressured to engage with more disordered eating behaviours. With better guidance and education some of the long-term behavioural impacts highlighted in this research may be mitigated or lessened, thus protecting vulnerable participants.

CONCLUSION

Past research suggests that it is common practice for female, amateur boxers to participate in weight management methods with the aim of losing weight to optimise size and strength to gain a competitive advantage.[5,8,50] However, the current research identified that for female boxers at the elite level the need to lose weight often became an obsession rather than just a process of the sport. Crucially, those interviewed who are now retired from competition highlighted that the way in which weight is lost can be considered unconventional with some of the behaviours recognised as symptoms of disordered eating. Significantly, such methods should not be considered sustainable when weight loss requires extreme restriction of calories, missing meals, throwing food away or spitting it out along with excessive amounts of compulsive or compensatory exercise and forced dehydration. This research found, that for these female boxers, serious anxiety of seeing weight gain through an increased number on the scales resulted in the aforementioned behaviours becoming part of everyday life. This differs from the perception in past literature regarding making weight in boxing who found boxers undergoing a cycle of rapid dieting followed by returning to 'walking-around weight'.[7] Although retiring from the sport should theoretically enable the athlete to stop engaging in strict weight loss methods, a key finding of this research showed this not to be the case. The fear and anxiety of weight gain appeared to be long-term and significantly impacted an athlete's behaviour well-into retirement. Whereas, weight loss which at first is considered necessary in order to box, resulted in a change in perception of what is an acceptable, healthy weight; thereby, significantly changing an athlete's feelings about weight and body shape in relation to the number visible on the scales.[51]

In conclusion, the key findings and significant insights of this research indicate that female boxers can significantly change their perception of what is a good, acceptable and healthy weight. A boxing weight, a number on a scale, achieved through extreme and strict weight-loss methods can become an obsession. Any weight gain from this number creates fear, guilt, stress, anxiety and the drive to lose weight. These perceptions, the negative emotions and extreme weight-loss behaviours continue even into the long-term after retirement from boxing.

ETHICAL APPROVAL

This study has been ethical approval was granted by University of Gloucestershire Research Ethics Committee.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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