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Changes in strength, power, and speed across a season in English county cricketers

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CHANGES IN STRENGTH, POWER AND SPEED ACROSS A SEASON IN ENGLISH COUNTY CRICKETERS

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1 **CHANGES IN STRENGTH, POWER AND SPEED ACROSS A**
2 **SEASON IN ENGLISH COUNTY CRICKETERS**

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50 **ABSTRACT**

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52 **Purpose:** Previous research has investigated changes in athletes' strength, power and speed
53 performances across the competitive season of many sports, although this has not been
54 explored in cricketers. The aim of this study, therefore, was to investigate changes in lower
55 body strength, jump and sprint performances across the English county cricket season.

56 **Methods:** Male cricketers ($n = 12$; age 24.4 ± 2.3 years; body mass, 84.3 ± 9.9 kg; height,
57 184.1 ± 8.1 cm) performed countermovement jumps (CMJ) and 20 m sprints on 4 separate
58 occasions, and back squat strength testing on 3 separate occasions across a competitive
59 season. **Results:** Both absolute (12.9%, $P = 0.005$, effect size (ES) = 0.53) and relative lower
60 body strength (15.8%, $P = 0.004$, ES = 0.69) and CMJ height (5.3%, $P = 0.037$, ES = 0.42)
61 improved significantly over the pre-season training period, although no significant change
62 (1.7%, $P > 0.05$) in sprint performance was observed. Contrastingly, absolute (14.3%, $P =$
63 0.001 , ES = 0.72) and relative strength (15.0%, $P = 0.001$, ES = 0.77), CMJ height (4.2%, $P =$
64 0.023 , ES = 0.40) and sprint performance (3.8%, $P = 0.012$, ES = 0.94) declined
65 significantly across the season. **Conclusions:** The results of this study show that both the
66 demands of the competitive cricket season and current in-season training practices do not
67 provide a sufficient stimulus to maintain strength, jump, and sprint performances in these
68 cricketers. Therefore, coaches should implement a more frequent, higher load strength
69 training program across the competitive cricket season.

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72 **Key words:** competition, maintenance, performance, jump, sprint, squat

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100 INTRODUCTION

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102 With the increasing popularity of Twenty-20 and one-day cricket, the intensity of the game
103 has increased. Batsmen are increasingly expected to score more runs, which involves taking
104 more risks and requires the ability to run faster between the wickets. Glazier *et al.*¹ identified
105 a strong correlation between run up speed and ball release speed ($r = 0.70-0.73$) of fast-
106 medium bowlers, with other studies also reporting running speed as a predictor of ball release
107 speed.^{2,3} Sprinting is often involved in moments that directly affect the outcome of the game,
108 therefore high sprinting speed capacity is considered to be an important attribute of the
109 modern cricketer.⁴

110

111 Studies investigating the relationship between strength and sprint performance have observed
112 a moderate-strong significant correlations between the two in a variety of sports.⁵⁻⁸ In
113 addition, Comfort *et al.*⁹ reported that 20 m sprint time (3.03 ± 0.09 s to 2.85 ± 0.11 s; $P <$
114 0.001) improved concurrently with one repetition maximum (1RM) back squat strength (1.78
115 ± 0.27 kg.kg⁻¹ to 2.05 ± 0.21 kg.kg⁻¹; $P < 0.001$) over an 8 week training period undertaken by
116 rugby league players. Similarly, research has also identified a strong relationship between
117 vertical jump height and sprint time in numerous sports,^{6, 8, 10} with Carr *et al.*¹⁰ recently
118 reporting a strong correlation between countermovement jump (CMJ) height and 20 m sprint
119 times ($r = -0.74$) in a group of first-class county cricketers and Foden *et al.*¹¹ reporting
120 similar findings between these variables in academy cricketers ($r = -0.67$). It is, therefore, no
121 surprise that strong associations have also been found between lower body strength and
122 vertical jump height. Wisloff *et al.*⁸ reported a correlation of $r = 0.78$ between 1RM half
123 squat strength and CMJ height, while Comfort *et al.*⁶ reported a correlation of $r = 0.76$
124 between maximum back squat strength and CMJ height. These relationships between
125 strength, jump and sprint performance suggest that maintaining strength levels is vital in
126 maintaining jump and sprint performance.

127

128 A combination of strength training and conditioning is typically performed throughout the
129 pre-season period, preparing cricketers for the start of the season. Justifiably, and as in many
130 skill-based sports, focus then shifts towards technical and tactical preparation as the
131 competitive season approaches. However, this transition to technical and tactical work is
132 often conducted at the expense of regular strength training and in some circumstances the
133 cessation of strength training. Over the course of a 26 week competitive season, this oversight
134 is worrying from both performance and injury prevention perspectives, as declines in strength
135 are observed 2-4 weeks following the cessation of strength training.¹² This notion may have
136 **negative** implications for sprint and jump performance **throughout the competitive season,**
137 given the aforementioned association observed between **strength and sprint and jump**
138 **performances.**^{6, 8}

139

140 The competitions themselves conducted throughout the in-season period can, in some sports,
141 provide a sufficient stimulus to maintain or even improve strength and power levels.¹³⁻¹⁵
142 Hoffman *et al.*¹³ for example, suggested that the demands of the basketball season provided
143 an adequate stimulus to maintain leg strength and vertical jump performance, although there
144 was a slight decrease in performances in the middle of the season. Less physically demanding
145 sports, such as cricket, may not allow this to happen, however, as games are unlikely to
146 provide a sufficient strength and/or power stimulus.

147

148 With the large ratio of aerobic compared to strength or power based activities during one-day
149 and test game play for both bowlers and fielders,¹⁶ cricket provides a challenge to improving

150 muscle strength, power and speed during the competitive season. However, studies have
151 effectively maintained, or improved, strength, power, and speed across a competitive
152 season¹⁷⁻¹⁹ by implementing in-season strength training programs. Baker²⁰ reported that sub-
153 elite rugby league players increased lower body performance, while elite athletes managed to
154 maintain performance across the season. The protocol used by Marques *et al.*¹⁸ also involved
155 variation in volume and intensity; however, cricket presents unique demands due to the long
156 duration (e.g. four days) of competitive games, and relatively low intensities.¹⁶ More
157 research, therefore, is required into in-season training strategies adopted by cricketers in order
158 to identify and develop optimal strategies.

159

160 The aim of this study was to investigate the variation in strength, jump and sprint
161 performance of English county cricketers across the pre-season period and the English county
162 season. It was hypothesized that strength, jump and sprint performance would improve over
163 the long off-season and pre-season training periods (20 weeks). It was also hypothesized that
164 strength, jump and sprint performance would then decline throughout the competitive season,
165 due to the reduction in the frequency and therefore overall volume of strength training.

166

167 **METHODS**

168

169 **Subjects**

170 All subjects were regular first team first-class county cricketers ($n = 12$; age 24.4 ± 2.3 years;
171 body mass 84.3 ± 9.9 kg; height 184.1 ± 8.1 cm) from the same club. Subjects consisted of all
172 rounders ($n = 6$), batsmen ($n = 4$) and spin bowlers ($n = 2$). They were provided with full
173 participant information and all provided written informed consent. The study protocol was
174 approved by the institutional ethics committee and conformed to the principles of the World
175 Medical Association's Declaration of Helsinki (1983). Players from the team that regularly
176 missed strength training sessions due to injury or illness across the season were excluded
177 from analysis, resulting in the sample size of 12.

178

179 **Design**

180 This study used a repeated measures observational design to identify the changes in strength,
181 power and speed of English county cricketers across the English county season. The sprint 20
182 m distances represented the short sprints performed when running between the wickets (17.68
183 m), with CMJ height selected as an indicator of lower body power. The three repetition
184 maximum (3RM) back squat test was selected as a measure of lower body strength. Testing
185 was performed at the start of the off-season training period (week 1), at the end of pre-season
186 (week 20), in-season (week 36), and at the end of the season (week 46). Strength testing was
187 not performed for the mid-season testing (i.e. week 36) due to restrictions made by technical
188 coaches due to the high volume of fixtures.

189

190 All subjects were instructed to arrive at each session as they would to training, in a fed and
191 hydrated state, in an attempt to standardize the athletes' status prior to each testing session.
192 None of the subjects were injured during the testing period. The subjects were familiar with
193 all of the tests completed as they formed part of the normal monitoring at the cricket club. All
194 speed and jump tests were performed on an indoor cricket surface which the subjects were
195 accustomed to training and testing on. Subjects were from the same club, as in a previous
196 study by Carr *et al.*,¹⁰ in which they performed the jump and sprint tests incorporated in the
197 current study. The CMJ and 20 m sprint tests were found to be reliable both within-session
198 (ICC = 0.987 and 0.964, respectively) and between-sessions (ICC = 0.966 and 0.923,
199 respectively).

200

201 **Methodology**

202 The subjects performed the tests in the following order: CMJ, 20 m sprints, strength testing.
203 Each testing session was conducted at the same time of day, ≥ 48 hours after any previous
204 training or competition. Testing was conducted in small groups to increase the level of
205 competition and aid in the motivation of the players to aid in ensuring maximal effort.

206

207 *Jump Tests*

208 Prior to the CMJ, subjects undertook a standardized 5 minute non-fatiguing dynamic warm-
209 up, including mobilisation exercises and various jumping activities. All subjects performed 3
210 trials with 2 minutes recovery time between each trial. The best performance of the 3 trials
211 was reported for comparison between testing sessions.

212

213 The subjects were required to keep their hands on their hips throughout each jump trial to
214 eliminate the facilitative use of the arms. Jump height was assessed using a portable jump mat
215 (Fit Tech, Australia), which calculated jump height from flight time. Flight time was defined
216 as the period between the instants of take-off and subsequent ground contact upon landing.
217 This time was then used in the equation of uniform acceleration (A) to determine jump
218 height:

219

$$220 \quad JH = \frac{9.81 \times FT^2}{8} \quad (A)$$

221

222 Where JH = jump height and FT = flight time

223

224

225 *Sprint Tests*

226 The subjects undertook a standardized 10 minute warm-up which included activation and
227 mobilisation exercises in addition to sprint drills and progressive sprints. The subjects
228 performed three sprints each, with 2.5 minutes rest between each trial. The time taken to run
229 20 m was measured using Brower timing gates (Draper, Utah, USA). The subjects started 0.5
230 m behind the first timing gate at 0 m, using a two point stationary start. There was a 20 m run
231 off after the final timing gate to reduce the possibility of the subjects decelerating early, with
232 the lead investigator visually checking that each subject attempted to accelerate through the
233 entire 20 m. The best of three trials was reported for comparison between testing sessions.

234

235 *Strength Tests*

236 The subjects performed a standardized barbell warm-up which included squat and lunge
237 variations. Subjects then performed three warm-up sets of 5, 3, and 2 reps at 50%, 75%, and
238 90% of the target load, respectively. They then performed a 3RM back squat set, with 1RM
239 back squat performance subsequently predicted using the Brzycki equation.²¹ If the subject
240 exceeded 3 repetitions they rested for 3-5 minutes before repeated the set at a heavier load,
241 with increments of 2.5-5.0 kg dependent on the individual's previous performance. Whilst
242 this method is an estimation of maximal strength calculated using a regression, it has been
243 shown to be an accurate method of predicting 1RM back squat performance.²² The 3RM back
244 squat protocol was selected to reduce the risk of musculoskeletal injury, particularly as the
245 subjects did not perform regular maximal strength training. Predicted 1RM values were then
246 calculated and expressed as relative measures (predicted 1RM / body mass) to take into
247 account any changes in body mass across the season.

248

249

250 *Strength Training*

251 Strength training programmes were split into phases (Tables 1-4), with the repetition volumes
252 designed as a range, depending on the players' role and training age. Strength training
253 sessions were performed twice per week during the off-season period (weeks 1-14), then once
254 per week during pre-season (weeks 15-20) and the competitive season (week 21 onwards).
255 The in-season strength programme (Table 4) was performed from week 19, except for week
256 20, when the session was replaced by strength testing (T2). However, adherence to the
257 programme declined noticeably from week 24. Training frequency was one session per week
258 (100% adherence) until week 24, then approximately one session per month (25% adherence
259 rate) between weeks 24 and 46. Due to lack of adherence to the program, program content
260 remained unchanged between weeks 24 and 46.

261

262 Subjects also performed a small volume of sprint technique training integrated into their
263 warm ups prior to skill based training. Additionally ~20 minutes of maximal aerobic speed
264 (MAS) training at 110-120% MAS was conducted once per week prior to a skill based
265 training sessions, across the duration of the study.

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INSERT TABLES 1-4 ABOUT HERE

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271

272

273 **Statistical Analyses**

274 Normal distribution was assessed using Shapiro-Wilk's test of normality. Repeated measures
275 analysis of variance (RMANOVA), with Tukey least significant difference (LSD) post-hoc
276 analysis used to determine differences in CMJ and strength data across time points.
277 Friedman's test, with multiple Wilcoxon signed ranks tests and Bonferroni correction, was
278 performed to compare sprint performances across time points. SPSS software (version 20.0,
279 IBM) was used in all of the above calculations. Data is presented as percentage change
280 including 90% confidence intervals (CI). Additionally, effect sizes (ES) were calculated
281 using Cohen's d and interpreted by the criteria proposed by Rhea.²³ The subjects in this study
282 were considered as recreationally trained as they had been training consistently for between 1
283 and 5 years and demonstrated low relative strength levels, therefore effect sizes were
284 interpreted as follows; large as >1.5, moderate as 0.80-1.50, small as 0.35-0.80, and trivial as
285 <0.35.

286

287

288

288 **RESULTS**

289

290 There were no significant ($P > 0.05$) changes in body mass across the season (Table 5). CMJ
291 performance decreased significantly ($P < 0.001$, Power = 0.87) across time points with
292 Tukey's LSD pairwise comparison revealing a small yet significant improvement between T1
293 and T2 (5.2%, 90% CI = 4.25-6.15, $P = 0.037$, ES = 0.42) and a small but significant decline
294 between T2 and T4 (4.3%, 90% CI = 3.22-5.30, $P = 0.023$, ES = 0.40) (Table 5). Sphericity
295 was assumed via Mauchley's test ($P > 0.05$).

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INSERT TABLE 5 ABOUT HERE

299

300 Sprint performances decreased significantly ($P < 0.001$, Power = 0.82) between testing
301 sessions, with Wilcoxon's test revealing small to moderate and significant declines in
302 performance between T2 and T3 (2.3%, 90% CI = 1.67-2.99, $P = 0.024$, ES = 0.61), and T2
303 and T4 (4.0%, 90% CI = 2.93-5.07, $P = 0.012$, ES = 0.94) (Table 5).

304

305 Lower body strength (3RM back squat) changed significantly ($P < 0.001$, Power = 0.99)
306 between testing sessions, with Bonferroni post-hoc analysis showing a small but significant
307 increase occurred between T1 and T2 (12.9%, 90% CI = 9.91-15.89, $P = 0.005$, ES = 0.53),
308 and a small yet significant decrease between T2 and T4 (14.2%, 90% CI = 11.16-17.24, $P =$
309 0.001, ES = 0.72) (Table 5). Similarly relative strength (predicted 1RM / body mass)
310 demonstrated significant differences ($P < 0.001$, Power = 0.99) between testing sessions, with
311 Bonferroni post-hoc analysis identifying a small but significant improvement between T1 and
312 T2 (15.7%, 90% CI = 12.47-18.93, $P = 0.004$, ES = 0.69), and a small yet significant decline
313 between T2 and T4 (15.0%, 90% CI = 12.01-17.99, $P = 0.001$, ES = 0.77) (Table 5).

314

315

316 DISCUSSION

317

318 As hypothesized, strength, jump and sprint performances all improved between the start of
319 the off-season and end of the pre-season period (T1-T2) (Table 5), although the small
320 improvement in sprint performance was not statistically significant ($P > 0.05$). Additionally,
321 as hypothesized, 3RM strength (14.2%, 90% CI = 11.16-17.24%), relative strength (15.0%,
322 90% CI = 12.01-17.99%), CMJ height (4.3%, 90% CI = 3.22-5.30%), and sprint (4.0%, 90%
323 CI = 2.93-5.07%) performances subsequently declined between the end of pre-season and the
324 end of the competitive season (T2-T4) (Table 5). Body mass did not differ significantly
325 across the season and therefore is unlikely to have influenced any of the performance
326 variables.

327

328 A study with a similar protocol investigated the effect of detraining in the handball season.¹⁷
329 Subjects performed resistance training during pre-season for a period of 12 weeks, over
330 which sprint performance, loaded and unloaded CMJ height, and ball throw speed improved.
331 Resistance training was then discontinued for a period of 7 weeks. The authors reported no
332 significant decline in CMJ or sprint performance, but a significant decline in ball throw
333 speed. The reason for no significant decline in **sprint and CMJ** performance could **have been**
334 **due to the volume of sprinting and jumping** performed during competitive play in handball
335 **which may have served as a sufficient in-season force and power stimulus for maintaining**
336 **sprint and jump performances for this cohort.** Additionally, this detraining period was only 7
337 weeks in length and so a significant decline may have been observed over a longer detraining
338 period, similar to that of the current study which saw a decline in CMJ performance after 16
339 weeks of the competitive season.

340

341 Resistance training performed over a competitive lacrosse season (24 weeks) of similar
342 length as the current study (26 weeks) elicited improvements in sprint and change of direction
343 performance.²⁴ The subjects had similar anthropometric and strength characteristics to those
344 in the present study, therefore, had resistance training continued over the course of the county
345 cricket season, similar findings may have been observed. However, differences in resistance
346 training between groups may have affected the results. Another factor to be considered is that
347 in the study by Thomas *et al.*²⁴ competitive matches occurred on one day per week

348 throughout the study period, rather than the five days in the current study, allowing more time
349 to perform non-game specific training.

350

351 Researchers have shown that the session design of in-season resistance training is also
352 important to ensure maintenance or development of specific athletic attributes.^{18, 25-28} Studies
353 have observed that prolonged periods of training at low-moderate intensity do not prevent a
354 decline in strength levels.²⁵ Training at low volumes for a prolonged period may trigger a
355 decrease in lean body mass, power, and speed.²⁰ This is supported by the findings of the
356 current study. Maintaining the intensity of strength training is also essential in the
357 maintenance or development of strength and with the underlying influence of strength on
358 sprint and jump performance, this must be considered when designing an in-season
359 programme. Moreover, conclusions of a meta-analysis were that the optimum intensity for
360 maximal strength gains is 85% 1RM.²⁹

361

362 Training at half the volume and frequency of pre-season training, but maintaining 80-90%
363 1RM intensity was enough to maintain strength at near pre-season levels for 10 weeks across
364 an American football season.²⁶ Sprint and vertical jump performance also improved. This
365 suggests that the in-season programme in the current study may have been effective if
366 adhered to. However, one methodological concern with this study was the very short pre-
367 season period of only 2.5 weeks.²⁶ This, and the community college standard of the athletes,
368 means their capacity for adaptation may be much greater than athletes with a longer training
369 history and a longer pre-season period. Collegiate athletes typically participate in other sports
370 and so the college-level athletes observed in the aforementioned study may well have been
371 training for another sport which may have also contributed to the observed performance
372 results.

373

374 Research has shown the importance of variation in training stimuli. Studies investigating the
375 effect of high force and high power resistance training methods on strength and power levels
376 suggest that both methods can be ineffective when used alone and over a prolonged period.^{27,}
377^{28, 30} Newton *et al.*²⁸ observed no improvements in jump height in elite volleyball subjects
378 after performing heavy slow resistance training over the pre-season period. The same
379 research group found that the addition of ballistic training stopped the decline in jump
380 performance which occurred whilst performing exclusively heavy slow resistance training.
381 However, performing explosive resistance training exclusively was not sufficient to maintain
382 maximum and explosive strength in female volleyball players.²⁷

383

384 Other research has shown that a varied program may be most effective training method.^{30, 31}
385 Harris *et al.*³⁰ observed greater benefits from using a combined programme than high force or
386 high power programmes in three groups of previously trained men. Marques *et al.*¹⁸ observed
387 an improvement in lower body strength and CMJ height over a 12 week volleyball season,
388 with session volumes and intensities varied between 3 sets of 3-6 repetitions at 50-80% 4RM.
389 These sessions included loaded jumping drills that the subjects had not previously performed,
390 which may account for the improved performances. Whether this intensity is sufficient to be
391 the cause for the observed improvements is questionable. The training effect may have
392 derived from the combination of moderate intensity resistance training and plyometric
393 training, or the novel training stimulus provided by the loaded jumping exercises.

394

395 This type of programme provides a simple way to introduce variation into athletes'
396 programmes. With regard to its potential application to cricket, it must be taken into
397 consideration that this programme was designed for rugby which requires maintenance of

398 hypertrophy over the competitive season. Whilst the variation in this protocol could be
399 useful for cricket athletes, hypertrophy, particularly in the upper body of fast bowlers, may
400 not be beneficial or, therefore, desired.³² Keeping repetitions lower and maintaining intensity
401 has been shown to elicit strength gains with less hypertrophy.³³⁻³⁵

402

403 Due to the unique demands and fixture scheduling in cricket, further research should be
404 conducted investigating the efficacy of varied in-season strength training protocols. Research
405 in basketball has shown that a training frequency of two sessions per week is effective at
406 maintaining strength levels for up to 6 months,³⁶ with research in other sports showing
407 similar findings.^{20, 24} However, one session per week has been shown to be effective at
408 preventing a significant decline in strength, sprint and jump performance over 12 weeks if the
409 intensity of the session is equal to at least 4RM (~90% 1RM).¹⁹ It is difficult to determine
410 whether these findings would occur over a longer period, therefore, training frequency may
411 be a key factor to investigate further, given the limited time opportunities available during the
412 competitive cricket season.

413

414 PRACTICAL APPLICATIONS

415

416 The results of this study show that the physical demands of the English county cricket season
417 alone are not enough to maintain pre-season strength, jump and sprint performance. Findings
418 from research in a number of other sports show that performing regular resistance training
419 can not only maintain, but improve pre-season levels of strength across a competitive season.
420 Coaches should implement a time-effective resistance training strategy in-season, adopting a
421 varied wave-like periodization. Based on research findings, programmes should maintain a
422 minimum intensity ($\geq 80\%$ 1RM) usually associated with strength training and a minimum
423 frequency of one session per week, but ideally two sessions week, depending on the
424 competition schedule.

425

426 CONCLUSIONS

427 Both the demands of the competitive English county cricket season and current in-season
428 training practices undertaken by these county cricketers do not provide a sufficient stimulus
429 to maintain pre-season levels of strength, jump and sprint performance across this period. It is
430 therefore suggested that county cricket players include ≥ 1 strength training session per week,
431 incorporating compound movements at loads $\geq 80\%$ 1RM.

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For Peer Review

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Tables

Table 1. Example of training program during the General Preparation Phase 1 (Weeks 1- 6)

Session 1	Sets x Reps	Session 2	Sets x Reps
60-70% 1RM		60-70% 1RM	
Back Squat	3 x 6-10	Overhead Squat	3 x 6-8
Romanian Deadlift	3 x 6-10	Mid-Thigh Clean Pull	3 x 6-8
Hip Thrusts	3 x 6-10	Hip Thrusts	3 x 6-10
Close Grip Pull Ups	3 x 8-10	Wide Grip Pull Ups	3 x 8-10
Weighted Press Ups	3 x 6-8	Behind Neck Press	3 x 5-8

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Table 2. Example of training program during General Preparation Phase 2 (Weeks 7-14)

Session 1	Sets x Reps	Session 2	Sets x Reps
80-85% 1RM		75-80% 1RM	
Back Squat	3 x 5-8	Overhead Squat	3 x 5-6
Romanian Deadlift	3 x 5-8	Mid-Thigh Power Clean	3 x 4-5
Hip Thrusts	3 x 5-8	Hip Thrusts	3 x 5-8
Close Grip Pull Ups (Weighted)	3 x 4-6	Prone Bench Pull	3 x 5-6
Weighted Press Ups	3 x 4-6	Push Press	3 x 4-6

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Table 3. Example of training program during Specific Preparation Phase1 (Weeks 15-18)

Session 1	Sets x Reps
60-80% 1RM	
Power Clean	3 x 4-5
Back Squat	3 x 5-6
Hip Thrusts	3 x 4-6
Romanian Deadlifts	3 x 5-6
Close Grip Pull Ups (Weighted)	3 x 4-5

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Table 4. Example of in-season (Competition Phase) training program (Week 19 onward)

Session 1	Sets x Reps
70-90% 1RM	
Power Clean	3 x 3
Back Squat	3 x 3-5
Romanian Deadlifts	3 x 5
Close Grip Pull Ups (Weighted)	3 x 3

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Table 5. Descriptive statistics (means \pm standard deviations) for body mass, jump, sprint, and strength testing results across the testing period.

	T1	T2	T3	T4
Body Mass (kg)	84.3 \pm 9.9	84.0 \pm 9.3	83.8 \pm 9.2	83.6 \pm 9.5
CMJ (cm)	42.3 \pm 5.9	44.5 \pm 4.5*	43.5 \pm 4.2**	42.6 \pm 5.0***
Sprint (s)	3.06 \pm 0.15	3.00 \pm 0.11	3.07 \pm 0.12**	3.12 \pm 0.13***
3RM (kg)	97.1 \pm 25.9	109.6 \pm 21.5*		94.0 \pm 21.6***
1RM (kg/kg)	1.27 \pm 0.30	1.47 \pm 0.28*		1.25 \pm 0.29***
* Significant increase in performance between T1 and T2				
** Significant decrease in performance between T2 and T3				
*** Significant decrease in performance between T2 and T4				

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