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2 **Why Size matters; Rugby Union and Doping**
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7 **Key Words:**

- 8 (1) Sport
9 (2) Anti-Doping
10 (3) Qualitative interviews
11 (4) Recreational athletes
12 (5) Bigorexia
13 (6) Masculinity
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19 **Abstract**
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21 Rugby Union is a sport where physical attributes such as strength, speed and power, are
22 highly desirable. To this end, there have been suggestions that rugby players might use
23 doping substances to fulfil these said demands. The present study comprises interviews with
24 thirteen doped recreational Welsh Rugby Union players. The study examined: (i) perceived
25 physical demands of rugby; (ii) motivations to lift weights and follow specific diets; and (iii)
26 the motivating factors to use nutritional and doping substances. Participants detail novel
27 insight into doping within recreational Welsh rugby and reaffirm the perception that size
28 matters. Specific factors such as coach reinforcement, age group categories and level of
29 competition, contribute to this perception. Notably, however, participants use/d doping
30 substances for multiple reasons that were context-sensitive, each carrying different weight
31 and influenced by temporal and developmental dimensions. Importantly, most players also
32 referred to factors outside of rugby participation. These findings have important implications
33 for the Welsh Rugby Union and National Anti-Doping Organisations. We recommend that
34 the Welsh Rugby Union target these potentially doping-inducing perceptions, offering more
35 non-elite focused education for both athletes and coaches, with a focus on safe and healthy
36 weight and size gaining practices.
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40 **Highlights:**
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- 42 • Welsh Rugby Union players perceive size and muscularity are important
43 • Perceptions stem from performance related and societal factors
44 • Some athletes use doping substances to fulfil these perceived demands
45 • Acknowledgment of these factors should inform future Anti-Doping education
46 • The health of recreational athletes should be a primary focus
47 • Traditional understandings of doping ought to be re-evaluated

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1. Introduction

According to UK Anti-Doping, Rugby Union is a sport that attracts a large percentage of Anti-Doping Rule Violations (ADRV) (UKAD, 2022). In consequence, anti-doping scholars have targeted this population for specific studies (Cox, Bloodworth & McNamee, 2021; Didymus & Backhouse, 2020; Whitaker & Backhouse, 2017; Backhouse et al., 2016; Till et al., 2016). While many sanctions during this period were issued to recreational level rugby players (UKAD, 2022), there was a dearth of research exploring the motivations behind such behaviors.

Backhouse et al., (2016) highlighted what is almost universally acknowledged within the sport of rugby, that too much emphasis has been placed by coaches on the weight and size of rugby players. Their study focuses on schoolboy rugby players within the English Rugby Football Union (RFU) and states: (i) schoolboy rugby union players experienced implicit and explicit pressures to be a certain size to guarantee team selection; (ii) that increased size and strength were deemed protective factors against potential harm from the physical demands of the game (iii) and that teachers/coaches were influential in the prevailing perceptions that ‘size matters’. Accordingly, this meant schoolboy rugby players were more likely to use protein supplements, spend more hours in the gym, have a greater drive for muscularity, and be more likely to take a risky substance. It is against this backdrop that we examine these perceptions further, specifically focusing on perceptions of size, strength and muscularity.

1.1 Rugby Union

Rugby Union is a contact sport that typically consists of two teams each fielding fifteen players. Players numbered one-to-eight are typically known as ‘forwards’ and nine-to-fifteen known as ‘backs’. Games last eighty minutes and are divided into two forty-minute halves. Forwards are usually taller and heavier than backs and are more likely to have a greater number of collisions (Paul et al., 2022; Roe et al., 2016). Indeed, evidence documents positive correlations between the collective weight and height of a team to success (Sedeaud et al., 2012). Some teams have, therefore, adopted this approach within team selection, with heavier, taller and more muscular players being selected over smaller, shorter and weaker

82 players (Lewis et al., 2015). This has driven perceptions related to ‘size matters’ and
83 reinforced perceptions that schoolboy rugby players think they need to ‘bulk up’ (Backhouse
84 et al., 2016). Consequently, some turn to muscle building supplements and anabolic
85 androgenic steroids (AAS) (Backhouse et al., 2016; Till et al., 2016). Taken alongside
86 existing evidence of doping within recreational level rugby union (UKAD, 2022; Cox et al.,
87 2021; Whitaker et al., 2017), it is somewhat surprising that National Anti-Doping
88 Organization’s (NADOs) prioritize elite and somewhat overlook recreational athletes within
89 their educational efforts (Cox, Bloodworth & McNamee, 2022; Christiansen et al., 2020). As
90 a consequence, this injustice likely exposes recreational athletes to greater doping
91 vulnerability and risk.

92
93 While Backhouse and colleagues provide insightful evidence within their Report, the findings
94 are limited to a population of English school level male rugby players, where few individuals
95 had ever used doping substances. Moreover, shifting perceptions towards muscularity and
96 body image within society (Christiansen, 2020; Edgar, 2016; Andreasson & Johansson, 2014;
97 Pope et al., 2000) and the existence of masculinist cultures within rugby (Dalla Pria &
98 Bonnet, 2022; Holland & Scourfield, 2019; Besnier et al., 2018; Darko, 2009; Pringle &
99 Markula, 2005) are largely overlooked. In contrast, a small number of studies have
100 exclusively examined doped rugby players (Didymus et al., 2020; Cox et al., 2021; Whitaker
101 et al., 2017). Nevertheless, these investigations overlook the notion that ‘size matters’ and the
102 potential association to doping likelihood.

103 104 *1.2 Doping in elite and recreational Sport*

105 Although not focused on rugby, a large body of literature has examined elite athletes’
106 motivations to dope (Backhouse et al. 2016; Blank et al. 2016; Ntoumanis et al. 2014;
107 Bloodworth & McNamee, 2010). At an individual level, performance enhancement appears
108 the most prominent motive, however, the desire to win, injury setbacks, financial rewards,
109 retirement and team cultures are also commonly cited (Overbye, Knudsen & Pfister, 2013).
110 Within recreational sport, the picture is less clear and doping motives are far more diverse
111 (Cox, Bloodworth & McNamee, 2022; Christiansen et al., 2020). This is perhaps
112 understandable considering the scale and heterogeneity of the population and the vast
113 motivations for participation. To better understand doping, Backhouse et al. (2018) argues it
114 is important to recognize doping beyond an individual level and grasp the complex array of
115 factors (surroundings, opportunities and conditions) that contribute to doping. Collectively,

116 these factors are referred to, perhaps too strongly, as the ‘dopogenic environment’. Taken
117 alongside the goal-oriented models of doping behaviour, such as the life-cycle model and the
118 incremental model of doping behaviour (Petróczi & Aidman, 2008; Petróczi, 2013), we
119 utilize the notion of ‘functional use’ of performance-enhancing substances to better
120 understand doping within recreational Welsh Rugby Union. Whilst acknowledging the
121 influence of the athlete’s environment, the central tenet of these models is a performance-
122 related goal that drives the behaviour choices and outcome expectation that serves as the base
123 for continuous evaluation of goal achievements. Although being similar in their goal-oriented
124 focus, each model captures something unique which has relevance to the decision about and
125 experiences with doping among recreational rugby players. It is the importance of outcome
126 expectancy and the continuous goal setting – engagement - achievement evaluation – re-
127 engagement or exit loop proposed in the life-cycle model (Petróczi & Aidman, 2008), and the
128 recognition that doping is growing out from habitual engagement with a variety of
129 performance-enhancing practices, including experimenting with nutritional supplements for
130 performance-enhancement. The latter resonates well with Kandel’s (2002) gateway theory.

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132 To address the concerns laid out within this introductory section, semi-structured interviews
133 were conducted with thirteen doped recreational Welsh rugby players, that is to say,
134 individuals using substances on the Prohibited List of the World Anti-Doping Agency
135 (WADA, 2021). Interviews examined perceptions related to physical size, strength,
136 muscularity and motivations behind the use of nutritional and doping substances. The rich
137 accounts offered by our participants allowed for further interrogation of motivations for
138 doping, and their relation to size, building upon existing literature in this field. The aim of
139 this paper, therefore, is to bring nuanced empirical data to discussions concerning perceptions
140 related to ‘size matters’ within rugby union, identify why this ought to be considered
141 problematic and provide policy makers within national and international sport federations and
142 anti-doping organizations (ADO), with a range of potential policy responses.

143 **2. Methods**

144 **2.1 Participants**

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148 In total, the study interviewed thirteen Welsh Rugby Union players. All participants were
149 male. Three played for semi-professional/championship teams, and ten played in divisions
150 below this level. No player was an elite athlete – this meant no participant had a professional

151 contract during data collection. All thirteen athletes played for thirteen different rugby clubs
152 within Wales. In terms of playing position, seven participants were “backs” and six were
153 “forwards”. This is important given the different playing demands of these positions, with
154 forwards typically bigger and heavier than backs. All participants were from the South Wales
155 region and were aged between 25 - 40 years old at the time of the study. At the age of drug
156 use onset, participants were aged between 16 - 27 years old. The mean age of drug onset was
157 21 years of age.

158

159 *2.2 Data collection*

160 The primary source of data collection was conducted through a purposeful sample method
161 (Emmel, 2013). The first author had previously played rugby non-professionally but retired
162 through injury. His time spent within a local rugby club meant that he was able to utilize old
163 and existing contacts to share the details of this specific research investigation. The outline of
164 the research investigation was also shared within rugby club group chats via the social media
165 platform ‘WhatsApp’ and provided the contact details of the first researcher. After initial
166 contact had been made with a doping athlete and they had been interviewed, the research
167 team requested that participants shared the study details with potential interviewees. This data
168 collection and recruitment technique is more commonly known as the snowball sample
169 technique (Noy, 2008). Of course, recruitment of participants for a study such as this is
170 notoriously difficult given that athletes are breaking anti-doping rules. If these individuals are
171 caught using doping substances, they would likely face a sporting sanction between two-and
172 four-years (WADA, 2021). Accordingly, recruitment was resource intensive: the first author
173 had to follow a multitude of potential leads, spend considerable time developing rapport with
174 potential interviewees, and was frequently let down last minute by individuals dropping out
175 or simply not turning up to the interview. This arose often without explanation. The first
176 author, following research ethical approval guidelines, respected the decision of these
177 individuals and did not pursue these potential interviewees further. It seems reasonable to
178 assume the contentiousness of the doping problem within sport but also society more
179 generally, exaggerated these problems of access to the already restricted participant pool.

180

181 Prior to the interviews, participants were made aware that the interviews were being recorded
182 and that the data could later be used within scientific journals. This was agreed with all
183 participants prior to their participation within this study and confidentiality and anonymity
184 was assured. This was important since Sport Wales (the quasi autonomous non-governmental

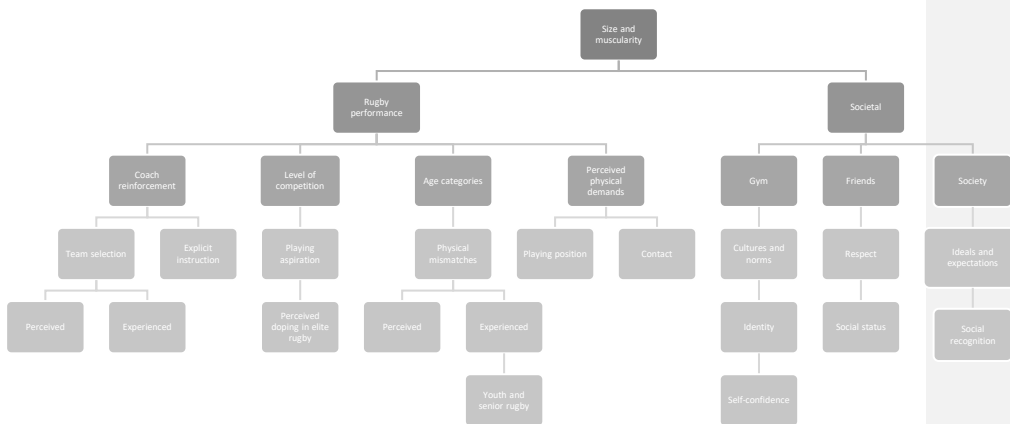
185 organization responsible for (most) sport at an elite and community level) was a sponsor of
186 the research and share with other stakeholders, the responsibility to ensure doping-free sport
187 in Wales. The maintenance of a boundary between the funders, who had anti-doping
188 responsibilities, and the knowledge of doping processes and personnel was critical. Thus, to
189 comply with research ethics approval, it was fundamental to protect the participants during
190 and after this research. Despite using the first researchers contacts initially, the snowball
191 method ensured a sample of athletes previously unknown to the researcher and from thirteen
192 different rugby clubs in the region.

193
194 Interviews were semi-structured and included open-ended questions. Interview guides were
195 constructed by the first and fourth author after the first author had conducted a literature
196 review. The search focused on studies exploring doping motivations between 2009 – 2019
197 and included the following key words: *doping motives*, *doping motivations*, *doping*
198 *intentions*. In order to provide greater specificity, the key word “rugby” was added which
199 allowed the identification of particularly important studies (Backhouse et al., 2016; Till et al.,
200 2016; Whitaker & Backhouse, 2017). Semi-structured interviews were conducted to gain a
201 better understanding of personal experiences related to participation within rugby and the use
202 of permissible and prohibited substances. Interviews lasted between 27 and 78 minutes and
203 were conducted face-to-face, over the phone, or on skype with the first author as the
204 interviewer. Interviews were recorded on tape devices and were later transcribed manually by
205 the first author. The fourth author independently reviewed the transcribed data against the
206 interview recordings to ensure methodological rigour. The investigation was approved by
207 Swansea University Research Ethics Committee.

208 209 2.3 Data Analysis

210 The first author used the software programme NVivo 12 to code the interview data and assist
211 in the identification of common themes. A thematic analysis was conducted to identify key
212 themes within the data (Guest, MacQueen & Namey, 2011). This allowed the first author to
213 group together common and reoccurring themes (Figure 1) associated with muscularity: (1)
214 perceived physical demands; (2) coach reinforcement; (3) age group categories; (4) level of
215 competition; and (5) societal factors.

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 218 Figure 1. presents the different themes and sub-themes identified during the analysis.
 219
 220 The analysis of the data followed a grounded theory approach (Glaser & Strauss, 2017). The
 221 interview data guided the themes throughout the analysis. The fourth author examined the
 222 first authors coded data against the raw interview transcripts to ensure methodological rigour.
 223 It is also important to note and recognize the positionality of all four researchers. Given the
 224 well networked positionality of the research team, access to the study population was
 225 facilitated through the first named author. While the positions of the four researchers no
 226 doubt influenced both the questions asked and analysis of the data, the knowledge possessed
 227 by the researchers helped in developing rapport and in understanding the data. The first
 228 author was also careful to ensure the participant voice was fully heard during the interviews.
 229 This instantiated the ethical dimension of the methodology captured well by Chappell (2014:
 230 p.8): *'ethics is centrally about understanding the distinctive phenomenal contents of life's*
 231 *paradigm'*. Thus, the first author sought to understand participant behaviors in their entirety
 232 and reiterated the importance of context, detail and depth within their responses. All four
 233 authors contributed throughout the course of research design, data collection and analysis, to
 234 ensure scientific rigor.

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3. Results and discussion

3.1 Perceived physical demands

During the interviews, most participants outlined the perceived need to be a specific size in order to play and remain competitive at that level of rugby, with the perception that *'bigger is better'* (P.12) evident. This finding is somewhat supported within current sport science literature, where younger players perceive the physical demands of rugby to contribute towards players wanting to 'bulk up' (Backhouse et al., 2016; Till et al., 2016). These perceptions perhaps stem from current strength and conditioning trends within rugby, where players have increased notably in physical size (height and muscularity), weight and strength in recent years (Lombard, et al., 2015; Sedeaud et al., 2012). It is therefore possible that recreational level rugby players adopt these beliefs, and focus their training goals on physical attributes such as size, strength and muscularity and use nutritional and doping substances to achieve them. Accepting this notion, we identify the first doping vulnerability risk factor as the perceived physical demands of rugby union.

Responding to the question whether rugby players need to be a particular size, participant (1), a forward, notes, *'Yes, you need to be big, especially being a prop, I'm 18 stone [114.3 kg] now'* (P.1). The perception that players needed to be heavier and more muscular rang true for most of the participants within our investigation. For some, these perceptions stemmed from the physical demands of rugby, with specific playing positions exaggerating perceptions further. Participants who identified as "“forwards”", typically numbered 1-8 on a team sheet (i.e., roster), noted greater perceived physical demands than participants who identified as "“backs”", typically numbered 9-15 – something also noted by Till, Scantlebury & Jones, (2017). This suggests that "“forwards”" are more likely to place emphasis on muscularity and strength due to their role or perceived game-related duties as "“forwards”". This orientation was not mirrored by the "“backs”". Indeed, the demands of the game mean that "“forwards”" will be involved in more contact and physical collisions than "“backs”" (Paul et al., 2022; Roe et al., 2016; Gabbett, King, Jenkins, 2008) and due to the collision-based nature of these positions, well developed physical characteristics are desirable for both performance and injury prevention (Owen et al., 2020; Read et al., 2018; Hislop et al., 2017). Thus, there exists a positional expectation that individuals playing within the forward positions (1-8) are taller, heavier and stronger than the back positions (9-15), to meet position specific demands of the

270 game (Darrall-Jones, Jones & Till, 2016; Durandt et al., 2006). The perceived positional
271 demands are echoed by another forward:

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273 'Yeah, obviously when you play in certain positions, prop for example, you need to
274 maintain a heavier weight. If you were lighter, you wouldn't be able to keep up with
275 the demands of the game' (P.8).

276

277 Though we do not attempt to make more general claims about these findings, for over half of
278 the participants within the current investigation, the perceived physical demands of rugby
279 contributed to the final doping decision. Importantly, while doping is a universally used term,
280 in reality the decision to dope is hugely variegated. In some cases, there is no decision to
281 dope underpinning the bringing of an ADRV against an athlete (WADA, 2021: pp 168; 172).
282 Children, for example, fall under WADAs protected person category (WADA, 2021: pp 174)
283 and the inclusion into their diet of prohibited substances is not their choice; rather they are
284 vulnerable to the decisions of others. Other cases of doping, which are the subject of the
285 present study, can be intentional and sometimes strategic. Situating the final decision to dope
286 is a complex affair mediated by many variables.

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288 The notion of a 'incremental' model has previously been discussed to understand doping
289 (Petróczi, 2013). For example, a rugby player might use the gym, follow specific diets and
290 take nutritional supplements (behaviors) because they believe this will enable them to
291 increase their weight, physical size and strength (expected outcome / motivation) to fulfill the
292 perceived physical demands of the game (risk factor). For some, however, nutritional
293 supplements fail to fulfill the expected outcomes, which - if the goal remains important but
294 not yet achieved - can lead to reaching for doping substances to be used alone or in
295 combination with nutritional supplements. This is best understood through participant (5):

296

297 'I felt as though I hit a wall training and using supps [nutritional supplements]. It
298 wasn't as far as I could've gone naturally but the progress had slowed down. In the
299 first year of training you make noticeable gains, you are going to. You have gone
300 from doing nothing to doing something, you will make changes to your body. I made
301 some of the most gains then, that's normal I think because it's a shock to the system,
302 but after a couple of years your body becomes accustom to it and it all slows down,
303 you plateau and I think that was when I decided to use these things' [doping
304 substances] (P.5).

305

306 The incremental, progressive nature of the use of performance-enhancing substances supports
307 the 'incremental' model (Petróczi, 2013) as well as the 'gateway' hypothesis (Kandel, 2002),

308 which proposes that individuals seldom start on harder drugs without experimentation on
309 lighter ones. Of course, this does not mean that those using lighter substances will progress to
310 harder ones, but it does offer insight into the possible trajectories taken by individuals.
311 Players who were satisfied with the outcomes they achieved by diet, training and perhaps
312 other ergogenic aids, are not progressing to doping as long as their performance-related goals
313 are achieved.

314
315 Our data is consistent with this context dependent, complex combination of factors and
316 processes, where for most participants, the decision to dope was constructed through an array
317 of different factors – some of which are highlighted within the subsequent sections of this
318 paper. Naturally, some factors carry more or less weight, are liable to shift over time, and
319 appear very specific to the individual. These factors form part of a broader web of influences
320 and ought to be considered in combination with others, rather than alone. Moreover, it is
321 difficult precisely to distinguish between the perceived physical demands of rugby, from the
322 underlying western male societal trends associated to muscularity (Christiansen, 2020). This,
323 evidently, highlights the complexities of doping-related behaviors, some of which might even
324 stem from unconscious cultural norms and perceptions. The perceived physical demands of
325 rugby, therefore, ought to be considered alongside, or in combination with, other factors to
326 increase the likelihood of doping.

327
328 While the present study focuses on Rugby Union, positional expectations related to the
329 physical demands (weight, strength, muscularity) of a sport, reach far beyond Rugby Union.
330 Sports such as Rugby League, American Football and Basketball, all have specific positional
331 expectations related to the weight and strength of players. Thus, the concerns documented
332 within the current investigation bear relevance for those engaged in anti-doping education
333 and compliance and could inform policy makers from similar sports. It is important to note
334 that we are not suggesting that generalizations may be drawn to those sports from the present
335 Rugby Union study, but rather that they may offer fruitful insight into the possible
336 similarities and differences when strength and muscle mass are required in other power-based
337 or contact of collision sports.

338

339 *3.2 Coach reinforcement*

340

341 The second theme to be identified as a potential risk factor within the doping decision was
342 the influence of coaches. It has been suggested that coaches sometimes select players and put
343 considerable emphasis on the physical size and weight of players in preference to other
344 performance variables such as skill, game intelligence, and so forth (Lentin et al. 2021; Hill
345 et al. 2018; Gabbet et al. 2013). This coaching disposition contributes towards, perhaps even
346 drives, perceptions regarding the importance and even necessity of enhanced muscularity.
347 This may go some of the way to explaining perceptions that size matters at various other
348 levels of rugby not only within the current investigation.

349

350 Responding to the question where perceptions related to the need for increased muscularity
351 stem from, participant (11) outlines:

352

353 'You would get told to. So, I would put some on, then you might put a little too much
354 on and get told to lose some, which you do, then you might get told again to put it
355 back on, I was literally bouncing back and fore' (P.11).

356

357 This response outlines that some coaches reinforced perceptions related to physical size and
358 strength. Coach reinforcement is also reflected within the work of Till et al., (2016) who note
359 that coaches contributed to perceptions that size matters through team selection. While we
360 did not examine nor include coaches within the current investigation, it is feasible to suggest
361 that muscles and size were an outcome of an over emphasis on these physical traits.

362 Participant (11) continues:

363

364 'I got told to, because of rugby, I was told I needed to get stronger, so I tried to get a
365 little stronger, then they would tell you that you needed to get fitter, so you would end
366 up doing more of that' (P.11).

367

368 With coaches explicitly telling players to get stronger and to put on weight, it is clear that
369 coaches might drive perceptions related to physical size. In a multi-method study focusing on
370 Welsh Rugby Union, Lewis et al., (2015) document that twenty-six coaches prefer bigger,
371 faster and stronger players over younger and less physically mature individuals. Again, this
372 might implicitly drive perceptions concerning physical size, strength and muscularity (by
373 favoring bigger, taller, stronger and more muscular players over weaker, shorter and smaller
374 players). A point that participant (12) reaffirms: '*the bigger boys always played, being bigger
375 and stronger is better*'. Notably, however, our research found that, in some cases, coaches are
376 explicitly telling individuals to get bigger and heavier. This is a novel finding and is

377 concerning when we consider that coaches appear to be reinforcing unrealistic or even
378 unnecessary expectations related to weight-gain, that could be interpreted by some athletes to
379 go and dope. Where emphasis is placed on strength and muscularity of players, this will
380 influence perceptions and training priorities related to muscularity and drive individuals to
381 consider the use of nutritional and prohibited substances. A similar response is echoed by
382 another Welsh rugby player:

383
384 ‘It was straight up coaches, they wanted a bigger second row or number 8, the average
385 weight of one of them is between 18-20 odd stone [114.3- 127kg]. When I was with
386 the higher-level stuff, semi-professional, they would give you dietary and training
387 advice but with the other clubs they were just telling me to get on with it pretty much,
388 get in the gym, get your supplements in, keep fit and healthy sort of thing, be ready to
389 play on a Saturday’ (P.2).
390

391 Without question, coaches harbour the potential to reinforce norms through their team
392 selection, favoring bigger and more muscular players. Their messages, whether implicit or
393 even explicitly telling players to get bigger and stronger, can also reinforce doping behaviors.
394 Furthermore, their instruction to use nutritional supplements as strategic performance
395 enhancing aids might also contribute towards a doping mindset (Petróczi, 2013).
396 Additionally, due to the power relation that exists between coaches and players, it is likely
397 furthermore that players will adhere to their instruction and seek ways to put on weight and
398 get stronger as a rational strategy. For example, players know that in most cases, coaches are
399 the individuals who will make the decision whether the player will be selected to play or not.
400 Due to the existence of these relations, it is possible that some athletes will be exposed to a
401 greater degree of risk. While older individuals will likely be able to digest, analyze and
402 navigate advice from coaches, less experienced and less successful individuals are more
403 vulnerable to a greater degree of influence. In this sense, it is worth considering whether the
404 explicit messages or implicit “signalling” that coaches convey around muscularity and size
405 could disproportionately affect younger athletes, exposing them to greater doping
406 vulnerability and risk. Notwithstanding this, we acknowledge that such “messages” or
407 “signalling” may be considered a “green light” to older athletes considering doping, who
408 might perceive they have less to lose at the end of their careers.

409
410 The severity of this point is exacerbated when we consider that recreational athletes
411 are not provided with the same educational opportunities related to anti-doping as elite

412 athletes (Cox et al., 2022). Neither are they able to access the level of nutritional support that
413 might enable safe weight gain. This is evidenced within an investigation into doping within
414 recreational Welsh rugby, where over half the participants reported they had not received any
415 formal anti-doping education (Cox et al., 2021) and is documented within the WRU Anti-
416 Doping Protocol and Guidance document, where greater focus and emphasis is placed on
417 elite athletes (WRU, 2021). This basic inequality means that recreational athletes will lack
418 essential anti-doping knowledge when compared with elite athletes. Indeed, this exposes
419 recreational athletes to greater vulnerability even when considering that the WADA Code is
420 applied somewhat indifferently within both elite and recreational sport – concerns highlighted
421 by Cox et al. (2022). It should be noted, however, that the inflation of anti-doping policy
422 (ADP) to recreational athletes is open to a considerable interpretation when it comes to
423 athlete sanctioning (Exner 2022), where some ADOs are more zealous than others (Henning
424 & Dimeo, 2018; Henning, 2017; Henning & Dimeo, 2015).

425
426 Given the increased vulnerability of children, adolescents and recreational athletes, this point
427 has import for good practice in the contexts of safeguarding. With coaches explicitly
428 reaffirming the importance of physical size, muscularity and strength, one can question
429 whether this was ‘code’ to dope. Without explicitly instructing athletes to dope, coaches
430 nevertheless make it clear that this is what athletes have to do in order to “make it”. These
431 cultural reinforcements are at odds to the anti-doping message and expose weaknesses within
432 both ADP and practice. This point is further reinforced by Patterson, Duffy & Backhouse
433 (2014), who write that coaches have played a role in encouraging and facilitating doping.
434 Given that coaches are expected to uphold the anti-doping message, this is clearly an area for
435 mixed messages. Within elite sport, where the anticipated consequences and benefits of
436 competition(s) are more significant, one can readily comprehend why some coaches
437 incentivise doping behaviours. At recreational levels, however, the picture is less clear. While
438 recreational athletes will largely not receive any payment, coaches sometimes do. Moreover,
439 both may be motivated by non-financial incentives to dope (Bloodworth & McNamee, 2010).
440 Thus, to better understand this issue, future research should address the semi-(professional)
441 coach to recreational athlete dynamic. Nonetheless, with previous studies describing doping
442 cultures a direct threat to sporting integrity (Cox et al., 2021; Allen et al., 2017; Mazanov et
443 al., 2014; Ohl et al., 2013), this allows us to consider the broader picture.

444

445 We argue that this provides policy makers with insight and scope to target potential future
446 educational material. Indeed, Patterson & Backhouse (2018) previously argued that coach-
447 focused anti-doping education is needed to ensure coaches take a more proactive role within
448 anti-doping efforts. Accepting this point and taken alongside evidence that argues coaches
449 play a vital role within anti-doping (Kim et al., 2011; Peters et al., 2009), we argue that these
450 efforts ought to be extended to recreational sport.

451

452 *3.3 Age group categories*

453

454 Physical mis-matches within age group categories were another notable risk factor identified
455 within the current investigation. These mismatches seemingly increased perceptions
456 regarding physical size and strength – exposing some individuals to a greater degree of
457 doping vulnerability and risk.

458

459 Welsh Rugby Union organize competitions by chronological age groups up until the age of
460 eighteen. When players reach eighteen years of age, they may play men's senior rugby,
461 which has no upper age limit. While Welsh Rugby Union is classified by chronological age,
462 no consideration is made for "biological age". Biological age considers factors such as
463 physical maturity, something that chronological age categorization overlooks (Owen et al.,
464 2022; Howard et al., 2016; Lewis et al., 2015). In youth rugby, sixteen- and eighteen-year-
465 olds may compete against one another (WRU, 2021) and while the chronological ages of
466 players are shared in relatively narrow bands, biological age differences vary considerably
467 (Lewis et al., 2015). Participant (2) outlined:

468

469 'I went straight to men's rugby after I left college and obviously being in that kind of
470 environment, I needed to put weight on, they wanted me to put weight on as well and
471 then when I started playing for [states rugby club name], division 3 rugby, it was a
472 whole different ball game of rugby there. So, that was when I really started to try and
473 put weight on' [...] 'To keep up with other guys, to get bigger, to get stronger, yeh just
474 to keep up with the other guys I was playing with really. I had to be a lot bigger because
475 I was playing up in a higher level of men's rugby at a younger age. I could see everyone
476 getting bigger and stronger and I was just stuck at a point where I was using all the legal
477 supplements but I wasn't getting any bigger' (P.2).

478

479 The final part of the quotation above aligns with the 'incremental' model (Petróczi, 2013),
480 whereby participant (2) perceived that nutritional supplements were a requirement to increase
481 muscle mass and strength. This, as Petróczi (2013) describes, is a learned behaviour, where

482 the use of external aids is seen as necessary to enhance performance, promoted and supported
483 by extensive research from sport science and sport supplement industry. In addition to being
484 accustomed to using a wide range of ergogenic aids for performance enhancement, for
485 participant (2), the perceived physical mismatches between players were something identified
486 as contributing to supplement use and thus, doping vulnerability. To further understand
487 doping behaviours, the work of Backhouse et al., (2017) is worth drawing upon. Factors at
488 the 'local level' (e.g., team, sports club, home, neighborhood and school) work alongside
489 'structural' (education, national and international sport organizations factors and societal
490 attitudes and beliefs), contributing to the final doping decision (Backhouse et al., 2017). This
491 is to say, multiple factors and at different levels likely contribute to an end behavior. While
492 we identify one specific factor (perceived physical mis-matches) in this section, we ought not
493 overlook additional factors also contributing to the final decision. Similarities within rugby
494 player responses are evidenced below, whereby participant (4), echoes the response of
495 participant (2):

496

497 'Maybe one of the more influential points was when I moved from age group rugby
498 into the youth and senior levels. I found the size of players between age grade, under
499 16's, and youth rugby varied greatly. Within age grade you might have one or two
500 larger players but moving into youth you had a lot more bigger guys and that was
501 greater again at senior level. Being in and around these environments, I felt like I
502 needed to be bigger to compete with the bigger guys' (P.4).

503

504 Rugby players moving between specific age categories is another point where perceptions
505 and sensitivities related to size and muscularity are heightened. This is when younger, less
506 physically developed players, mix with older, more physically developed players. Whether
507 this physical mismatch is perceived or real, participants perceived they needed to be stronger,
508 heavier and more muscular to combat these concerns. Moreover, due to the different rates of
509 maturation in different individuals, some players develop and mature (much) earlier/later
510 than others. Further insight is offer by participant (11) below:

511

512 'When I said the transition between under 16's rugby into youth rugby, the age gap is
513 fairly noticeable and so is the physicality. You could be a young 16-year-old playing
514 with an older 19-year-old. It shows and is daunting when you first make that step.
515 When I made that step there was a huge aspect and emphasis put on that, being
516 bigger'.

517

518 Accordingly, individuals who are much stronger, heavier and more muscular than others, will
519 compete against one another, placing slower maturers, or simply smaller opponents, at risk.

520

521 The Welsh Rugby Union are not alone distinguishing players by chronological age
522 categorization. The English Rugby Football Union (RFU) also take this approach:

523

524 *“There is currently no research or evidence to suggest that altering Age Grade Rugby*
525 *so that it is structured to banding by maturation or weight (i.e., bio-banding) would*
526 *have any benefit in terms of injury prevention or player development.”* (RFU, 2018).

527

528 While several NGBs have adopted age categorization as a way of grouping together players,
529 other NGBs have taken a different approach. Bio-banding, an approach that groups together
530 athletes based on maturation and physical attributes (Cumming et al., 2017) is elsewhere
531 recognized as good practice. World Rugby (2020) have published guidance on categorization
532 via weight and age, further supporting the proposal. By contrast, in New Zealand, youth
533 rugby is categorized using both age and weight, where significantly heavier players can play
534 at a more senior level and players considered underweight within their age category are
535 permitted to play down an age grade (New Zealand Rugby, 2022)¹. While variation exists
536 between districts, this approach grants greater flexibility and consideration for the different
537 physical size of individuals. This is important considering the potential physical mismatches
538 in rugby and the range of serious injuries said to be associated with these mismatches (Nutton
539 et al., 2012). Similarly, Lentin et al. (2021) argues that the weight-grading model should be
540 considered to limit mis-matches in anthropometric variables. This further supports our
541 recommendation, responding directly to damaging beliefs and behaviors associated with
542 muscularity within rugby.

543

544 Protection from injury appears to be the main premise within the categorization of players
545 (weight versus age), however, we identify how physical mis-matches throughout age grade
546 rugby reaffirmed perceptions of size and muscularity. Indeed, these perceptions contributed
547 towards weight gain practices. Concerningly, for a small number of participants within the
548 current investigation, physical mismatches within age group categories contributed to the
549 final doping decision. This provides further insight into the progression towards the use of
550 doping substances and is perhaps further supportive of the ‘incremental’ model (Petróczi,

¹ For more information on New Zealand Rugby banding <https://www.nzrugby.co.nz/assets/National-Rugby-Policy-Age-Bands.pdf>

551 2013). Of course, this is not to say that every player who perceives there to be physical
552 mismatches will dope. We do, however, recognize the potential significance of this factor as
553 identified by some participants within the context of the current study.

554

555 Considering the high rates of UKAD sanctions issued to Welsh rugby players (UKAD, 2022;
556 Whitaker et al., 2017) and the notion that a small number of participants used doping
557 substances due to these physical mismatches, we tentatively argue that the method of
558 grouping players by physical maturation ought to be considered more generally, but
559 especially with respect to Welsh contexts. Grouping by age and bio-banding are important
560 themes to consider when attempting to understand perceptions of why size seems to matter,
561 but consideration also must be made of the influence of the level of play.

562

563 *3.4 Level of competition*

564

565 The playing aspirations of the individual was another notable factor that contributed to the
566 final doping decision amongst a small number of participants. Participant (3) summarized his
567 position thus: *'I felt like I needed to be a certain shape to get a certain level'* (P.3). Evidence
568 in sport science research confirms increases in strength, weight and muscularity of
569 professional rugby players over the years (Sedeaud et al., 2012; Olds, 2001). Moreover, Jones
570 et al. (2018) outline that an individual's physical qualities contribute to attaining a
571 professional contract. Against this backdrop, it is clear to see where perceptions of size and
572 muscularity stem from and why the playing aspirations of a player ought to be considered as
573 a potential doping risk factor. Interestingly, Mills et al., (2017) note that non-elite players
574 strongly believe they are inferior (when comparing weight, strength, speed) to their elite
575 counterparts, something said to drive body dissatisfaction. Backhouse et al., (2016), also note
576 that English school boy rugby players endorsed a similar perception.

577

578 Given the present digital-age, the growing popularity of rugby and the increased exposure
579 given to imagery of professional rugby players and their bodies, formations of gender, body
580 image and masculinity are said to have emerged (Dalla Pria et al., 2022; Pringle & Markula,
581 2005; Worth, Paris & Allen, 2002). With rugby central to the national identity of some
582 countries (e.g., Fiji, Tonga and New Zealand (Holland et al., 2019; Mills & Giles, 2017;
583 Pringle, 2008; Pringle, 2004)), it should come as no surprise that increased perceptions
584 surrounding muscularity exist within specific communities. While most individuals will use
585 the gym and make dietary adjustments to achieve these increased physical demands, others

586 sometimes seek prohibited and harmful methods in combination with conditioning work. For
587 some, this provided a justification to dope, with the use of doping substances allowing these
588 individuals to put on weight and increase their physical presence on the rugby field.

589 Participant (2) outlines:

590

591 'To do well and keep up with these guys who were obviously using it [doping
592 substances], you had to join in [dope]. The clubs didn't put pressure on you, it was
593 just one of those obvious things you had to do to step up' (P.2).

594

595 This response parallels the work of Bloodworth et al. (2012) who note that talented young
596 athletes perceive that without doping, they would not make it to a higher level within sport.
597 Not only did participant (2) feel doping was a necessary behavior to play at a higher level but
598 the perception that other rugby players were using doping substances provided moral
599 justification for doping. Doping research into moral disengagement suggests that there is
600 conditional endorsement of transgressional behavior (doping) (Boardley, Grix & Harkin,
601 2015; Boardley & Kavussanu, 2011; Bandura, 1991). Although the response of participant
602 (2) is consistent with that position, the data does not more generally support a stronger link.

603

604 With that in mind, we argue that the concept of the 'dopogenic' environment (Backhouse et
605 al., 2018) can help us understand the complexities behind doping behaviors, including
606 environmental factors. For participant (2), the desire to play at a higher level and the
607 perception that doping was common place within Welsh rugby were notable risk factors. As
608 the participant saw it, the behavior (doping) appeared necessary to increase muscle size and
609 strength (expected outcome of doping) to meet the perceived demands of rugby. Participant
610 (2) provides further insight into his personal experience when using doping substances:

611

612 'When I took these things [anabolic androgenic steroids], the gains were pretty
613 incredible. I had more energy, I was waking up earlier, I felt like I had more energy in
614 general. I was in the gym for longer, my muscles were throwing up the weights and I
615 was way stronger on the pitch. I think in a 4- or 5-week cycle on the stuff, I gained
616 about 12 pounds [5.4 kg] in weight. These things really helped me keep up with the
617 guys I was playing with'.

618

619 Based upon his goals, to increase muscle size and strength (to remain competitive with other
620 rugby players, to play a higher level of rugby, perceived widespread doping), participant (2),
621 above, outlines positive experiences when using doping substances. These positive
622 experiences stem from clear perceptions of both weight and strength increases, suggestive of

623 possible goal attainment. According to Petróczi et al. (2008), this mechanism would then
624 likely repeat continually due to this positive feedback. If the feedback was negative, however,
625 the individual would cease using doping substances. Although we identify playing ambition
626 as a potential doping risk factor, it is of course true that it is not a key trigger point. Instead,
627 the identification of this factor (quoted by a small number of participants within the current
628 investigation), ought to be considered within a wider spectrum of factors that potentially
629 expose athletes to greater doping vulnerability.

630

631 It was clear, nonetheless, that a significant number of participants expressed concerns that
632 elite rugby players were using doping substances, *'I've heard rumours that stuff [doping]*
633 *goes on at those higher levels'* (P.12), with another suggesting that doping was "rife". Indeed,
634 these perceptions are damaging and potentially trickle-through recreational Welsh rugby
635 communities, where close groups of friends come together, practice and socialize. Participant
636 (8) states:

637

638 'Don't try to tell me that elite rugby players don't use PEDs [performance enhancing
639 drugs]. Their speed, their size, the amount of big hits they give and take. It's not
640 possible to stay that size and maintain those levels of fitness. The biggest guys used to
641 last fifty minutes, now they last the full eighty. It's not possible' (P.8).

642

643 A similar response is echoed below:

644

645 'I also think a lot of rugby players use them, I know a few internationals who were a
646 lot smaller growing up and disappear for a few years and come back really big. I
647 wonder how that happens. You look at some of those guys playing international rugby
648 and they put on a lot of size in less than 12 months. It's not natural' (P.3).

649

650 For some participants, these beliefs reinforce the perception that "size matters" and that the
651 use of doping substances were required to make it to the professional level. These perceptions
652 are perhaps supported with the high percentage of doping sanctions issued to rugby players
653 (UKAD, 2022). Many of these sanctions, however, have been issued to recreational level
654 rugby players (Whitaker et al., 2017). Thus, participant perceptions that doping is "rife"
655 within all levels of Welsh rugby may have no objective correlate. Participant (7) shares a
656 similar belief:

657

658 'I know it goes on at the elite level for sure. I've played with players who have played
659 at much higher levels who have been told to take it and have been told to take it at age
660 group levels as they are still progressing' (P.7).

661

662 Of course, these perceptions should worry both NADOs and NGBs. We suggest educational
663 efforts ought to target and challenge these destructive perceptions. Rather interestingly, for
664 players who fail to excel in rugby, evidence suggests these individuals are more likely to turn
665 to weight training to increase size, gain respect and to earn their masculine status (Mills et al.,
666 2017; Pringle et al., 2005). Considering the current study included recreational athletes (with
667 some at the lowest levels of recreational Welsh rugby), it is possible that this argument holds
668 true, with individuals from challenging socio-economic locations seeking muscularity to
669 attain masculine status within societies that hold rugby as a central and defining feature of
670 their identity and culture. This confirms with early literature documenting anabolic
671 androgenic steroids (AAS) use in south Wales (Baker et al. 2008). We develop this point, the
672 appreciation of broader societal influences on perceptions related to muscularity in the
673 following section.

674

675 *3.5 Societal influences*

676

677 Most Welsh rugby players in our study perceived physicality to be important; size mattered
678 to them. Notably, however, we also identified that most rugby players perceive increased
679 muscularity desirable in terms of body image. Recognizing this point, we identify the final
680 risk factor contributing to the doping decision as societal factors.

681

682 For participants who noted size matters in terms of body image, it was clear that increased
683 muscularity enhanced perceptions of social recognition and self-confidence. Though these
684 individuals played rugby and often recognised some of the performance advantages that
685 increased muscularity facilitated, this was not their primary driving force. Noting this
686 prioritization of motivation, within this final section, we consider some of these factors and
687 examine what they mean for NGBs and ADOs. It is worth quoting participant (6) at length in
688 this regard:

689

690 'I think when I started to go to the gym and I think you can say this for a lot of rugby
691 players, you start going to the gym because you want to perform better at rugby. And,
692 the outcomes of going to the gym, getting stronger, putting on muscle, putting on
693 weight, becoming more powerful, are all useful outcomes of the gym which translate
694 very well to rugby performance. Going to the gym and playing rugby fit very well
695 together, I don't think you'll find many players who haven't been to the gym. Even at
696 the lower levels, you don't want to be shown up by others in training or a match day.
697 Lifting weights and playing rugby go hand-in-hand. I started using the gym primarily
698 to become a better rugby player, I didn't think of anything else at the time, it was all I

699 wanted to do and all I wanted to be. I wanted to get stronger and faster and thought that
700 using the gym to help me achieve that. But, you get addicted to the gym environment,
701 it's competitive. It became more about the gym than it did the rugby. The more I trained
702 and became involved in the gym environment, the more I was concerned with how my
703 body looked, you simply get the gym bug. You want to get bigger; you want to get
704 bigger than the guy next to you. You want to get stronger; you want to get stronger than
705 the other guys training there and instead of focusing on rugby, you focus more on the
706 weights and feel more like a bodybuilder, and it's happened to a few of my friends
707 when you swap rugby for the gym, bodybuilding and powerlifting. You get the gym
708 vibe' (P.6).

709 Literature documents the existence of deeply rooted masculine sub-cultures throughout rugby
710 communities and within hardcore gym environments (Dalla Pria et al 2022; Christiansen, 2020;
711 Holland et al., 2019; Besnier et al., 2018; Darko, 2009; Pringle et al., 2005; Klein, 1993). For
712 participant (6), who was deeply embedded within both rugby and gym communities, it is clear
713 that he was exposed to a set of norms and behaviors consistent across both sub-cultures. Not
714 only was there competition on the rugby field to be the biggest and strongest but this
715 competition was also evident within gym spaces. These environments, therefore, appear to
716 drive perceptions associated with physical appearance and strength, with body image coming
717 under great scrutiny and rewarded through the respect and recognition of others. Moreover,
718 societal perceptions of masculinity have also shifted and is perhaps partly to blame for this
719 increased concern and drive towards muscularity. Christiansen (2020) highlights bigger, leaner
720 and more muscular bodies are now seemingly normalized. Accordingly, this has contributed
721 towards and perhaps even shaped perceptions of what we consider 'masculine'. While
722 participants are likely unaware of the underlying societal norms and trends, it is feasible to
723 suggest that these factors underpin perceptions associated to size and muscularity.

724
725
726 Acknowledging that the societal prevalence of substance misuse is historically supported by
727 scientific literature that documents the high rates of AAS use within South Wales (Baker et al.,
728 2008; Baker et al., 2006; Grace et al., 2001), it is unsurprising then, that perceptions related to
729 muscularity exist within the current rugby-specific investigation given that broader cultural
730 norms and values have long been documented. The disposition towards muscularity drives
731 motivations and behaviors that reinforce the perception. Participant (12) highlights this:

732
733 'I think it is a problem in South Wales. I'm not sure if that's still the case but it definitely
734 was when I was playing. If you look at other places in the UK, I don't think they have
735 the same kind of obsession with being bigger, I think South Wales in particular has a
736 problem'.
737

738 This response provides some insight into the perceptions of body image and associated cultures
739 and norms within South Wales. With Holland et al., (2019) arguing that rugby union is central
740 to Welsh identity and the fact that it is still very popular in this geographical region, rugby
741 cannot isolate itself from these broader social norms. Thus, perceptions of masculinity might
742 stem from these increased muscular ideals within the region. Nevertheless, it is a moot point
743 for policy development how public health organizations work alongside national governing
744 bodies in terms of policy and practice.

745

746 For gym users unconcerned with the regulatory authority of the World Anti-Doping Code
747 (hereafter: Code), the use of substances like AAS is permitted within the UK². Christiansen
748 (2020) outlines how Danish males sometimes use AAS to build muscle to establish and/or
749 enhance masculinity, shape personal identity and increase confidence. Wider literature also
750 documents some of these perceived benefits of these drugs (see Latham et al., 2019; Kotzé &
751 Antonopoulos, 2019; Vassallo & Olrich, 2010). Notably, however, for an athlete under the
752 Code, elite or recreational level, the use of prohibited substances and methods within sport may
753 have serious consequences (WADA, 2021). It is notable, therefore, that both of these athletic
754 populations share gym spaces, some of which might be more or less prone to drug use. Indeed,
755 some ‘hardcore’ gym facilities have deep-rooted and problematic subcultures embedded within
756 those facilities (Christiansen, 2020; Klein, 2007; Klein, 1993) and illustrates broader social
757 bonds connects individuals as part of wider subcultures. In anti-doping terms, this shared space
758 is problematic since what is prohibited for one population may be prized and somewhat
759 normalized by the other. From an anti-doping perspective, it appears essential to understand
760 how exposure to these specific “permissive” cultures might increase doping vulnerability and
761 risk.

762

763 Boardley, Grix and Harkin (2015) note individuals training in environments where
764 performance enhancing drugs (PEDs) are being used can facilitate doping through diffusion of
765 responsibility. Similarly, Backhouse et al., (2016) identifies ‘the gym’ as a risk environment
766 for NADOs, where substance use is embedded within that social and cultural network.
767 Furthermore, within some ‘hardcore’ gyms, the use of image and performance enhancing drugs
768 (IPEDS) have become normalized (Bates & Backhouse, 2019; Van de Ven & Mulrooney,

² These substances are illegal in countries such as Denmark where regular gym users are subject to the same anti-doping regulations and testing as elite athletes and can be randomly tested

769 2017). Thus, it is easy to see how cultures and places of substance misuse merge with those
770 (like rugby) that are ostensibly regulated by ADP. This has the consequence of destabilizing
771 official doping-free spaces and inevitably blurs boundaries between the motivations to use
772 nutritional and doping substances. Further societal factors are evidenced below:

773

774 'Well, I was small compared to everyone else my age, I was much smaller, it was
775 something I had noticed early on and something that bothered me when I was in school,
776 that was the big drive, I wanted to get bigger, I wanted to get stronger' (P.10).

777

778 Participant (10) draws upon the negative feelings he experienced during his younger years
779 when he felt physically inferior compared to his peers. These emotions perhaps stem from the
780 evidence suggestive that western societies have placed great emphasis on muscularity
781 (Christiansen, 2020; Olivardia et al., 2004; McCreary & Sasse, 2000). Moreover, Klein (2007)
782 highlights, 'every man engages with some sort of dialogue with muscle' and that 'size matters
783 when it comes to muscles'. Taken collectively, we can perhaps begin to better understand
784 where the concerns of participant (10) stem from and why size and muscularity appear to be a
785 prominent part of today's society.

786

787 Accepting the societal significance of muscularity, it is also important to recognize the reports
788 of body image dissatisfaction amongst men (McCabe & Ricciardelli, 2004; Olivardia et al.,
789 2004; Pope et al., 2000). Christiansen (2020) suggests that media outlets (television, movies,
790 reality shows, adverts and social media platforms) are partly responsible for showcasing
791 unrealistic and sometimes enhanced bodies. With some men making physical comparisons to
792 these images and thinking they are not sufficiently muscular; this is said to have contributed to
793 body dissatisfaction. More specifically, the use social media – also said to be a location to
794 source AAS (Cox, Gibbs & Turnock, 2023) - is said to drive body image concerns, motivating
795 young men to make dietary adjustments and increase resistance training (Piatkowski et al.,
796 2020; Griffiths et al., 2018). For some men, then, chasing these hyper muscular bodily 'ideals',
797 the use of drugs such as AAS appear to be rational means (Kanayama, Hudson & Pope, 2020).

798 Participant (4) asserts:

799

800 'I used them [anabolic steroids] to put on size and get bigger, I thought they would get
801 me to look good, help me get noticed more and help me fit into social groups. I was
802 probably trying to bridge insecurities that I had with myself and I saw them as a quick
803 fix solution to problems I had with myself' (P.4).

804

805

806 Concerns related to body image were reported in three quarters of the participants who took
807 part in the current study. While the severity of dissatisfaction differed between responses, these
808 participants were unmistakably unhappy with the way they looked. For most of these
809 participants, the overriding desire was to be bigger, more muscular and leaner. Indeed,
810 participant (4) wanted to be “bigger” and decided that doping substances would help facilitate
811 that goal. Within the context of the current investigation, therefore, body image dissatisfaction
812 is considered a doping risk factor.

813
814 Previously, Whitaker et al., (2017) claimed that “vanity” reasons drove some rugby players to
815 dope. While this might be a true description of the motivations for some players, such as
816 participant (7) who states: *‘When I used those [anabolic steroids] it was purely to look good,*
817 *it wasn’t really rugby related, it was just to cut up for holidays’*, for others, the narcissistic
818 label should be handled with caution. Durvasula & Lysonski (2008) define physical vanity as
819 *‘the extent to which a person regards physical appearance as important’*. For some, therefore,
820 the term will have negative connotations (e.g., showing off, excessive concern with image,
821 attractiveness and desirability), however, our research documents factors that are more
822 emotionally sensitive, more emotionally vulnerable, than the label “vanity” captures. The
823 response of participant (9) evidences this: *‘My confidence was terrible, really bad. I would*
824 *think people were talking about me, it wasn’t nice. I had no confidence whatsoever’* (P.9).
825 Indeed, negativity associated with one’s appearance can drive psychological disorders (Pope
826 et al., 2000) exposing individuals to greater vulnerability and perhaps doping risk. Thus, the
827 application of this term within policy discussions ought to be addressed to ensure it captures a
828 wider spectrum of motivating factors.

829
830 Given that sanctions are now applicable for anti-doping rule violations at the level of
831 recreational sport (Cox et al., 2022; WADA, 2021) it is foreseeable that more athletes will
832 experience complex emotional challenges that have been documented elsewhere. This raises
833 the deeper question of whether the detect and punish approach to Anti-Doping is best suited to
834 recreational athletes such as those in our study.

835

836 **Limitations and future directions**

837 Given the qualitative nature of this study, the limited number of participants and its exclusive
838 focus on one sport in one country, the findings should be understood as a snapshot in time
839 and place. No claim to generalizability is made. Nevertheless, this study offers novel insights

840 into the mindset and behaviors of a notoriously hard to reach population of athletes who have
841 engaged in a socially ostracized behaviour via doping and been prepared to discuss them
842 despite the shame that often surrounds them. To this end, our recommendations ought to be
843 considered with these limitations in mind.

844

845 **Conclusion**

846 Like any sport, Rugby Union cannot separate itself from broader cultural norms where
847 perceptions of size and muscularity are prevalent. Alongside those wider norms, we
848 identified various factors within recreational Welsh rugby that contribute to perceptions of
849 size and muscularity in relation to physical enhancement generally and doping more
850 specifically. Collectively, these factors appear to intertwine and exacerbate perceptions that
851 'size matters'. The widespread understanding of doping is as 'performance enhancement
852 ~~through the use of using~~ various ~~drugs~~ prohibited substances'³. This common sense
853 (mis)perception about the nature of doping needs to become more nuanced by empirical
854 studies that draw out the many and varied associations athletes have with the concept, and the
855 role that it plays in their athletic and non-athletic lives. we argue it is much more complex
856 than that, with cultures within both sport and society contributing towards doping. Being an
857 atheoretical,

858

859 The present study was not conceived strictly within any research-theoretical perspective.
860 exploratory study, the results Nevertheless, it resonates with multiple several theories and
861 proposed behavioral models for doping (e.g., the incremental model of doping behaviour, the
862 life cycle model and the role of moral disengagement in doping) but ascribes to none in
863 particular. As with all particular, theory-driven, research, paradigmatic
864 commitments highlight certain aspects while forcing others into the shade.- Given that all of
865 the theories mentioned above offer some insight and explanation, we argue there is still a
866 need to reconceptualize how doping behaviours are theorized and subsequently attempt to
867 understand doping above and beyond the level of data collection and analysis (Hauw and
868 McNamee, 2017). Our participants often identified multiple context-sensitive factors, each

³ In contrast to common sense understandings we note, however, that from regulatory terms, of course, there is no definition of "doping" but that is tangential to our point (McNamee, M. J. (2015). The spirit of sport and the world anti-doping code. In Routledge handbook of drugs and sport (pp. 41-53). Routledge). In terms of the WADA Code, there is only the specification of 11 distinct Anti Doping Rule Violations WADA. (2021). The World Anti-Doping Code. <https://www.wada-ama.org/en/resources/world-anti-doping-program/world-anti-doping-code>

869 carrying different weight and influenced by temporal and developmental dimensions. This
870 underlines the complexities of understanding these behaviors, ~~and the need for research to~~
871 ~~continue to enrich our understanding of doping within recreational sport. Indeed, attempting~~
872 ~~to align with one particular theory risks overlooking specific nuances and would restrict our~~
873 ~~understanding of this phenomenon.~~ Whether or not the social scientific (anti) doping research
874 ~~communities~~ will itself be prepared to debate the possibility of “normal science” in Kuhn’s
875 sense (Kuhn, 1962) in its theorization of doping is a moot point. Moreover, it may be the
876 ~~case that funding bodies will need to better understand the complexity of theory-method-data~~
877 ~~relationship in order to promote greater convergence of research “findings” in the field.~~ Of
878 ~~course, it may also be the case that no such convergence is achievable, a result of which will~~
879 ~~be that the commensurability of qualitative doping data will remain problematic.~~

880
881 Accepting the more general limitations of qualitative research in doping, we argue that the
882 ~~these factors in Figure 1 specifying why size seems indeed to matter in rugby.~~ could increase
883 doping vulnerability ~~as it by predisposing/disposing~~ individuals to several harmful practices:
884 (i) potential to influence dietary patterns; (ii) nutritional supplement use and; (iii) the use of
885 doping substances. Thus, for participants within the current study, their participation within
886 Welsh rugby appears to reinforce what might be termed “doping-friendly” as opposed to
887 “dopogenic” norms. Accordingly, this should be a concern not only for ADOs, but also
888 public health bodies. We recommend that additional and recreational-level specific
889 educational sessions should be developed for athletes and coaches within rugby clubs,
890 schools and college settings, enhancing awareness and facilitating safe and healthy weight
891 gain practices. ~~Moreover, we call on academies/researchers may need to re-evaluate common-~~
892 ~~sense understandings to dismantle traditional conceptions of doping, and enable coaches and~~
893 ~~administrators to recognize that these~~ heterogeneity of “messages” and “signals” that shape
894 ~~the contexts in which doping-related attitudes can be formed, whether implicitly or explicitly.~~
895 ~~behaviors are often an accumulation of experience, understand the uniqueness underpinning~~
896 ~~these dynamic behaviors and explore factors that lay outside the individual level. Moreover,~~
897 ~~further educational interventions ought to be considered for coaches, reiterating how~~
898 ~~coaching practices can leave lasting consequences on impressionable individuals.~~ We further
899 recommend that challenges between anti-doping and public health domains are addressed.
900 Dialogue could usefully focus on the way that these separate organizations can collectively
901 protect the health of recreational athletes. Lastly, weight and height categorization ought to
902 be considered to combat physical mismatches within youth rugby. This diminishes the

903 latency and power of beliefs associated with size and muscularity, contributing to a reduction
904 in the use of doping substances.

905

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907

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911

912

913 **References**

914

915 Allen, J. B., Morris, R., Dimeo, P., & Robinson, L. (2017). Precipitating or prohibiting factor:
916 Coaches' perceptions of their role and actions in anti-doping. *International Journal of Sports
917 Science & Coaching*, 12(5), 577-587.

918

919 Backhouse, S. H., Griffiths, C., & McKenna, J. (2018). Tackling doping in sport: a call to
920 take action on the dopogenic environment. *British Journal of Sports Medicine*, 52(23), 1485-
921 1486.

922

923 Backhouse, S., Whitaker, L., McKenna, J., Beggs, C., & Petroczi, A. (2016). Schoolboy
924 supplement use behaviours and doping vulnerability. Retrieved from
925 [https://eprints.leedsbeckett.ac.uk/id/eprint/7554/1/SchoolboySupplementUseBehavioursAnd
926 DopingVulnerabilityPV-BACKHOUSE.pdf](https://eprints.leedsbeckett.ac.uk/id/eprint/7554/1/SchoolboySupplementUseBehavioursAndDopingVulnerabilityPV-BACKHOUSE.pdf) Accessed on 12.04.21

927

928 Backhouse, S. H., Whitaker, L., & Petroczi, A. (2013). Gateway to doping? Supplement use
929 in the context of preferred competitive situations, doping attitude, beliefs, and
930 norms. *Scandinavian Journal of Medicine & Science in Sports*, 23(2), 244-252.

931

932 Bandura, A. 1991. "Social cognitive theory of moral thought and action". In *Handbook of
933 moral behavior and development: Theory research and applications*, Edited
934 by: Kurtines, W.M. and Gewirtz, J.L. 71–129. Hillsdale, NJ: Lawrence Erlbaum Associates,
935 Inc.

936

937 Bates, G., Tod, D., Leavey, C., & McVeigh, J. (2019). An evidence-based socioecological
938 framework to understand men's use of anabolic androgenic steroids and inform interventions
939 in this area. *Drugs: Education, Prevention and Policy*, 26(6), 484-492.

940

941 Bates, G., & Backhouse, S. (2019). 20 Preventing image and performance enhancing drug
942 use. *Human Enhancement Drugs*.

943

944 Baggish, A. L., Weiner, R. B., Kanayama, G., Hudson, J. I., Picard, M. H., Hutter Jr, A. M.,
945 & Pope Jr, H. G. (2010). Long-term anabolic-androgenic steroid use is associated with left
946 ventricular dysfunction. *Circulation: Heart Failure*, 3(4), 472-476.

947

948 Barkoukis, V., Lazuras, L., Ourda, D., & Tsorbatzoudis, H. (2020). Are nutritional
949 supplements a gateway to doping use in competitive team sports? The roles of achievement
950 goals and motivational regulations. *Journal of Science and Medicine in Sport*, 23(6), 625-
951 632.

952

953 Baker, J., Thomas, N., Davies, B., & Graham, M. (2008). Anabolic androgenic steroid (AAS)
954 abuse: Not only an elite performance issue. *Open Sports Medicine Journal 2*: 38-39.

955

956 Baker, J. S., Graham, M. R., & Davies, B. (2006). Steroid and prescription medicine abuse in
957 the health and fitness community: A regional study. *European Journal of Internal
958 Medicine*, 17(7), 479-484.

959

960 BBC. 2020. Steroids at 16: South Africa's schoolboy rugby scene faces a widespread doping
961 problem. Retrieved from <https://www.bbc.com/sport/rugby-union/50785122> Accessed on
962 22.09.21

963

964 BBC. 2016. 'Societal' issue behind Welsh rugby drugs problem, says UKAD chief. Retrieved
965 from <http://wwwnews.live.bbc.co.uk/sport/0/rugby-union/35770106> Accessed on 03.02.22

966

967 Blank, C., Kopp, M., Niedermeier, M., Schnitzer, M., & Schobersberger, W. (2016).
968 Predictors of doping intentions, susceptibility, and behaviour of elite athletes: a meta-analytic
969 review. *SpringerPlus*, 5(1), 1-14.

970

971 Bloodworth, A., & McNamee, M. (2010). Clean Olympians? Doping and anti-doping: The
972 views of talented young British athletes. *International Journal of Drug Policy*, 21(4), 276-
973 282.
974

975 Bloodworth, A. J., Petróczi, A., Bailey, R., Pearce, G., & McNamee, M. J. (2012). Doping
976 and supplementation: the attitudes of talented young athletes. *Scandinavian Journal of*
977 *Medicine & Science in Sports*, 22(2), 293-301.
978

979 Boardley, I. D., Grix, J., & Harkin, J. (2015). Doping in team and individual sports: a
980 qualitative investigation of moral disengagement and associated processes. *Qualitative*
981 *Research in Sport, Exercise and Health*, 7(5), 698-717.
982

983 Boardley, I. D., & Kavussanu, M. (2011). Moral disengagement in sport. *International*
984 *Review of Sport and Exercise Psychology*, 4(2), 93-108.
985

986 Chappell, T. (2014). Why ethics is hard. *Journal of Moral Philosophy*, 11(6) pp. 704–726.
987

988 Christiansen, A. V., (2020). *Gym culture, identity and performance-enhancing drugs:*
989 *Tracing a typology of steroid use*. Routledge.
990

991 Christiansen, A. V., Bloodworth, A., Ham, E., & Cox, L. (2020). Doping prevention in
992 recreational sport in Europe—a study on emerging practices among European stakeholders,
993 Chapter 3 FAIR Final report. In *Fair-Forum for Anti-doping in Recreational Sport 2019*.
994 Final Report (pp. 24-73). Europe Active.
995

996 Compte, E. J., Murray, S. B., Sepúlveda, A. R., Schweiger, S., Bressan, M., & Torrente, F.
997 (2018). What position do you play? Eating disorder pathology among rugby players, and the
998 understudied role of player position. *International Journal of Eating Disorders*, 51(8), 1015-
999 1019.
1000

1001 Cox, L., Gibbs, N., & Turnock, L. A. (2023). Emerging anabolic androgenic steroid markets;
1002 the prominence of social media. *Drugs: Education, Prevention and Policy*, 1-14.
1003

1004 Cox, L. T. J., Bloodworth, A., & McNamee, M. (2022). The 2021 WADA Code, Recreational
1005 Athletes and Ethical Concerns. In *Doping in Sport and Fitness* (Vol. 16, pp. 181-192).
1006 Emerald Publishing Limited.
1007
1008 Cox, L. T. J., Bloodworth, A., & McNamee, M. (2021). Doping in recreational Welsh Rugby
1009 Union; Athletes' beliefs and perceptions related to Anti-Doping policy and
1010 practice. *Performance Enhancement & Health*, 100211.
1011
1012 Cumming, S. P., Lloyd, R. S., Oliver, J. L., Eisenmann, J. C., & Malina, R. M. (2017). Bio-
1013 banding in sport: applications to competition, talent identification, and strength and
1014 conditioning of youth athletes. *Strength & Conditioning Journal*, 39(2), 34-47.
1015
1016 Darrall-Jones, J. D., Jones, B., & Till, K. (2016). Anthropometric, sprint, and high-intensity
1017 running profiles of English academy rugby union players by position. *The Journal of*
1018 *Strength & Conditioning Research*, 30(5), 1348-1358.
1019
1020 Dalla Pria, Y., & Bonnet, C. (2022). The Beefcake and the Beast: Professionalization,
1021 Mediatization, and the Representations of Masculinity in French Rugby. *Sociological*
1022 *Focus*, 55(3), 285-305.
1023
1024 Darko, N. (2009). "Get up, shut up and stop being a fanny": Rugby Union men and their
1025 suppression of body anxiety. *Journal of Men's Health*, 6(4), 331-337.
1026
1027 Denham, B. E. (2008). Masculinities in hardcore bodybuilding. *Men and*
1028 *Masculinities*, 11(2), 234-242.
1029
1030 Didymus, F. F., & Backhouse, S. H. (2020). Coping by doping? A qualitative inquiry into
1031 permitted and prohibited substance use in competitive rugby. *Psychology of Sport and*
1032 *Exercise*, 49, 101680.
1033
1034 Durandt, J., Du Toit, S., Borresen, J., Hew-Butler, T., Masimla, H., Jokoet, I., & Lambert, M.
1035 (2006). Fitness and body composition profiling of elite junior South African rugby
1036 players. *South African Journal of Sports Medicine*, 18(2), 38-45.
1037

1038 Durvasula, S., & Lysonski, S. (2008). A double-edged sword: understanding vanity across
1039 cultures. *Journal of Consumer Marketing*.
1040

1041 Eichner, A., & Tygart, T. (2016). Adulterated dietary supplements threaten the health and
1042 sporting career of up - and - coming young athletes. *Drug Testing and Analysis*, 8(3-4), 304-
1043 306.
1044

1045 Emmel, N. (2013). *Sampling and choosing cases in qualitative research: A realist approach*.
1046 Sage.
1047

1048 Exner, J. (2022). Intent, substances of abuse, aggravating circumstances, protected persons
1049 and recreational athletes: does the World Anti-Doping Code 2021 provide proportionate
1050 sanctions?. *The International Sports Law Journal*, 22(1), 62-84.
1051

1052 Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A
1053 hybrid approach of inductive and deductive coding and theme development. *International*
1054 *Journal of Qualitative Methods*, 5(1), 80-92.
1055

1056 Gabbett, T. J., & Seibold, A. J. (2013). Relationship between tests of physical qualities, team
1057 selection, and physical match performance in semiprofessional rugby league players. *The*
1058 *Journal of Strength & Conditioning Research*, 27(12), 3259-3265.
1059

1060 Gabbett, T. J., Kelly, J., Ralph, S., & Driscoll, D. (2009). Physiological and anthropometric
1061 characteristics of junior elite and sub-elite rugby league players, with special reference to
1062 starters and non-starters. *Journal of Science and Medicine in Sport*, 12, 215-222.
1063

1064 Gabbett, T., King, T., & Jenkins, D. (2008). Applied physiology of rugby league. *Sports*
1065 *Medicine*, 38(2), 119-138.
1066

1067 Geyer, H., Parr, M. K., Koehler, K., Mareck, U., Schänzer, W., & Thevis, M. (2008).
1068 Nutritional supplements cross - contaminated and faked with doping substances. *Journal of*
1069 *Mass Spectrometry*, 43(7), 892-902.
1070

1071 Gibson, C., Hindle, C., McLay-Cooke, R., Slater, J., Brown, R., Smith, B., ... & Black, K.
1072 (2019). Body image among elite rugby union players. *The Journal of Strength &*
1073 *Conditioning Research*, 33(8), 2217-2222.

1074

1075 Glaser, B. G., & Strauss, A. L. (2017). *Discovery of grounded theory: Strategies for*
1076 *qualitative research*. Routledge.

1077

1078 Grace, F., Baker, J., & Davies, B. (2001). Anabolic androgenic steroid use in recreational
1079 gym users: a regional sample of the Mid-Glamorgan area. *Journal of Substance Use*, 6(3),
1080 189-195.

1081

1082 Graham, M. R., Davies, B., Grace, F. M., Kicman, A., & Baker, J. S. (2008). Anabolic
1083 steroid use. *Sports medicine*, 38(6), 505-525.

1084

1085 Griffiths, S., Murray, S. B., Krug, I., & McLean, S. A. (2018). The contribution of social
1086 media to body dissatisfaction, eating disorder symptoms, and anabolic steroid use among
1087 sexual minority men. *Cyberpsychology, Behavior and Social Networking*, 21(3), 1–8.
1088 <https://doi.org/10.1089/cyber.2017.0375>

1089

1090 Guest, G., MacQueen, K. M., & Namey, E. E. (2011). *Applied thematic analysis*. sage
1091 publications.

1092

1093 Hauw, D., & McNamee, M. (2015). A critical analysis of three psychological research
1094 programs of doping behaviour. *Psychology of Sport and Exercise*, 16, 140-148.

1095

1096 Henning, A. D., & Dimeo, P. (2018). The new front in the war on doping: Amateur
1097 athletes. *International Journal of Drug Policy*, 51, 128-136.

1098

1099 Henning, A. (2017). Challenges to promoting health for amateur athletes through anti-doping
1100 policy. *Drugs: Education, prevention and policy*, 24(3), 306-313.

1101

1102 Henning, A. D., & Dimeo, P. (2015). Questions of fairness and anti-doping in US cycling:
1103 The contrasting experiences of professionals and amateurs. *Drugs: education, prevention and*
1104 *policy*, 22(5), 400-409.

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1105
1106 Hill, N. E., Rilstone, S., Stacey, M. J., Amiras, D., Chew, S., Flatman, D., & Oliver, N. S.
1107 (2018). Changes in northern hemisphere male international rugby union players' body mass
1108 and height between 1955 and 2015. *BMJ open sport & exercise medicine*, 4(1), e000459.
1109
1110 Hislop, M. D., Stokes, K. A., Williams, S., McKay, C. D., England, M. E., Kemp, S. P., &
1111 Trewartha, G. (2017). Reducing musculoskeletal injury and concussion risk in schoolboy
1112 rugby players with a pre-activity movement control exercise programme: a cluster
1113 randomised controlled trial. *British Journal of Sports Medicine*, 51(15), 1140-1146.
1114
1115 Hoberman, J. (2005). *Testosterone dreams*. University of California Press.
1116
1117 Holland, S., & Scourfield, J. (2019). Ei gwrol ryfelwyr*. Reflections on body, gender, class
1118 and nation in Welsh rugby (* a line from the Welsh national anthem, translated as 'its brave
1119 (or manly) warriors'). In *The Body in Qualitative Research* (pp. 56-71). Routledge.
1120
1121 Howard, S. M., Cumming, S. P., Atkinson, M., & Malina, R. M. (2016). Biological maturity-
1122 associated variance in peak power output and momentum in academy rugby union
1123 players. *European Journal of Sport Science*, 16(8), 972-980.
1124
1125 Kanayama, G., Hudson, J. I., & Pope Jr, H. G. (2020). Anabolic-androgenic steroid use and
1126 body image in men: A growing concern for clinicians. *Psychotherapy and*
1127 *Psychosomatics*, 89(2), 65-73.
1128
1129 Kanayama, G., Hudson, J. I., DeLuca, J., Isaacs, S., Baggish, A., Weiner, R., ... & Pope Jr, H.
1130 G. (2015). Prolonged hypogonadism in males following withdrawal from anabolic-
1131 androgenic steroids: an under - recognized problem. *Addiction*, 110(5), 823-831.
1132
1133 Kanayama, G., Hudson, J. I., & Pope Jr, H. G. (2008). Long-term psychiatric and medical
1134 consequences of anabolic-androgenic steroid abuse: a looming public health concern?. *Drug*
1135 *and Alcohol Dependence*, 98(1-2), 1-12.
1136

1137 Kanayama, G., Pope Jr, H. G., & Hudson, J. I. (2001). 'Body image' drugs: A growing
1138 psychosomatic problem. *Psychotherapy and Psychosomatics*, 70(2), 61-65.
1139

1140 Klein, A. M. (1997). Size Matter: Connecting subculture to culture in bodybuilding. In J. K.
1141 Thompson & G. Cafri (Eds), *The muscular ideal: Psychological, social, and medical*
1142 *perspectives*. Washington, DC: American Psychological Association.
1143

1144 Klein, A. M. (1993). *Little big men: Bodybuilding subculture and gender construction*. Suny
1145 Press.
1146

1147 Kotzé, J., & Antonopoulos, G. A. (2019). Boosting bodily capital: Maintaining masculinity,
1148 aesthetic pleasure and instrumental utility through the consumption of steroids. *Journal of*
1149 *Consumer Culture*, 1469540519846196.
1150

1151 Latham, J. R., Fraser, S., Fomiatti, R., Moore, D., Seear, K., & Aitken, C. (2019). Men's
1152 performance and image-enhancing drug use as self-transformation: Working out in makeover
1153 culture. *Australian Feminist Studies*, 34(100), 149-164.
1154

1155 Lewis, J., Morgan, K., & Cooper, S. M. (2015). Relative age effects in Welsh age grade
1156 rugby union. *International Journal of Sports Science & Coaching*, 10(5), 797-813.
1157

1158 Lentin, G., Cumming, S., Piscione, J., Pezery, P., Bouchouicha, M., Gadea, J., ... & Gavarry,
1159 O. (2021). A Comparison of an Alternative Weight-Grading Model Against Chronological
1160 Age Group Model for the Grouping of Schoolboy Male Rugby Players. *Frontiers in*
1161 *Physiology*, 12, 745.
1162

1163 Light, R. (2007). Re-examining hegemonic masculinity in high school rugby: The body,
1164 compliance and resistance. *Quest*, 59(3), 323-338.
1165

1166 Lombard, W. P., Durandt, J. J., Masimla, H., Green, M., & Lambert, M. I. (2015). Changes in
1167 body size and physical characteristics of South African under-20 rugby union players over a
1168 13-year period. *The Journal of Strength & Conditioning Research*, 29(4), 980-988.
1169

1170 Maughan, R. J. (2005). Contamination of dietary supplements and positive drug tests in
1171 sport. *Journal of Sports Sciences*, 23(9), 883-889.
1172

1173 McCreary, D. R., & Sasse, D. K. (2000). An exploration of the drive for muscularity in
1174 adolescent boys and girls. *Journal of American College Health*, 48, 297-304.
1175

1176 Mills, C. D., & Giles, G. J. (2017). Body Image concerns of Male Rugby Players, with
1177 specific focus on Muscularity and Body Fat. *Journal of Obesity and Overweight*, 3(1), 103-
1178 110.
1179

1180 Mullen, C., Whalley, B. J., Schifano, F., & Baker, J. S. (2020). Anabolic androgenic steroid
1181 abuse in the United Kingdom: An update. *British Journal of Pharmacology*, 177(10), 2180-
1182 2198
1183

1184 Nauright, J., & Chandler, T. J. L. (Eds.). (1996). *Making men: Rugby and Masculine*
1185 *Identity* (Vol. 10). Psychology Press.
1186

1187 New Zealand Rugby. 2022. Age bands for age grades rugby. Retrieved from
1188 <https://www.nzrugby.co.nz/assets/National-Rugby-Policy-Age-Bands.pdf> Accessed on
1189 03.02.22
1190

1191 Noy, C. (2008). Sampling knowledge: The hermeneutics of snowball sampling in qualitative
1192 research. *International Journal of Social Research Methodology*, 11(4), 327-344.
1193

1194 Ntoumanis, N., Ng, J. Y., Barkoukis, V., & Backhouse, S. (2014). Personal and psychosocial
1195 predictors of doping use in physical activity settings: a meta-analysis. *Sports*
1196 *medicine*, 44(11), 1603-1624.
1197

1198 Nutton, R. W., Hamilton, D. F., Hutchison, J. D., Mitchell, M. J., Simpson, A. H. R., &
1199 MacLean, J. G. (2012). Variation in physical development in schoolboy rugby players: can
1200 maturity testing reduce mismatch?. *British Medical Journal open*, 2(4), e001149.
1201

1202 Olds, T. (2001). The evolution of physique in male rugby union players in the twentieth
1203 century. *Journal of Sports Sciences*, 19(4), 253-262.

1204 Overbye, M., Knudsen, M. L., & Pfister, G. (2013). To dope or not to dope: Elite athletes'
1205 perceptions of doping deterrents and incentives. *Performance enhancement & health*, 2(3),
1206 119-134.
1207

1208 Owen, C., Till, K., Weakley, J., & Jones, B. (2020). Testing methods and physical qualities
1209 of male age grade rugby union players: a systematic review. *Plos one*, 15(6), e0233796.
1210

1211 Owen, J., Owen, R., Hughes, J., Leach, J., Anderson, D., & Jones, E. (2022). Psychosocial
1212 and Physiological Factors Affecting Selection to Regional Age-Grade Rugby Union Squads:
1213 A Machine Learning Approach. *Sports*, 10(3), 35.
1214

1215 Patterson, L. B., & Backhouse, S. H. (2018). "An important cog in the wheel", but not the
1216 driver: Coaches' perceptions of their role in doping prevention. *Psychology of Sport and*
1217 *Exercise*, 37, 117-127.
1218

1219 Patterson, L. B., Duffy, P. J., & Backhouse, S. H. (2014). Are coaches anti-doping?
1220 Exploring issues of engagement with education and research. *Substance use & misuse*, 49(9),
1221 1182-1185.
1222

1223 Paul, L., Naughton, M., Jones, B., Davidow, D., Patel, A., Lambert, M., & Hendricks, S.
1224 (2022). Quantifying Collision Frequency and Intensity in Rugby Union and Rugby Sevens: A
1225 Systematic Review. *Sports medicine-open*, 8(1), 1-38.
1226

1227 Petroczi, A. 2013. doping mindset—Part I: Implications of the functional use theory on
1228 mental representations of doping. *Performance Enhancement & Health*, 2(4), 153-163.
1229

1230 Piatkowski, T. M., White, K. M., Hides, L. M., & Obst, P. L. (2020). Australia's Adonis:
1231 Understanding what motivates young men's lifestyle choices for enhancing their
1232 appearance. *Australian Psychologist*, 55(2), 156-168.
1233

1234 Pope Jr, H. G., Kanayama, G., Athey, A., Ryan, E., Hudson, J. I., & Baggish, A. (2014). The
1235 lifetime prevalence of anabolic - androgenic steroid use and dependence in Americans:
1236 Current best estimates. *The American Journal on Addictions*, 23(4), 371-377.

1237

1238 Pope, H. G., Jr., Gruber, A. J., Mangweth, B., Bureau, B., deCol, C., Jouvent, R., & Hudson,
1239 J. I. (2000). Body image perception among men in three countries. *Ameri- can Journal of*
1240 *Psychiatry*, 157, 1297–1301.

1241

1242 Pringle, R. (2004). A social-history of the articulations between rugby union and masculinities
1243 within Aotearoa/New Zealand. *New Zealand Sociology*, 19(1), 102-128.

1244

1245 Read, D. B., Jones, B., Phibbs, P. J., Roe, G. A., Darrall-Jones, J., Weakley, J. J., & Till, K.
1246 (2018). The physical characteristics of match-play in English schoolboy and academy rugby
1247 union. *Journal of Sports Sciences*, 36(6), 645-650.

1248

1249 Readhead, C. (2015). Response to: ‘The search for size: a doping risk factor in adolescent
1250 rugby’. *British Journal of Sports Medicine*, 49(23), 1541-1541.

1251

1252 RFU. 2018. Codes of practice. Retrieved from
1253 [https://www.englandrugby.com/dxdam/ab/aba417df-0157-40a8-9c4a-](https://www.englandrugby.com/dxdam/ab/aba417df-0157-40a8-9c4a-a9041f3a6d08/Codes%20of%20Practice.pdf?fbclid=IwAR0f_blv8BXFQbcjmmsOojDpdc7w9otitpVa-Z3REN0iHqeDCHT8wkcWPUo)
1254 [a9041f3a6d08/Codes%20of%20Practice.pdf?fbclid=IwAR0f_blv8BXFQbcjmmsOojDpdc7w](https://www.englandrugby.com/dxdam/ab/aba417df-0157-40a8-9c4a-a9041f3a6d08/Codes%20of%20Practice.pdf?fbclid=IwAR0f_blv8BXFQbcjmmsOojDpdc7w9otitpVa-Z3REN0iHqeDCHT8wkcWPUo)
1255 [9otitpVa-Z3REN0iHqeDCHT8wkcWPUo](https://www.englandrugby.com/dxdam/ab/aba417df-0157-40a8-9c4a-a9041f3a6d08/Codes%20of%20Practice.pdf?fbclid=IwAR0f_blv8BXFQbcjmmsOojDpdc7w9otitpVa-Z3REN0iHqeDCHT8wkcWPUo) Accessed on 03.02.22

1256

1257 Ring, C., Kavussanu, M., & Walters, B. (2020). The self-other divergence effect for doping
1258 likelihood: mediation by guilt and moderation by moral agency and values. *Journal of Sport*
1259 *and Exercise Psychology*, 42(5), 417-423.

1260

1261 Roe, G., Halkier, M., Beggs, C., Till, K., & Jones, B. (2016). The use of accelerometers to
1262 quantify collisions and running demands of rugby union match-play. *International Journal of*
1263 *Performance Analysis in Sport*, 16(2), 590-601.

1264

1265 Sekulic, D., Bjelanovic, L., Pehar, M., Pelivan, K., & Zenic, N. (2014). Substance use and
1266 misuse and potential doping behaviour in rugby union players. *Research in Sports*
1267 *Medicine*, 22(3), 226-239.

1268

1269 Sánchez-Oliver, A. J., Domínguez, R., López-Tapia, P., Tobal, F. M., Jodra, P., Montoya, J.
1270 J., & Ramos-Álvarez, J. J. (2021). A Survey on Dietary Supplement Consumption in
1271 Amateur and Professional Rugby Players. *Foods*, 10(1), 7.
1272
1273 Sedeaud, A., Marc, A., Schipman, J., Tafflet, M., Hager, J. P., & Toussaint, J. F. (2012). How
1274 they won Rugby World Cup through height, mass and collective experience. *British Journal*
1275 *of Sports Medicine*, 46(8), 580-584.
1276
1277 Smart, D. J., Hopkins, W. G., & Gill, N. D. (2013). Differences and changes in the physical
1278 characteristics of professional and amateur rugby union players. *The Journal of Strength &*
1279 *Conditioning Research*, 27(11), 3033-3044.
1280
1281 Till, K., Jones, B., McKenna, J., Whitaker, L., & Backhouse, S. H. (2016). The search for
1282 size: a doping risk factor in adolescent rugby?. *British journal of sports medicine*, 50(4), 203-
1283 204.
1284
1285 Till, K., Scantlebury, S., & Jones, B. (2017). Anthropometric and physical qualities of elite
1286 male youth rugby league players. *Sports Medicine*, 47(11), 2171-2186.
1287
1288 The WADA Code. 2021. Retrieved from [https://www.wada-](https://www.wada-ama.org/sites/default/files/resources/files/2021_wada_code.pdf)
1289 [ama.org/sites/default/files/resources/files/2021_wada_code.pdf](https://www.wada-ama.org/sites/default/files/resources/files/2021_wada_code.pdf) Accessed 10.05.21
1290
1291 UKAD. 2022. Sanctions. Retrieved from <https://www.ukad.org.uk/sanctions> Accessed on
1292 [02.09.21](https://www.ukad.org.uk/sanctions)
1293
1294 Van de Ven, K., & Mulrooney, K. J. (2017). Social suppliers: exploring the cultural contours
1295 of the performance and image enhancing drug (PIED) market among bodybuilders in the
1296 Netherlands and Belgium. *International Journal of Drug Policy*, 40, 6-15.
1297
1298 Vassallo, M. J., & Olich, T. W. (2010). Confidence by injection: male users of anabolic
1299 steroids speak of increases in perceived confidence through anabolic steroid
1300 use. *International Journal of Sport and Exercise Psychology*, 8(1), 70-80.
1301

1302 Whitaker, L., & Backhouse, S. (2017). Doping in sport: an analysis of sanctioned UK rugby
1303 union players between 2009 and 2015. *Journal of Sports Sciences*, 35(16), 1607-1613.
1304
1305 WRU. 2021. Player Pathway. Retrieved from [https://www.wrugamelocker.wales/en/player-](https://www.wrugamelocker.wales/en/player-pathway/)
1306 [pathway/](https://www.wrugamelocker.wales/en/player-pathway/) Accessed on 02.09.21
1307
1308 World Rugby. 2020. Weigh consideration guideline for age grade rugby. Retrieved from
1309 <https://www.world.rugby/news/573411/weight-consideration-guideline-for-age-grade-rugby>
1310 Accessed on 03.02.22