

1 A multidisciplinary investigation into “playing-up” in academy football

2 according to age phase

3 In an attempt to facilitate more appropriate levels of challenge, a common practice in
4 academy football is to *play-up* talented youth players with chronologically older peers.
5 However, the context of playing-up in academy football is yet to be empirically
6 explored. Thus, the purpose of this study was to examine the multidimensional factors
7 that differentiated players who play-up from those who do not. Ninety-eight
8 participants from a single football academy were examined within their age phase:
9 Foundation Development Phase (FDP; under-9 to under-11; $n=40$) and Youth
10 Development Phase (YDP; under-12 to under-16; $n=58$). Drawing upon the FA Four
11 Corner Model, 27 factors relating to *Technical/Tactical*, *Physical*, *Psychological*, and
12 *Social* development were assessed. Following MANOVA analysis within both the FDP
13 and YDP, significant differences were observed for *Technical/Tactical* and *Social* sub-
14 components ($P<0.05$). Further differences were observed for *Physical* and
15 *Psychological* sub-components ($P<0.05$) within the YDP. In sum, *Technical/Tactical*
16 and *Social* characteristics appeared to differentiate those who play-up compared to
17 those who do not within the FDP. In the YDP however, there were measures
18 representing all sub-components from the FA Four Corner Model. Subsequently, it is
19 suggested coaches and practitioners consider these holistic factors when playing-up
20 youth football players within relevant age-phases.

21 Keywords: Accelerated learning; Elite youth football; Expertise; Talent identification;
22 Talent development; Relative age effect

23 **Introduction**

24 A key challenge for sport organisations relates to creating appropriate developmental settings
25 for athletes (Côté, Turnnidge, & Evans, 2014). Indeed, understanding how to effectively meet
26 the needs of athletes with a varying range of experience, ability, and motivation is a perpetual
27 struggle for sport practitioners (Côté, Bruner, Erickson, Strachan, & Fraser-Thomas, 2010).
28 In general, the typical method for grouping athletes is by chronological age. However, within
29 these age-bands, there may be large discrepancies in athletes' physical and psychosocial
30 development (Wattie & Baker, 2018). For high-achieving athletes, there is often pressure
31 from stakeholders (e.g., organisations, coaches, and parents) to search for more appropriate
32 levels of challenge and competition (Collins & MacNamara, 2017; Taylor & Collins, 2019).
33 One common solution to this issue is for athletes to train and compete with older peers; this
34 practice is commonly known as *playing-up* (Malina et al., 2019). Anecdotal evidence
35 suggests that athletes who play-up may be exposed to higher intensities of practice and
36 competition, which could have important implications on their developmental outcomes (e.g.,
37 Malina, 2010; O'Sullivan, 2017; U.S. Soccer, 2011; Wiersma, 2000). However, no studies to
38 date have explored playing-up a chronological age group and its connections to athletes'
39 outcomes.

40 If playing-up is thought of as a way to group athletes based on skill, there is a growing
41 body of research on how other forms of athlete grouping may affect development. Current
42 literature in sport has mainly explored the effects of grouping athletes based on chronological
43 age and size. With regards to chronological age, concerns have been raised due to relative age
44 effects (RAEs) that favours older athletes in a respective age group (Barnsley, Thompson, &
45 Barnsley, 1985). For instance, when sport programmes create age groups using an annual
46 calendar year, athletes born just after the cut-off date are older than most of their peers
47 (Musch & Grondin, 2001). As such, these athletes are often bigger and stronger than those

48 born later in the selection year, and fortuitously size and strength are often mistaken or
49 misconstrued as implications of *talent* (Baker, Schorer, & Wattie, 2018; Baxter-Jones, 1995;
50 Cogley, Baker, Wattie, & McKenna, 2009). To be specific, if the oldest athletes are chosen
51 for a competitive team because of their age or physical qualities, they may gain access to
52 quality coaching, competition, and facilities, which could allow them to become better
53 players (e.g., Furley & Memmert, 2016; Sherar, Baxter-Jones, Faulkner, & Russell, 2007;
54 Wattie, Cogley, & Baker, 2008). Conversely, studies have shown detrimental effects for
55 relatively younger athletes, including limited selection opportunities and higher rates of
56 dropout (e.g., Delorme, Chalabaev, & Raspud, 2011; Hancock, Ste-Marie, & Young, 2013;
57 Helsen, Starkes, & Van Winckel, 1998). It is also important to consider that RAEs also go
58 “beyond the physical”, whereby age related differences in experience, cognitive, and social
59 development can exacerbate relative age advantages (Doncaster, Medina, Drobnic, Gómez-
60 Díaz, & Unnithan, 2020). Together, these findings indicate that when youth athletes are
61 grouped based on fixed chronological age, there are important implications for athlete
62 development.

63 Further to the bias of an earlier birthdate through RAEs, differences in growth and
64 maturation status within a single age group can also be considerable (Pearson, Naughton, &
65 Torode, 2006). Indeed, it is important to recognise that RAEs and maturation are independent
66 constructs (Cumming, Searle, et al., 2018). For instance, within an under-13 chronological
67 age group, it is possible to have two players with the same relative age but as much as five
68 years difference in biological age (Gouvea et al., 2016; Malina, Rogol, Cumming, Coelho-e-
69 Silva, & Figueiredo, 2015). Thus, individual increases in physical performance, such as
70 speed, power, agility, and endurance, will also occur at different chronological ages (Lloyd &
71 Oliver, 2012). Therefore, a player’s earlier growth and maturity status, relative to their later-
72 maturing but same-aged peers, may possess advantages in both physiological and physical

73 performance measures (Meylan, Cronin, Oliver, & Hughes, 2010). As a result, this often
74 leads to systematic selection and progression of more mature players compared to less mature
75 counterparts, who may be regarded as less *talented* during the player selection process, or
76 dropout due to low confidence or lack of success (Figueiredo, Goncalves, Coelho-e-Silva, &
77 Malina, 2009).

78 Drawing upon an education context, in the same way that coaches can play-up
79 *talented* youth athletes to expose them to a greater intensity of practice and competition,
80 teachers can move high-achieving students into advanced streams of study; providing them
81 with learning opportunities that are more appropriately challenging (e.g., Kulik, 2004;
82 Neihart, 2007; Tieso, 2005; Vygotsky, 1978). For example, *acceleration* (i.e., when students
83 enter school early or skip a grade) is a strategy that is comparable to playing-up. Previous
84 research on the impact of acceleration on youth's academic achievement has often supported
85 its implementation (Steenbergen-Hu, Makel, & Olszewski-Kubilius, 2016). Meta-analytic
86 data from Kulik and Kulik (1982) and Steenbergen-Hu and Moon (2011) found that high-
87 achieving students who were accelerated showed greater academic performance than their
88 non-accelerated equivalents, whilst also matching similar academic attainment to that of their
89 older peers. This evidence suggests the movement of youth into advanced learning
90 environments may be associated with positive performance outcomes for high-achieving
91 individuals. However, without advanced knowledge regarding *how* and *why* acceleration in
92 school and sport may affect academic achievement and sport-specific development,
93 practitioners will struggle to optimise programming for high-achieving students and athletes
94 alike. Therefore, in the context of playing-up, it is necessary to examine the factors that
95 influence the sport-specific development of those particular athletes.

96 To improve this understanding, recent research has developed tools to assess multiple
97 aspects of athlete development (e.g., Kelly, Wilson, & Williams, 2018). More specifically in

98 football, there has been a growing body of multidisciplinary athlete development research in
99 recent years, with evidence showcasing how certain factors are associated with greater
100 development towards attaining expertise (see Sarmiento, Anguera, Pereira, & Araujo, 2018).
101 For example, Forsman, Blomqvist, Davids, Liukkonen, and Konttinen (2016), Huijgen,
102 Elferink-Gemser, Lemmink, and Visscher (2014), and Zuber, Zibung, and Conzelmann
103 (2016) all applied a battery of holistic tools to measure athlete development in youth football.
104 They all revealed that highly skilled players scored above average on all physiological,
105 psychological, tactical, and technical factors compared to their lower skilled peers, as well as
106 being more likely to advance to the highest level of performance. This highlights the
107 importance of providing a multidisciplinary research methodology in youth football for
108 athlete development (Collins & MacNamara, 2017; Williams & Drust, 2012).

109 Multidisciplinary philosophies are evident through applied frameworks such as the
110 FA Four Corner Model (The Football Association, 2019). This model, which is often adopted
111 in professional football clubs and organisations, advocates the assessment and development
112 of players according to: (a) *Technical/Tactical*, (b) *Physical*, (c) *Psychological*, and (d) *Social*
113 attributes (The Football Association, 2014). Previous observational investigation from
114 Towlson, Cope, Perry, Court, and Levett (2019) has demonstrated the usefulness of applying
115 the FA Four Corner Model to holistic research in academy football. This study also reinforces
116 the importance of encompassing an age phase-specific approach to applied athlete
117 development literature. Additionally, by using this model to facilitate a greater knowledge
118 translation between theory and practice, it provides a salient framework for understanding the
119 factors associated with playing-up since it is a tool that is perceived to be relevant and useful
120 for sport practitioners.

121 Therefore, the purpose of this study was to examine the multidimensional factors that
122 differentiated players who play-up a chronological age group, compared to those who do not,

123 within an English football academy according to age phase (FDP and YDP). It was
124 hypothesised that characteristics across the FA Four Corner Model would positively
125 differentiate between those players who play-up and those who do not within both age
126 phases.

127 **Methods**

128 *Sample*

129 Following institutional ethical approval and informed consent, ninety-eight male participants
130 were examined within their specific age phase: FDP (under-9 to under-11; $n = 40$; $M_{\text{age}} 10.6$
131 ± 0.9 years) and YDP (under-12 to under-16; $n = 58$; $M_{\text{age}} 14.4 \pm 1.3$ years). All the
132 participants were recruited from the same Tier 4 English professional football club and their
133 Category 3 academy. Players were considered to play-up a chronological age group when
134 they participated in $\geq 50\%$ of their combined training and match-play time, throughout the
135 entire season, within an older age group in the FDP ($n = 15$ play-up; $n = 25$ non-play-up) and
136 YDP ($n = 13$ play-up; $n = 45$ non-play-up). Previous playing-up experience was also recorded
137 for the playing-up groups across the two age phases: (a) FDP play-up experience ranged from
138 1–4 years ($M_{\text{play-up}} = 2 \pm 0.9$ years); and, (b) YDP play-up experience ranged from 2–8 years
139 ($M_{\text{play-up}} = 4.6 \pm 2.4$ years). The average weekly training and match-play time was also
140 recorded for both age phases: (a) FDP = 9–10.5 training hours/week and one match-play
141 hour/week; and, (b) YDP = 10–14.5 training hours/week and one match-play hour/week.
142 Goalkeepers were not included in this study due to their contrasting position-specific
143 requirements (Gil et al., 2014). Institutional ethical approval was granted for this study.

144 *Measures*

145 Seven data collection methods were measured across an entire football season. For the

146 purpose of this research, these measures were then allocated into sub-components, in-line
147 with the FA Four Corner Model: (1) *Technical/Tactical*; (a) technical tests, (b) match analysis
148 statistics, and (c) perceptual-cognitive expertise (PCE) video simulation tests. (2) *Physical*;
149 (a) anthropometric measures, and (b) fitness tests. (3) *Psychological*; (a) the Psychological
150 Characteristics for Developing Excellence Questionnaire (PCDEQ). And, (4) *Social*;
151 Participation History Questionnaire (PHQ). The citation(s) aligned to each measure(s) below
152 represents the instrument and protocol used for the factors in this current study.

153 A combined total of 27 factors were cumulated from the seven measures: (1) Four
154 football-specific technical tests; (a) ball juggling, (b) slalom dribble, (c) shooting accuracy,
155 and (d) lob pass (see Vaeyens et al., 2006). (2) Four match analysis statistics from across an
156 entire season; (a) reliability in possession, (b) pass completion, (c) dribble completion, and
157 (d) total touches (see Kelly, Wilson, Jackson, & Williams, 2020). (3) Two PCE video
158 simulation tests; (a) ‘pre’ execution occlusion, and (b) ‘at’ execution occlusion (see Belling,
159 Suss, & Ward, 2014). (4) All six factors from the 59-item PCDEQ; (a) Factor 1 – support for
160 long term success, (b) Factor 2 – imagery use during practice and competition, (c) Factor 3 –
161 coping with performance and developmental pressures, (d) Factor 4 – ability to organise and
162 engage in quality, (e) Factor 5 – evaluating performances and working on weaknesses, and (f)
163 Factor 6 – support from others to compete to my potential (see MacNamara & Collins, 2011;
164 2013). (5) Six items from the PHQ; (a) age started playing academy football, (b) total coach-
165 led practice hours, (c) total peer-led play hours, (d) total football hours, (e) total multisport
166 hours, and (f) total football and multisport hours (see Ford, Ward, Williams, & Hodges,
167 2009). (6) One anthropometric measure; (a) percentage of estimated adult height attained (see
168 Khamis & Roche, 1994). And, (7) Four fitness tests; (a) 0–10 m sprint test, (b) 0–30 m sprint
169 test, (c) L-agility test, and (d) countermovement jump (CMJ) test (see Kelly, Wilson,
170 Jackson, Turnnidge, & Williams, 2020).

171 ***Data analysis***

172 Descriptive statistics were calculated for each variable using *z*-scores to account for
173 differences between chronological ages in each age phase, as well as confirming with data
174 normality. Four separate hypotheses were tested to examine the differences between playing-
175 up and non-playing-up groups, within each age phase, corresponding to the FA Four Corner
176 Model. Initial analysis investigated differences between playing-up and non-playing-up
177 groups' mean scores within both age phases using a two-way multivariate analysis of
178 variance (MANOVA). Further analysis used an independent samples *t*-test to compare
179 playing-up and non-playing-up groups' mean scores within both age phases, with a
180 Bonferroni correction applied to prevent alpha inflation. Cohen's *d* effect size was used to
181 examine the magnitude of difference between those who play-up and those who do not, with
182 $d = 0.2, 0.5, \text{ and } 0.8$ marking small, medium, and large effect sizes, respectively. A binary
183 logistic regression was also used to model playing-up and non-playing-up status within both
184 age phases, comprising of univariate analysis from the variables within each of the four sub-
185 components. Further multivariate logistic regression analysis was conducted for both the FDP
186 and YDP, with variables included when significant or nearing significance ($P < 0.100$) in the
187 univariate analyses which accumulated all the four corners. The multivariate model employed
188 a backward stepwise elimination of variables. Differences were considered statistically
189 significant at $P < 0.05$.

190 **Results**

191 ***MANOVA of between group differences***

192 The MANOVA for the *Technical/Tactical* sub-component showed a significant between
193 group difference within both the FDP, $F(10,29) = 6.044, P < 0.001$ with Pillais' Trace =
194 0.676, and the YDP, $F(10,46) = 2.088, P = 0.045$ with Pillais' Trace = 0.312. The

195 MANOVA for the *Physical* sub-component showed no significant between group difference
196 within the FDP, $F(5,34) = 2.968$, $P = 0.096$ with Pillais' Trace = 0.232. However, there was a
197 significant between group difference for the *Physical* sub-component within the YDP,
198 $F(5,51) = 3.766$, $P = 0.006$ with Pillais' Trace = 0.270. The MANOVA for the *Psychological*
199 sub-component showed no significant between group difference within the FDP, $F(6,33) =$
200 0.583 , $P = 0.741$ with Pillais' Trace = 0.096. However, there was a significant between group
201 difference for the *Psychological* sub-component within the YDP, $F(6,50) = 4.160$, $P = 0.002$
202 with Pillais' Trace = 0.333. The MANOVA for the *Social* sub-component showed a
203 significant between group difference within both the FDP, $F(6,33) = 2.560$, $P = 0.038$ with
204 Pillais' Trace = 0.318, and the YDP, $F(6,50) = 2.493$, $P = 0.035$ with Pillais' Trace = 0.230.

205 ***Technical/Tactical***

206 Within the FDP, there was a significant difference between the playing-up and non-playing-
207 up groups, with the playing-up group recording a greater pass completion, lob pass, and PCE
208 'pre'. Within the YDP, there was a significant difference between the playing-up and non-
209 playing-up groups, with the playing-up group recording greater total touches. A Bonferroni
210 correction was applied, with results considered significant at $P < 0.005$ (see Table 1).

211 *****Table 1 near here*****

212 ***Physical***

213 Within the FDP, there were no significant differences between the playing-up and non-
214 playing-up groups. Within the YDP, there was a significant difference between the playing-
215 up and non-playing-up groups, with the playing-up group recording greater percentage of
216 estimated adult height attained and CMJ height, as well as quicker 0–10 m and 0–30 m sprint
217 times. A Bonferroni correction was applied, with results considered significant at $P < 0.01$

218 (see Table 2).

219 *****Table 2 near here*****

220 *Psychological*

221 Within the FDP and YDP, there were no significant differences between the playing-up and
222 non-playing-up groups. A Bonferroni correction was applied, with results considered
223 significant at $P < 0.008$ (see Table 3).

224 *****Table 3 near here*****

225 *Social*

226 Within the FDP, there was a significant difference between the playing-up and non-playing-
227 up groups, with the playing-up group recording greater total football and multisport hours.

228 Within the YDP, there was a significant difference between the playing-up and non-playing-
229 up groups, with the playing-up group recording greater total coach-led practice hours. A
230 Bonferroni correction was applied, with results considered significant at $P < 0.008$ (see Table
231 4).

232 *****Table 4 near here*****

233 *Multivariate analysis*

234 Within the FDP, the multivariate logistic regression across the four corners showed a
235 significant association with playing-up ($\chi^2(4) = 38.486$, $P < 0.001$), with the lob pass and
236 PCE 'pre' significant predictors within the model and accounted for 61.8% of variance
237 observed. Within the YDP, the multivariate logistic regression across the four corners showed
238 a significant association with playing up ($\chi^2(4) = 39.610$, $P < 0.001$), with ball juggle, 0–10
239 m sprint, PCDEQ Factor 3, PCDEQ Factor 6, and total coach-led practice hours significant

240 predictors within the model and accounted for 49.5% of variance observed (see Table 5).

241 *****Table 5 near here*****

242 **Discussion**

243 Through adopting a holistic practical framework, the primary aim of this study was to
244 examine the characteristics that discriminated academy football players who played-up a
245 chronological age group compared to those who did not. By employing the FA Four Corner
246 Model, it was found that the majority of the significant factors associated with playing-up
247 within the FDP were *Technical/Tactical* and *Social* in nature. In comparison, results within
248 the YDP revealed measures representing a broader multidisciplinary perspective. The wider
249 range of differences observed within in the YDP group may be due to the fact that these older
250 players benefited from more years of playing-up and accumulated more training. As such, the
251 implications of these findings provide an impetus for coaches and practitioners to reflect
252 upon when considering playing youth football players up a chronological age group
253 according to age phase.

254 Technical features, including greater reliability in possession and pass completion,
255 have been associated with superior performance outcomes at senior professional level (e.g.,
256 Gomez, Mitrotasios, Armatas, & Lago-Penas, 2018; Liu, Hopkins, & Gomez, 2016;
257 Rampinini, Impellizzeri, Castagna, Couus, & Wisloff, 2009; Yang, Leicht, Lago, Gomez,
258 2018). Athlete development literature in youth football has also cited technical abilities as
259 distinct predictors of greater developmental outcomes (Figueiredo, Coelho-e-Silva, & Malina,
260 2011; Figueiredo et al., 2009). In this current study, *Technical/Tactical* factors appeared to be
261 discriminant functions for playing-up amongst both age phases. However, there were no
262 common themes between the age phases regarding specific *Technical/Tactical* characteristics.
263 There appears to be an association between a greater ball maintenance and executing accurate

264 actions with playing-up in the FDP (i.e., reliability in possession, pass completion, shooting
265 accuracy, and lob pass). Whereas, in the YDP, more creative skills appeared to be associated
266 with playing-up (i.e., dribble completion, total touches, slalom dribble, and ball juggling).
267 Thus, the complex nature of the *age-specific* developmental process coupled with the
268 *technique-specific* demands of the modern game are important considerations in the playing-
269 up decision-making process for coaches and practitioners.

270 There are a number of potential reasons why *Technical/Tactical* factors differentiated
271 those who play-up compared to those who do not. First, since coaches are often the decision-
272 makers in the playing-up process and have a greater understanding of *Technical/Tactical*
273 features compared to the other sub-components (Lefebvre, Evans, Turnnidge, Gainforth, &
274 Côté, 2016); greater value may be placed on these characteristics compared to the others.
275 Indeed, the term “if you are good enough, you are old enough” is commonly used to make
276 reference towards technical ability driving the decision for a player to compete in an older
277 age group, thus placing an important emphasis on creating a developmentally appropriate
278 environment beyond chronological age grouping. Furthermore, from a positive youth
279 development perspective, traditional coach education and sport-specific qualifications often
280 focus on athlete competence compared to other developmental factors (e.g., confidence,
281 connection, and character; Côté et al., 2010; Fraser-Thomas et al., 2005; Lefebvre et al.,
282 2016). Thus, whilst more evidence is required, it is suggested coaches and organisations
283 involve key stakeholders (e.g., Sport Scientists, Sport Psychologists, Strength and
284 Conditioning Coaches) as part of a broader, multidimensional decision-making strategy when
285 considering to play a young athlete up an age group (Piggott, Müller, Chivers, Papaluca, &
286 Hoyne, 2019).

287 It is well acknowledged that the observation of physical characteristics is an important
288 part of the talent identification and development processes in youth football (Kelly &

289 Williams, 2020). In the context of playing-up, this current study revealed the 0–30 m sprint
290 test was a key discriminator in both age phases, suggesting that it is an efficient physical test.
291 It is also worth recognising previous football development literature has acknowledged sprint
292 ability as a contributing factor towards an increased likelihood of recruitment (Carling, Le
293 Gall, & Malina, 2012), greater developmental outcomes (Buchheit & Mendez-Villanueva,
294 2014; Gonaus & Müller, 2012), and attaining senior professional status (Le Gall, Carling,
295 Williams, & Reilly, 2010). Findings within the YDP also exemplify how further fitness
296 testing factors (i.e., 0–10 m sprint test and CMJ), alongside enhanced maturity status (greater
297 percentage of estimated adult height attained), contributed to playing-up. Perhaps this can be
298 recognised as a positive outcome, whereby coaches and practitioners are (consciously or
299 unconsciously) identifying enhanced physical performance and maturity status in certain
300 players, and thus offering them the opportunity to play-up to counteract or moderate their
301 physical presence within their respective chronological age group (Baxter-Jones, 1995).
302 Conversely, if coaches and practitioners are mistaking athletes' maturity for their ability, this
303 may negatively affect the long-term developmental outcomes of late maturing athletes; who
304 might miss the opportunity for more appropriate levels of competition and coaching through
305 playing-up (Cobley et al., 2009). Due to the quantitative nature of this current study, one
306 difficulty is being unable to directly identify how much a decision of playing-up is based on a
307 *reward* for outperforming age group peers, and how much a decision is based on providing
308 *sufficient challenge*. Therefore, further research is needed to understand coaches and
309 practitioners' rationale for selecting youth athletes to play-up, and how this may influence
310 their development through playing-up.

311 To mitigate growth and maturation advantages that encompass chronological age
312 grouping, bio-banding (i.e., grouping athletes based on biological age) has been introduced in
313 team sports (Bradley et al., 2019; Cumming, Lloyd, Oliver, Eisenmann, & Malina, 2017).

314 Proponents of bio-banding suggest that it may help to reduce inequality in competition that
315 occurs due to growth and maturation differences between same-aged athletes (Malina et al.,
316 2015). Specifically, when athletes with larger body types compete against each other, they
317 have been shown to rely less on their size and more on their skill to succeed (Cumming,
318 Brown, et al., 2018). At the same time, when athletes with smaller body types compete
319 against each other, they may be exposed to more manageable levels of challenge (Bradley et
320 al., 2019; Malina et al., 2015). Thus, when applied to the context of playing-up, for those
321 with advanced maturity status and physical performance characteristics in the YDP, playing-
322 up may also be a useful tool to moderate these *Physical* advantages. Furthermore, it is
323 necessary to critique current knowledge regarding the needs of youth athletes who compete
324 above their age level, and the differentiating factors that allow these athletes to succeed under
325 challenging circumstances.

326 Although birth quarter was not included in the initial data analysis, it was found that
327 14 out of the 15 players who played-up in the FDP were born in the first half of the year.
328 Additionally, nine out of 13 of the players who played-up in the YDP were born in the first
329 half of the year. As a result, the overrepresentation of early birth quartiles who play-up
330 should not be ignored. As such, it may be suggested playing-up can impact upon
331 chronological age group development twofold: (a) playing-up may moderate the RAE by
332 presenting a new cohort of later birth quartiles. This proposal would enable players who play-
333 up to become the youngest in the older age group they move into. And, (b) playing-up may
334 create an *underdog effect* (e.g., Gibbs, Jarvis, & Dufur, 2012) for chronologically older
335 players. This psychologically based explanation suggests playing-up may facilitate long-term
336 developmental outcomes by necessitating players to overcome the odds of the RAE through
337 being challenged by older and more advanced peers (Kelly et al., 2020).

338 Over the last two decades there has been a substantial growth in research directly
339 related to sport psychology and youth football (Gledhill, Harwood, & Forsdyke, 2017).
340 *Psychological* factors in this current study revealed the PCDEQ Factor 6 (support from others
341 to compete to my potential) was greater in those who played-up in the YDP. Perhaps this is a
342 result of playing-up being recognised as a reward from coaches or practitioners for expert age
343 group *performance* (resulting in greater perceived support; Ginsburg, 2014; O’Sullivan,
344 2017); as opposed to acknowledging it as a tool to facilitate *development*. Alongside the
345 importance of the coach-athlete relationship, previous research has demonstrated the
346 particular importance of support from parents to facilitate long-term player development in
347 football. For instance, Kavussanu, White, Jowett, and England (2011) found elite-level
348 football players often have parents who create an environment of appreciation of success
349 through hard work and learning. Consequently, this may support the athlete development
350 process in youth football through player-level task-oriented and self-determined motivation,
351 which is associated with a supportive parenting environment (Ullrich-French & Smith, 2009).
352 Moreover, this may also develop a culture of unconditional self-acceptance and an increased
353 self-awareness in youth football players, which could be required whilst fluctuating between
354 chronological age groups (Hill, Hall, Appleton, & Kozub, 2008).

355 It is also important to reflect upon the potential psychological considerations of
356 moving players up an age group, such as: (a) recognise they are being taken away from their
357 chronological age group friends (Bradley et al., 2019). (b) Appreciate they are changing their
358 age group coach and realise that their individual needs may change (Renshaw, Oldham,
359 & Bawden, 2012). (c) Psychological and behavioural support should be offered to help them
360 compete against older players (e.g., Vygotsky, 1978). And, (d) ensure they (and their parents)
361 are being supported during this transition (Harwood, Drew, & Knight, 2016). Thus, this
362 process must be carefully considered by all key stakeholders (e.g., coaches, practitioners,

363 players, and parents) to protect the individual's psychological well-being. Indeed, in the
364 context of playing-up, Vygotsky (1978) suggests that the role of a coach is to skilfully
365 facilitate a child's development by sharing knowledge, as well as controlling those elements
366 of a task that are initially beyond the player's capabilities. Overall, contrary to Towlson et al.
367 (2019) who highlighted that practitioners placed significantly greater perceived importance
368 on psychological factors compared to the other three sub-components, this current research
369 suggests it may be more beneficial to focus on psychology as one aspect as part of a holistic
370 approach to athlete development. Nevertheless, further qualitative research is required to
371 understand the personal experiences of athletes who play-up, as well as the decision-making
372 processes of their coaches.

373 Various concepts, such as early specialisation, early diversification, and early
374 engagement, have attempted to align activities to developmental pathways for youth athletes',
375 in order to maximise their potential to achieve senior expertise (e.g., Côté, Baker, &
376 Abernethy, 2007; Côté, Turnnidge, & Vierimaa, 2016; Ericsson, Krampe, & Tesch-Roemer,
377 1993; Ford & Williams, 2017; Ford et al., 2009). In football specifically, existing research
378 appears mixed, in that each of the activity types are associated with development and
379 performance outcomes in some but not in others. For instance, sport-specific peer-led play
380 and coach-led practice in football is typically associated with performance at both youth and
381 senior level (Hendry & Hodges, 2018; Hendry, Williams, & Hodges, 2018; Roca, Williams,
382 & Ford, 2012). In contrast, engagement in multisport activities during childhood and
383 adolescence appeared to be the biggest performance discriminator for greater senior age
384 performance (Güllich, 2019; Güllich, Kovar, Zart, & Reimann, 2016; Hornig, Aust, &
385 Güllich, 2016). This current study proposes it is not necessarily the type of activity, but more
386 specifically the quantity of engagement through a diverse range of activities that contributes
387 to playing-up. In the FDP for instance, total football and multisport hours was the only *Social*

388 factor associated with playing-up. In comparison, total coach-led practice hours *and* total
389 peer-led play hours were associated with playing-up in the YDP.

390 From a psychosocial perspective, engaging in more activity as a whole may
391 demonstrate an increased self-determined motivation to achieve expertise (Hendry, Crocker,
392 Williams, & Hodges, 2019) or a greater vested interest in football activity (Memmert, Baker,
393 & Bertsch, 2010). It may also be suggested that engaging in a greater amount of coach-led
394 practice, peer-led play, and multisport activity together are all contributing factors to superior
395 development. Coaches and practitioners are encouraged to incorporate an array of activities
396 within a football academy setting (e.g., multisport games, child-led sessions) to offer a
397 broader range of development opportunities. Since the *Social* elements within this particular
398 study only focussed on the environment that athletes develop through exploring their sport
399 participation history (e.g., coach-led practice, peer-led play, individual practice, competition,
400 multisport activities), it is also important to recognise the need for more broader social
401 measures in athlete development literature in future playing-up research (e.g., social identity,
402 Bruner & Benson, 2018; prosocial behaviour, Kavussanu & Boardley, 2009; moral
403 disengagement, Boardley & Kavussanu, 2007). As such, these research methodologies may
404 prove fruitful in guiding a social-specific component as part of a greater holistic approach.

405 ***Limitations and future directions***

406 It is important to consider methodological limitations inherent with observational case
407 studies, such as access to limited participants and issues with external validity (Morgan,
408 Pullon, Macdonald, McKinlay, & Gray, 2017). To address these limitations, it is important to
409 recognise the accessibility to a sample of professional football academy players that are often
410 difficult to recruit, particularly for multidisciplinary observations. Thus, the methodological
411 framework applied to this current study offers a holistic resource to reflect upon when

412 considering playing young football players up a chronological age group according to age
413 phase. Regarding the potential concern of applying these findings externally, the category
414 status and geodemographic factors that distinguish academies must be considered. Thus, it is
415 important to recognise this study recruited Category 3 academy players from the South West
416 of England, and whether findings can be applied to higher-level category academies or other
417 countries remains unclear.

418 Although playing-up has implications for performance and developmental outcomes
419 in youth football, further qualitative research is required to investigate athlete perceptions and
420 experiences of playing-up (e.g., Goldman, Turnnidge, Kelly, de Vos, & Côté, under review).
421 Parents perceive playing-up as an opportunity for young players to attain positive
422 performance outcomes (Ginsburg, 2014; O’Sullivan, 2017). However, these outcomes do not
423 necessarily match with what youth may *want* to take away from their sport experiences
424 (Wiersma, 2000). For example, findings from preliminary research indicates that youth
425 athletes may not want to play-up if it prevents them from participating with same-aged
426 friends (Campbell, Bracewell, Blackie, & Patel, 2018). Anecdotal evidence shows that
427 athletes who play-up may perceive an increased risk of injury due to overtraining or
428 aggressive play from opponents (Moir, 2013). Indeed, this may further existing knowledge
429 concerning *Social* factors that were limited in this current study. In addition, further
430 longitudinal studies are suggested to identify whether playing-up has long-term benefits
431 towards developing expertise, through exploring transitions from youth level to professional
432 status or by examining how playing-up may accelerate development. Finally, although
433 perhaps applied less commonly, the factors that differentiate those who “play-down” a
434 chronological age group should also be examined. Similarly, the psychosocial implications of
435 playing-down may arguably differ to those who play-up, thus they should be considered as
436 two independent contexts to facilitate an appropriate learning environment for young athletes.

437 **Conclusion**

438 Findings from this current study support the implementation of the FA Four Corner Model to
439 facilitate a multidisciplinary approach in youth football player development. In the FDP,
440 *Technical/Tactical* and *Social* characteristics appeared to differentiate those who play-up
441 compared to those who do not. In the YDP however, there were significant measures
442 representing all four sub-components. Subsequently, it is important that coaches and
443 practitioners consider these holistic factors when deliberating playing youth footballers up a
444 chronological age group within both age phases. Further, coaches and practitioners are
445 encouraged to utilise playing-up as a strategy to facilitate greater individual *development*,
446 rather than solely focussing on fixed chronological age grouping for elite *performance*.

447 **Disclosure statement**

448 The authors declare that they have no conflict of interest.

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