

1 **Abstract**

2 This mixed methods study aimed to investigate weight-cutting practises of female taekwon-
3 do athletes internationally and explore their experiences of ‘making weight’. A survey of
4 weight-loss practices and eating behaviours was completed by 103 taekwon-do athletes from
5 12 countries which illustrated that 72.5% of athletes engage in both acute and chronic weight-
6 loss practices prior to competition and that there were higher levels of disordered eating
7 within this athletic population than non-weight cutting athletes. Semi-structured interviews
8 were conducted with five international level competitors; thematic analysis of the interviews
9 identified that the women in general felt weight-cutting was ‘horrible – but worth it’ and the
10 women believed that: 1) weight-cutting is unpleasant, difficult and challenging, and 2)
11 weight-cutting provides a competitive advantage. The implications of this study are that
12 weight-cutting is widespread amongst high level competitive female taekwon-do athletes and
13 this is unlikely to change given the perceived advantages. Efforts are needed to make sure the
14 women are knowledgeable of the risks and are provided with safe and effective means of
15 making weight.

16
17 **Keywords:** Weight cutting, Taekwon-do, Disordered eating, Weight category sports, Female
18 athletes

19

20 **Introduction**

21

22 It is well documented that combat athletes use a variety of both acute and chronic strategies
23 to achieve temporary body mass loss in a process known as ‘making weight’, to compete
24 within a lower weight category, with the intention of gaining a competitive advantage over
25 their opponents (Burke et al., 2021; Khodae et al., 2015). Food restriction and increased

26 physical activity are methods frequently used to achieve this aim, although more aggressive
27 and harmful ‘rapid weight loss’ (RWL) techniques are also commonplace (Artioli et al.,
28 2016). These strategies have been demonstrated to cause a whole host of negative
29 psychophysiological effects (Kasper et al., 2019) and resulted in several deaths (Barley et al.,
30 2019). Specific to females, prolonged periods of low energy availability may be a risk factor
31 for menstrual disorders linked to stress, extreme exercise and/or body mass reduction
32 (Meczekalski et al., 2014; Nazem & Ackerman, 2012). The majority of the previous research
33 on making weight in combat sports explores the type of strategies employed and
34 physiological effects through quantitative approaches and predominantly focuses on male
35 populations (Cheah et al., 2019; Langan-Evans et al., 2022). A number of limited qualitative
36 investigations combine both male and female athletes within their studies of wrestling, judo
37 and taekwon-do (Pettersson et al., 2012;2013; Sitch & Day, 2015), however there is a lack of
38 research on elite-level female athletes. The aim of this mixed-methods study was to collate
39 the types of making weight strategies used by female taekwon-do athletes, their perception of
40 the impact of such practice on them physically and mentally and the rationale for such
41 choices.

42

43 **Method - Quantitative**

44

45 **Recruitment and Participants**

46 Eight International Taekwon-do Federation (ITF) associations affiliated to the British
47 Taekwon-do Council were contacted via email and social media platforms requesting
48 permission to disseminate an on-line questionnaire to their members. Criterion for
49 participation included; (1) females aged ≥ 18 years (2) competed at least once at national or
50 international ITF taekwon-do championships. Once approval had been granted, details of the

51 research and an electronic link to the questionnaire were posted on each individual
52 association's social media pages, which generated 80 responses. In addition, individual
53 taekwon-do athletes known to the lead researcher were also contacted via social media and
54 invited to take part in the study, resulting in a further 23 responses. Ethical approval was
55 granted from the University of Huddersfield ethics panel. All participants provided written
56 informed consent prior to data collection.

57

58 **Questionnaire**

59 A modified version of the RWL questionnaire (Artioli et al., 2010) was used for the targeted
60 audience. The questionnaire included questions on demographic and background information,
61 weight history and dietary patterns, responses were recorded with a combination of short and
62 long answers, and multiple-choice options. Methods of body mass loss questions were
63 measured by a six-point Likert scale. Typical questions included; 'have you ever lost weight
64 to compete?' and 'please state how often did you use each one of the following methods to
65 lose weight before competitions?' The questionnaire was created in Google Forms and
66 disseminated as described above. The first page of the questionnaire contained the participant
67 information sheet and consent form, whereby a check box option was used to provide consent
68 before proceeding with the questionnaire. Additionally, the Eating Attitudes Test 26 (EAT-
69 26) (Garner et al., 1982) was administered. The EAT-26 is one of the most widely used self-
70 report tests for symptoms of eating disorders. Respondents are required to select an answer
71 from 5 options (always, usually, often, sometimes, rarely, and never) that are given a numeric
72 value (0-5). Typical responses include; 'I avoid eating when I am hungry', and 'I feel that
73 food controls my life'. The total of the all responses provides the individual's EAT-26 score,
74 with a score of ≥ 20 considered symptomatic of disordered eating behaviour (Abbott et al.,
75 2020;2021).

76

77 **Data Analysis**

78 This study used a mixed-methods design, therefore responses to open-ended questions were
79 read several times by the lead author to analyse the content of the data and establish meanings
80 and an understanding of the participants' statements to reach data saturation. Following
81 organisation of the dataset, themes and patterns were identified. Categorical responses were
82 analysed for frequency and the results presented below.

83

84 **Method - Qualitative**

85

86 **Recruitment Process and Participants**

87 In total, 5 female athletes were interviewed from the taekwon-do ITF England national
88 team. Initially, the lead researcher, also a member of the ITF England team, sought
89 permission from the head coach to approach adult female members to gauge their interest in
90 participating in the study. Purposeful sampling was used to select within this group those
91 athletes who declared they had experienced making weight prior to a competitive event. Of
92 the 4 female team members who were invited to participate in the study, 3 accepted and 1
93 declined. Due to the limited number of current female team members, a further 4 former
94 England national team members that no longer attended squad training sessions were
95 approached via a social media platform's messaging service. These former team members
96 were all known to the lead researcher and 2 of these members were suggested by the assistant
97 coach, specifically since they were known to have prior experience with making weight. All 4
98 of these former members initially agreed to participate, however 2 withdrew prior to being
99 interviewed. Recruited participants were aged 21-48, all athletes were experienced taekwon-

100 do practitioners (13-21 years training) with 2-17 years competition experience at both
101 national and international level.

102

103 **Semi-structured Interviews**

104 The interview guide was developed by the first author and structured around the following
105 themes; 1) taekwon-do and competition history, 2) body mass loss behaviours, 3) advice on
106 body mass loss and 4) experiences of body mass loss for competition. A pilot interview was
107 conducted and following this no substantial changes were made. Data from the pilot
108 interview produced useful information and therefore was included in the analysis. Interviews
109 were conducted at convenient locations for participants and lasted between 24-63 minutes.
110 Prior to the interview, participants were required to sign a consent form and reminded the
111 interview would be tape recorded as well as their right to withdraw from the research process
112 at any time.

113

114 **Analysis**

115 Interviews were transcribed verbatim by the first author and identifiable data anonymised.
116 Given the small population of female ITF England team members, participants are potentially
117 at risk of being identified from the data provided (King & Horrocks, 2010). Therefore,
118 participants were advised of this possible issue and a copy of the transcript forwarded to each
119 participant enabling them to notify the researcher if they wished for specific quotes to be
120 excluded from the analysis. Data was analysed thematically following guidance from Braun
121 and Clarke's (2006) six-step process; (1) familiarisation, (2) initial coding, (3) searching for
122 themes, (4) reviewing themes, (5) defining/naming themes and (6) producing the report. The
123 process was undertaken firstly by the first author and then repeated by another of the authors.

124 Any disagreements were discussed and a final set of themes derived. Excerpts were taken
125 from the data set to provide meaningful quotes for each of the themes and sub-themes.

126

127 **Results – Quantitative**

128

129 **Participant Characteristics**

130 In total, 103 participants completed the online questionnaire, one respondent was withdrawn
131 from the data as they did not meet the age criteria. The final sample consisted of 102 female
132 taekwon-do athletes affiliated to the ITF and recruited from the United Kingdom ($n = 77$) and
133 11 non-UK countries ($n = 25$) including Australia, Estonia, Hong Kong, Ireland, Italy,
134 Norway, Slovenia, South Africa, United Arab Emirates, Ukraine, and the United States of
135 America. Athletes were aged 18-59 years, with body-mass 39-115 kg and grade level 7th
136 Kup - 6th Dan (4th belt – 16th belt in the taekwon-do grading system). Athletes lost between
137 0.5kg-15kg over 2-120 days prior to the competition.

138

139 **Weight Making Strategies and Influencers of Making Weight Strategies**

140 Seventy-four athletes (72.5%) declared using body mass loss strategies prior to competition,
141 the preferred methods (i.e., always/sometimes) of those athletes that reduced body mass were
142 increasing exercise 86.5% ($n = 64$) and gradual dieting (losing weight in 2 weeks or more)
143 83.7% ($n = 62$). Of the 64 (86.5%) participants that stated using increased exercise for body
144 mass loss, when asked “what type of exercise did you do?”, 61 (95.3%) of participants
145 provided details of the types of exercise they used. One type of cardiovascular exercise or
146 more was the preferred method for increasing exercise 73.8% ($n = 45$).

147

148 Athletes that reported using gradual dieting (losing weight in 2 weeks or more) 83.7% ($n =$
149 62) were asked how gradual dieting makes them feel, 58 participants provided additional
150 information, 65.5% ($n = 38$) reported at least one negative emotion, 24.1% ($n = 14$) reported
151 positive emotions and 10.3% ($n = 6$) reported a combination of negative and positive
152 emotions. Negative emotions most frequently cited were fatigue, tiredness, weakness/loss of
153 strength and low mood. Positive feelings around body mass loss were mainly due to the
154 process being gradual i.e., “did it smart enough to feel ok” and “I always did it gradually over
155 a month so felt ok”. Athletes that experienced a combination of emotions made statements
156 such as, “feels good but is hard” and “can be stressful”, and “this was a really hard challenge”
157 and “my body felt clean, strong but sometimes fatigued”.

158

159 Over half of the athletes (52.7%, $n = 39$) reported skipping one or two meals a day with
160 carbohydrates being the most restricted macronutrient. Fluid restriction (deliberately not
161 drinking) was reported by 40.6% ($n = 30$) of athletes and mainly carried out either on or one-
162 two days prior to the weigh-in day. The majority of athletes stated they had never used
163 techniques like spitting 95.9% ($n = 71$), enema and/or colonic irrigation 94.6% ($n = 70$) and
164 vomiting 94.6% ($n = 70$). Table 1 presents a summary of the weight-loss strategies used for
165 body-mass reduction.

166

167 (Insert Table 1)

168

169 Athletes rated the amount of influence each individual had on their making weight strategies,
170 the most influential sources (i.e., quite/very influential) were, coach/trainer, other taekwon-do
171 competitor and training college. Nutritionist/dieticians and physician/doctors were amongst
172 the least influential sources (see Table 2).

173

174 (Insert Table 2)

175

176 Eating Attitudes Test (EAT-26)

177 The EAT-26 test (Garner et al., 1982) was used as a screening tool to identify a risk of

178 disordered eating; of the 102 participants that completed the questionnaire, 36.2% (n = 37)

179 scored ≥ 20 (at risk of disordered eating). Of the 74 athletes that lost body mass to compete,180 39.2% (n = 29) had scores ≥ 20 whilst 28.6% (n = 8) of athletes that did not lose body mass to181 compete scored ≥ 20 . In addition, of the 74 athletes that lost body mass to compete, 33.7% (n

182 = 25) declared making weight before age 18.

183

184 Results – Qualitative

185

186 Thematic analysis led to the researchers identifying an overarching theme “confliction – it’s

187 horrible but it’s worth it’, and two main themes (1) making weight is an unpleasant, difficult,

188 and challenging process and (2) perceived competitive advantage, as outlined in the table

189 below.

190

191 (Insert Table 3)

192

193 To achieve body mass reduction for international competitions the majority of athletes stated

194 that they utilised gradual dieting (>2 weeks) combined with increased physical activity,

195 typically within 1-3 months prior to a competitive event. Athletes stated that their making

196 weight strategies were based on past experiences, personal preferences, timescales,

197 sustainability, and motivational levels. To further facilitate body mass reduction, some

198 athletes reported RWL practices i.e., fasting, fluid restriction, saunas, sweat suits and
199 laxatives/diuretics, which tended to be used when they failed to see a desired decrease and
200 particularly during the final 24-hour period prior to weigh in. The most problematic factor for
201 athletes were the consequences of significant alterations to their normal dietary habits
202 required to achieve their target weight category as discussed below.

203

204 **Theme 1: Making Weight is an Unpleasant, Difficult, and Challenging**

205 **Process**

206 The athletes revealed that whilst they did take part in making weight, it was an uncomfortable
207 process, with details of how it impacted them explained through the sub-themes of; physical
208 effects, disturbance to psychological state and obsessive behaviour.

209

210 **Physical Effects**

211 Alterations to normal eating patterns and the use of more extreme body mass loss methods
212 contributed to the negative physical effects described by the athletes. In relation to altered
213 dietary habits, a reduction of energy intake and restriction of usual foods consumed were
214 aspects found to be problematic. All athletes showed displeasure when restricting certain
215 foods, whereby they felt deprived at not being able to consume what they described as “nice
216 foods, “junk food”, “bad foods” and “treats”. When energy intake was reduced, feelings of
217 fatigue, tiredness, hunger, exhaustion, and weakness were reported, making them feel
218 physically drained and lethargic, this was in particular during the fasting period prior to the
219 official weigh in.

220

221 Positive outcomes that co-exist with negative aspects in relation to their physical health were
222 mentioned by some athletes. Exchanging their usual diet for healthier alternatives initially

223 made some athletes feel physically better, although they articulated how they considered it to
224 be unsustainable for prolonged periods of time.

225

226 **Psychological Disturbances**

227 During the making weight process, most athletes reported experiencing some psychological
228 alterations to their mood. The main source of stress centred around being on schedule with
229 their body mass loss goals. Anxiety levels were heightened when athletes failed to see a
230 reduction, making them feel demotivated and demoralised. One participant expressed how
231 this affected her; “very depressed, really fed up, really angry to the point where you just sort
232 of think, crikey I’m working my backside off and getting nowhere, what’s the point!”.

233 Several athletes found it frustrating not being able to eat the foods they enjoyed which
234 negatively affected their mood, feelings of anger, jealousy, ‘being grumpy’ and having no
235 patience with others were reported.

236

237 The few days prior to weigh in was an increasingly stressful time, in addition to competitive
238 stressors the fear of not making weight was an extra concern frequently mentioned by the
239 athletes. They became anxious and nervous, one athlete commented, “It is a worry as you get
240 nearer to it [the weigh-in], it’s on your mind 24/7”. Mood state changed once athletes had
241 successfully completed the weigh in, athletes expressed great relief once the weigh in was
242 over and all the effort of making weight appeared to be worth it. One athlete commented that
243 she felt proud when she achieved her weight category goal, “all my hard work has paid off”.
244 Another athlete described it as “a box that needed ticking” and how she felt it was an
245 achievement to accomplish her weight category.

246

247 **Obsessive Behaviour**

248 Athlete statements demonstrated obsessive behaviour around body mass management,
249 constant monitoring of energy intake and body mass losses caused them to feel overwhelmed,
250 frustrated, and demoralised. Habitually checking their progress became a daily focal point for
251 some athletes and a time-consuming component of pre-competition preparation.

252

253 Obsessive weighing intensified the more that athletes struggled to lose body mass, with one
254 athlete reporting weighing herself at least three times a day to record any extra body mass
255 gained after each meal. Outside of the competitive period three athletes claimed to resume
256 normal eating behaviour, for the other two athletes, one ate excessively post-competition to
257 compensate for being deprived of the foods she liked during the making weight period. In
258 contrast, the other athlete continued weighing herself regularly during the non-competitive
259 season to ensure she did not regain too much body mass, stating “I’m always conscious of my
260 weight”.

261

262 **Theme 2: Perceived Competitive Advantage**

263 The main concept of this theme is central to the athletes’ belief that a physical advantage will
264 be gained by reducing their body mass to compete in a lower weight category than their
265 natural fighting weight. The decision to make weight was described as an autonomous
266 process driven by the athletes’ perception of gaining a physical advantage over their
267 opponent, therefore affording themselves the best opportunity to perform well and be
268 successful. Placing themselves at the higher end of a weight category, rather than being at the
269 lower end of a heavier category was the optimal goal. The sub-themes level playing field and
270 part of the culture describe the rationale for gaining a perceived advantage.

271

272 **Level Playing Field**

273 Statements from the athletes showed they strongly believed that competing at their natural
274 weight placed them at a great disadvantage. Being equally matched to their opponents in
275 terms of stature was of great importance, all athletes mentioned how their opponent's height,
276 or a combination of height and weight were fundamental characteristics in their decision to
277 compete in a lower weight category and potentially gain an advantage. Athletes also
278 acknowledged that heavier opponents posed some difficulties when sparring; being fearful or
279 apprehensive about injury were not concerns, the disadvantage arose from altering the way
280 they fought against their opponent.

281

282 **Part of the Culture**

283 Making weight was viewed by the athletes as a sport specific demand within the competitive
284 environment, although they did report that competition level influenced their decision to
285 engage in this process or not. A greater importance was placed on making weight for
286 international competitions, where athletes viewed it as standard practice, a behaviour that
287 most athletes engaged in to gain an advantage for competitive sparring bouts. Whilst losing
288 body mass presented various challenges to the athletes, they were all prepared to make
289 weight for international competitions.

290

291 In regard to national competitions, some athletes did not consider making weight to be
292 significantly beneficial. Fewer categories at these events meant the amount of body mass they
293 needed to lose to compete in a lower category was too great and they were also familiar with
294 the opponents they would compete against, whereas international competitions created
295 uncertainty about their opponents. A quote from one athlete summarises why the athletes are
296 prepared to make weight for competition. When asked if she worried about the consequences
297 of what she was doing, she replied;

298

299 I don't think you do at the time, all you can see is getting out there and being as best
300 weight you can be, to be in that best advantage for that category, and try and win a
301 medal, you don't really think about the long term.

302

303

Discussion

304

305 The majority of the 102 female taekwon-do athletes that completed the on-line questionnaire
306 engaged in some form of weight-cutting. This is consistent with other previous studies of
307 males and females in combat sports (Barley et al., 2019). The predominant weight-loss
308 strategies reported in our study were gradual dieting and increased exercise, which is
309 consistent with other studies including male and female taekwon-do athletes (Brito et al.,
310 2012; Cheah et al., 2019; da Silva Santos et al., 2016; Fleming & Costarelli, 2009). Our
311 findings showed extreme rapid weight-loss methods such as fasting, deliberate dehydration
312 via fluid restriction were less frequently reported with the majority using much more gradual
313 methods. The choice of strategies, according to the interviews, appeared to be determined by
314 athletes past experiences, learning from previous mistakes and experimenting with the
315 various strategies, suggesting that athletes develop weight-loss regimes based on the
316 effectiveness of reducing body-mass and what works best for them. However, those who
317 answered through the survey stated they were more inclined to seek advice from
318 coaches/trainers, other taekwon-do competitors and training colleagues rather than those
319 working in a professional capacity such as nutritionists/dieticians, physicians/doctors, and
320 physiotherapists. As suggested by Cheah et al. (2019), the choice of influencer can impact the
321 athletes' choice of strategies. While athletes continue to seek advice from those involved in

322 combat sports this may continue to promote unhealthy and potentially harmful practices, thus
323 re-enforcing the habits and behaviours that exist within the culture of combat sports.

324

325 The athletes who were interviewed described physical (e.g., fatigue, tiredness, weakness and
326 loss of strength,) and psychological (e.g., low mood, frustration and anxiety) disturbances but
327 they also reported positive symptoms of determination, feeling energised and feeling
328 mentally strong and how substituting their normal diet of “bad or unhealthy foods” to more
329 “healthy foods” made them feel physically healthy. Possible explanations for the different
330 emotions experienced by the athletes may be linked to the different phases of the weight-
331 cutting process, the amount of body-mass losses required, the extent to which they struggle to
332 lose weight and the effectiveness of their chosen strategies. It is therefore apparent that
333 weight-cutting is a unique and complex process affecting athletes' physical and psychological
334 health on a wide continuum.

335

336 A further finding from our study showed 39.2% of surveyed athletes that weight-cut for
337 competition were at risk of disordered eating behaviour. This aligns with existing literature
338 documenting that elite female athletes and athletes in weight-sensitive and weight-categorised
339 sports are risk factors for disordered eating behaviour (de Bruin & Oudejans, 2018; Kraus et
340 al., 2018; Smolak et al., 2000) which can lead to clinical eating disorders (Beals, 2000). In
341 our study, due to the significant alterations to normal dietary behaviour in order to make-
342 weight, it was anticipated that weight-cutting athletes may score higher for a risk of
343 disordered eating. However, some non-weight-cutting athletes (28.6%) were also identified
344 as at risk of disordered eating, therefore it cannot be assumed that weight-cutting alone places
345 athletes at a greater risk of disordered eating behaviour. Whilst there is a substantial amount
346 of literature documenting disordered eating behaviour in female athletes, there is a lack of

347 existing literature relating to female combat athletes, therefore our study adds to current
348 knowledge and highlights the need for more research amongst female populations in combat
349 sports. The questionnaire data showed over a third of surveyed athletes reported weight-
350 cutting before the age of 18, the youngest being 12. This highlights the need for future
351 research amongst female adolescent populations and the need to increase awareness and
352 educate athletes of all ages on best practices for healthy weight-loss through professional
353 sources.

354

355 Our study shows that irrespective of the negative effects to physical and psychological well-
356 being, weight-cutting behaviours are widespread in competitive taekwon-do and gaining a
357 perceived physical advantage over an opponent is the driving force for athletes engaging in
358 weight-cutting. Although athletes had a desire to win their sparring bout, the emphasis was
359 not placed on winning but more on being equally matched to their opponent, therefore giving
360 themselves the best chance of performing successfully. It may seem to the general
361 population, and possibly athletes that do not require weight reduction for their sport, to be a
362 detrimental and perplexing approach to pre-competition preparations, however these practices
363 are historically commonplace and normalised within the context of most competitive combat
364 sports (Connor & Egan, 2019; Hall & Lane, 2001; Langan-Evans et al., 2011).

365 Whilst interviewed athletes' attitudes towards weight-cutting are inherently negative,
366 statements indicate the desire to reach their target weight outweighs the unpleasant process of
367 weight-cutting. Athletes displayed a sense of accomplishment and relief when reaching their
368 weight-loss goal, giving them a sense of pride and preparedness which they perceived to
369 positively affect their mental state. As stated by one athlete "when I've made weight and I'm
370 lighter, I feel like I've already achieved, already won, which puts me in a really good sort of
371 positive mind-set".

372

373 Strengths and Limitations

374 By using a mixed-methods approach, combining qualitative and quantitative methods from
375 both paradigms allowed for the collection of a variety of data (Creswell & Plano Clark,
376 2018), increasing the credibility for the study. Conducting semi-structured interviews and the
377 questionnaire with athletes of varying ages, body-mass, grade level, experience and
378 competitive level, and the distribution of the questionnaire internationally allowed for a wider
379 population to be reached, thus enhancing generalisability. However, the majority of
380 questionnaire responses were from higher level grades leading to an under-representation of
381 lower grade athletes. The first author, as an insider-researcher shares an athletic identity and
382 similarity of experiences with participants, thus, establishing acceptance, trust and rapport
383 leading to a willingness of participants to disclose and share detailed accounts of their
384 experience. Although, this can be viewed as a limitation, with researchers own perceptions
385 and experiences influencing the interview structure and analysis, (Dwyer & Buckle, 2009) it
386 was thought this allowed the athletes to be more open and honest.

387

388 Clinical Implications and Conclusion

389

390 A high percentage of female ITF taekwon-do athletes utilise both acute and chronic weight-
391 loss strategies, with some athletes at risk of disordered eating behaviour. Furthermore,
392 athletes experience both negative and positive emotions during the weight-cut and experience
393 conflicting values in pursuit of achieving their weight-loss goal. This information may be
394 beneficial to athletes, coaches, and those with responsibility for the mental health of athletes
395 and suggests the need to educate, raise awareness and promote healthy nutritional practices
396 leading to safer methods of weight management. Increasing knowledge of professionals with

397 responsibilities for athletes in taekwon-do may also be important so that they can recognise
398 those athletes at risk from eating disorders and provide the necessary skills to either support
399 them or signpost them on to a mental health care provider. A coach or trainer who is eating
400 disordered informed or certified is better able to detect and support the recovery of athletes
401 with eating disorders (Conviser et al., 2018).

402

403 To our knowledge this is the first mixed-methods study to examine weight-cutting strategies
404 and experiences amongst female ITF taekwon-do athletes. This study provides an
405 understanding of how individuals perceive the weight-cutting process and the associated
406 physiological and psychological stressors they encounter, furthermore, an insight into female
407 taekwon-do athletes awareness of the types of weight-loss strategies available to them and the
408 rationale for their choice of strategy has been achieved. Studies examining the experiences of
409 female martial arts competitors are limited, indeed qualitative papers across all combat sports
410 and genders are lacking, therefore our study contributes to existing research in this field,
411 however, more studies across all combat sport populations are needed.

412

413

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