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**A Coach Perspective on the Use of Planned Disruptions in High Performance
Sports**

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25 **A Coach Perspective on the Use of Planned Disruptions in High Performance Sports**

26 **Abstract**

27 In elite sports, a case is increasingly made for the structural inclusion of what we label as
28 planned disruptions. These are structured and deliberate training activities whereby athletes
29 are exposed to increased and/or changing demands under controlled circumstances. Despite
30 the growing body of evidence in support of planned disruptions (e.g., Sarkar & Fletcher,
31 2017), there is a lack of knowledge on which strategies coaches use in an applied context and
32 why they use them. The present study, therefore, aimed at exploring the different types of
33 planned disruptions high performance coaches use and the desired outcomes of these
34 disruptions. To this end, thematic analysis (Braun, Clarke, & Weate, 2016) was used to
35 analyse semi-structured interviews with nine talent development and elite level coaches (M_{age}
36 = 42.9, $SD = 8.3$; 6 male, 3 female). Results indicated that coaches use a combination of nine
37 types of planned disruptions (i.e., location, competition simulation, punishments & rewards,
38 physical strain, stronger competition, distractions, unfairness, restrictions, and outside the
39 box). These strategies were used to familiarize athletes to pressure, create awareness, develop
40 or refine personal resources, and promote team processes. Three additional themes emerged,
41 namely the surprise use of planned disruptions, periodization, and the impact on personal
42 relationships. The findings in the present study can guide further applied and theoretical
43 explorations of the use of planned disruptions.

44

45 **Keywords:** Mental Toughness; Pressure Training; Resilience; Stress Exposure Training;
46 Stress Inoculation Training

47 **A Coach Perspective on the Use of Planned Disruptions in High Performance Sports**

48 A growing body of evidence suggests that adversity or stress-related experiences hold
49 value for athletic development and performance. For example, a recent study examining the
50 developmental history of super-elite Olympic champions (i.e., multiple medallists) found that
51 these champions all reported experiencing early life adversity which – coupled with a positive
52 sport-related experience – was instrumental for their eventual athletic success (Hardy et al.,
53 2017). Based on this and similar findings (e.g., Galli & Reel, 2012; Sarkar, Fletcher, &
54 Brown, 2015), scholars have considered the practical implications of this knowledge. It seems
55 evident that imposing significant adversity or trauma on promising and talented young
56 athletes would be highly problematic and unethical. Increasingly, however, a case is made for
57 the structural inclusion of planned disruptions in the development of talented and elite athletes
58 (Collins & MacNamara, 2012; Sarkar & Fletcher, 2017). Planned disruptions can be
59 described as structured and deliberate activities, whereby athletes are exposed to increased
60 and/or changing demands under controlled conditions. Such planned disruptions are typically
61 relatively small training activities aimed towards eliciting a subjective stress response (i.e.,
62 assessment of the demands-resources balance; Lazarus & Folkman, 1984) and increasing
63 pressure (i.e., perceived importance of performing well; Baumeister, 1984).

64 Artificial challenges such as planned disruptions might provide valuable learning
65 opportunities (Collins & MacNamara, 2012), provided they are carefully implemented based
66 on the developmental needs of the individual athlete (Collins, MacNamara, & McCarthy,
67 2016) within a sufficiently supportive environment (Fletcher & Sarkar, 2016; Savage, Collins,
68 & Cruickshank, 2017). Planned disruptions can, for example, be related to training under
69 pressure (Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers, 2009, 2010). This approach
70 aims to specifically train and learn to perform relevant sport or task specific perceptual-motor
71 skills (e.g., dart throwing, basketball free throw shooting, handgun shooting) under the same
72 pressurized circumstances under which they eventually have to be performed. Results from

73 these studies show that such pressure training leads to long term increased performance under
74 high pressure.

75 It has also been argued that stress exposure through planned disruptions can play a role
76 in the development of athletes' resilience (Fletcher & Sarkar, 2016; Galli & Gonzalez, 2015;
77 Kegelaers & Wylleman, in press) and mental toughness (Bell, Hardy, & Beattie, 2013; Crust
78 & Clough, 2011; Weinberg, Freysinger, & Mellano, 2016). To illustrate, Fergus and
79 Zimmerman (2005) proposed a challenge model of resilience, suggesting that exposure to
80 some adversity can strengthen resistance against future adversity. This model is based on the
81 idea that the stress associated with adversity will, over time, lead individuals to develop both
82 personal (e.g., coping strategies) and environmental (e.g., use of social support) protective
83 resources – a process also referred to as steeling (Rutter, 2006). This steeling occurs when
84 stress levels are high enough to stimulate the development of new resources, but not too high
85 that overcoming the stress becomes impossible. Furthermore, such experiences might also
86 familiarize athletes to stress-related symptoms and lead to more constructive interpretations of
87 these symptoms (Hanton, Cropley, Neil, Mellalieu, & Miles, 2007). In line with the challenge
88 model of resilience, a recent study found a positive relation between a history of moderate life
89 adversity – compared to no or very high adversity – and functioning outcomes such as lower
90 physiological stress responses and better performance under pressure (Moore, Young,
91 Freeman, & Sarkar, 2018). What remains unclear, however, is how much and what type of
92 stress is optimal, and which other mechanisms (e.g., reflective behaviours) have to be in place
93 (Collins et al., 2016).

94 Finally, planned disruptions can be traced back to traditional clinical psychotherapy
95 techniques such as systematic desensitization (Wolpe, 1958), stress inoculation training
96 (Meichenbaum, 1985), and related non-clinical approaches such as stress exposure training
97 (Driskell, Sclafani, & Driskell, 2014). These phased approaches are generally built around
98 educating individuals on the nature and effects of stress, teaching specific psychological skills

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99 (e.g., cognitive and physiological control techniques), and consequently practicing these skills
100 through gradual exposure to realistic stress situations. As such, the selective and periodic use
101 of planned disruptions might be an effective way for athletes to develop, refine, and train
102 psychological skills under representative conditions and, perhaps more importantly, allow the
103 athlete to build confidence in the use of these skills (Collins et al., 2016; Savage et al., 2017).
104 In sports, such approaches have already been demonstrated to be effective to reduce anxiety
105 and increase performance (Hamilton & Fremouw, 1985; Mace & Carroll, 1986, 1989).

106 Although it seems planned disruptions can improve performance under pressure and
107 play a role in the development of resilience and mental toughness, there remains a lack of
108 knowledge on how such strategies can be structurally implemented within an applied setting.
109 It should be noted that a number of scholars have previously advocated the use of planned
110 disruptions without giving concrete examples or clarifying how this can be done in praxis
111 (e.g., Collins & MacNamara, 2012; Sarkar & Fletcher, 2017; Weinberg et al., 2016). Others
112 have examined specific disruptions under highly controlled laboratory conditions, which are
113 not easily replicable in an applied setting or have limited ecological validity (Oudejans &
114 Pijpers, 2010). To date, only one study directly explored coaches' experiences of planned
115 disruptions as a way to increase pressure on their athletes (Stoker, Lindsay, Butt, Bawden, &
116 Maynard, 2016). This study found that coaches set up planned disruptions by increasing the
117 demands of the training activity and by adding consequences to the training. Task demands
118 might, for example, be increased by setting up handicaps (Mace & Carroll, 1986), creating
119 additional noise (Driskell et al., 2014), and setting up exercises under fatigue (Crust &
120 Clough, 2011). Consequences might be altered by introducing observers (Oudejans & Pijpers,
121 2009), and by adding rewards and forfeits (e.g., financial or physical; Bell et al., 2013; Mace
122 & Carroll, 1986; Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers, 2009). It is unclear
123 however whether these strategies encompass the broad spectrum of planned disruptions used
124 by coaches.

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150 provide a valuable source of practical knowledge on planned disruptions, as highlighted by
151 Greenwood, Davids, and Renshaw (2012):
152 coaches' experiential knowledge, gained through day-to-day immersion within specific
153 performance contexts, might be useful to scientists as it is based on extensive
154 experience and an intuitive understanding of the influence of performance task
155 constraints on athlete behaviours (p. 412).

156 Using a combination of purposeful criterion and opportunistic sampling (Suri, 2011),
157 participants were selected based on the following criteria: (a) be employed as a coach by their
158 national sport governing body, (b) coach athletes who received a high performance athlete
159 statute from their National Olympic Committee, and (c) already utilize some form of planned
160 disruptions in their coaching. These criteria were adopted to ensure that the coaches had both
161 a high level of expertise and sufficient experience with the topic of study. This study adopted
162 a heterogenous sampling approach, selecting participants representing a range of different
163 sports – both individual and team sports – and including both talent development and elite
164 level coaches. Further demographics are provided in Table 1. All elite level coaches, except
165 for one (korfbal is not an Olympic sport), had Olympic coaching experience and all talent
166 development coaches had experience coaching at major international tournaments at their
167 respective age groups. The coaches were recruited in the Netherlands ($n = 3$) and Flanders (n
168 $= 6$) (the Dutch speaking community of Belgium) and had an average of 18.33 years of
169 coaching experience ($SD = 10.99$). The disproportionate representation of male participants
170 was expected, given the fact that male coaches largely outnumber female coaches in elite
171 sports (De Bosscher, Shibli, Westerbeek, & Van Bottenburg, 2015).

172 -- INSERT TABLE 1 AROUND HERE --

173 **Procedure and Data Collection**

174 Upon receiving institutional ethical approval, potential participants were searched
175 through the extended network of the authors. A total of 12 coaches, who could potentially

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176 meet all selection criteria, were identified by the authors. These coaches were consequently
177 contacted via email or telephone. In order to establish that the coaches already used planned
178 disruptions, a pre-interview question was asked at this point: “Do you sometimes use
179 coaching strategies specifically aimed to increase pressure on your athletes?” Three of the
180 potential participants either did not meet all selection criteria or were not available for
181 interviews, resulting in a final sample of nine participants. Some qualitative researchers have
182 advocated the use of generic sample size guidelines, typically based on the concept of
183 saturation (e.g., Guest, Bunce, & Johnson, 2006). However, recently it has been argued that a
184 number of practical (e.g., resource constraints or lack of suitable participants) and conceptual
185 (e.g., lack of agreement on when saturation is reached) issues exist with such an approach
186 (O’Reilly & Parker, 2013). Furthermore, striving for saturation might perpetuate the
187 problematic notion that the number of participants is directly related to the quality of
188 qualitative research (Mason, 2010; Smith, 2018). It has therefore been argued that sample size
189 should rather be determined by the richness of the data (i.e., the relevance of the sample for
190 the specific research question), the adopted research approach (e.g., inductive exploratory
191 versus grounded theory research), and the experience of the interviewer (Levitt, Motulsky,
192 Wertz, Morrow, & Ponterotto, 2016; Mason, 2010; O’Reilly & Parker, 2013). Given the
193 exploratory nature of the present study, the original sample of 12 and the final sample of nine
194 participants were considered appropriate as it allows for in-depth, practically manageable,
195 engagement with the experiences of a group of highly relevant participants, whilst
196 simultaneously recognizing that other experiences can and will always exist (O’Reilly &
197 Parker, 2013).

198 Interviews took place in person – at a quiet location of the participant’s choice – or via
199 Skype. To give direction to the interviews and address the specific research questions, a semi-
200 structured interview guide was developed for this study. First, a number of questions were
201 asked in order to establish rapport and gather participant background information (e.g., “Can

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202 you describe your current position?”). Second, a general question was asked in order to
203 introduce the topic of planned disruption (i.e., “To which extend do you create instances to
204 place your athletes under increased pressure?”). Follow-up questions were designed to
205 explore the different types of planned disruptions coaches used (e.g., “Can you give a
206 concrete example of such an instance?”; “How might you try to accomplish this?”) and the
207 desired outcomes of these planned disruptions (e.g., “What was the goal of doing this?”;
208 “How would you know this strategy was effective?”). The interview guide was first
209 developed by the lead researcher and further refined in discussion with the second author.
210 This guide was then pilot-tested with a single track and field coach, leading to minimal
211 changes. In line with previous recommendations (Rapley, 2004) the interview guide was used
212 primarily as a reference, as throughout the interviews the natural flow of conversation was
213 followed, rather than rigidly sticking to the guide. All interviews lasted between 46 and 93
214 minutes. The disparity in interview length might be partially explained by the variance in the
215 number of planned disruptions coaches used and the extend in which they used them. After
216 completion, all interviews were transcribed verbatim to facilitate further analysis.

217 **Data Analysis**

218 The written transcripts were analysed by the first author, using inductive thematic
219 analysis (Braun et al., 2016). Thematic analysis was used as it is a useful and accessible
220 method to identify and analyse meaning patterns in qualitative data, whilst at the same time
221 also maintaining a high level of theoretical flexibility. Thematic analysis was done by
222 following the step-by-step guide proposed by Braun and Clarke (2006). This analysis started
223 with carefully reading and re-reading all transcripts in order to get familiarized with the data.
224 After familiarization, segments of data were coded with a succinct label, representing its
225 particular topic. These codes were then clustered into provisional themes (i.e., broader
226 meaning patterns). Throughout analysis, themes were carefully reviewed, tweaked, and
227 grouped together into higher order themes, by checking back to the entire data set. Finally, the

228 themes were inductively defined in a way that the label succinctly represents each theme's
229 focus and scope.

230 In order to ensure the quality of qualitative research, a relativist approach to rigor was
231 adopted (Sparkes & Smith, 2009). Within this approach, two general strategies were used.
232 First, throughout analysis, the second author acted as a critical friend (Smith & McGannon,
233 2018). This critical friend served to provide critical feedback on the interpretations made by
234 the lead researcher. Second, at the conclusion of data analysis, member reflections were also
235 utilized (Smith & McGannon, 2018). Hereby, the participants were invited to examine the
236 results and provide additional reflections, insights, or data. No substantial changes resulted
237 from these member reflections.

238 Results

239 Types of planned disruptions

240 During the interviews, coaches mentioned several types of planned disruptions they
241 utilized during training, (practice) games, or even outside sports. These strategies are divided
242 into nine types of planned disruptions, as illustrated in Table 2.

243 -- INSERT TABLE 2 AROUND HERE --

244 **Location.** One form of planned disruptions mentioned by the coaches was seeking out
245 specific locations. Five coaches stated that they would take their athletes to an *unpleasant*
246 *location* that in and of itself is straining. Such locations were chosen in order to “remove
247 athletes from the luxury that they are accustomed to” (C4). To illustrate, both Coach 5 and
248 Coach 9 described how they would, deliberately, organize training camps in locations where
249 the accommodation and facilities were described as “Spartan.” In addition to seeking out
250 these unpleasant locations, two coaches also used *travel* or long travel times as a planned
251 disruption. For example, Coach 6 would let athletes play through jetlag's or Coach 9 stated:
252 “The bus stands ready [at the training facility]. They have to get on and we drive the whole
253 night to [city]. When we arrive, the first thing they have to do is complete a training.” Finally,

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254 two coaches also used *deliberate bad organization* when they were on location, during
255 tournaments or training camps. This included not booking the right number of rooms or
256 “making sure the light was off in the gym” (C4). Coach 6 described such a strategy:

257 On our way to the quarter final [of a minor tournament], we simulated the bus having a
258 failure. I thought it was necessary for them to experience such things ... So about a
259 kilometre from the stadium we told them the bus broke down. The bus driver was
260 playing it perfectly as well. And we just stood back to see how they would handle this.

261 **Competition Simulation.** Another strategy utilized by every coach in the study was
262 simulating competition during practices. A large part of creating this disruption was
263 encouraging *competition between players*, such as teammates or training partners. As Coach 4
264 stated: “our players have to fight against each other in everything. Everything.” One of the
265 ways coaches tried to achieve this was by “simulating rankings”, as explained by Coach 2:

266 They have to shoot 72 arrows. Against each other [in a tournament format]. They know
267 who they have to compete against. Know each other’s scores. So, they know how much
268 they would need to shoot in order to advance to the next round... And the scores are
269 hung out.

270 Several other coaches also stated that they would create competition by setting up “game-like
271 competitive exercises” and “keeping scores” (C5) during technical or physical training
272 sessions.

273 Simulating competition was not only done by having team members compete against
274 each other. Some coaches also tried to emulate *competition conditions*. This entailed coaches
275 trying to invoke the feeling of competition as closely as possible during their practices. Coach
276 2, for example, would “go to the place where they are going to have a competition... Let them
277 shoot there.” Coach 7 would also set up “test practices,” in which she tried to recreate the
278 conditions of actual competition: “first they have to do pre-competition warm-up and then

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279 they get specific tests [running several times at near max. intensity] ... Then you notice – also
280 because of the warm-up – that it almost feels the same as an actual competition.”

281 **Punishments and Rewards.** As noted above, coaches regularly included competition
282 elements during training. These small competitions were often also accompanied by
283 additional punishments and rewards. Four coaches, for example, said that they might attach
284 small *physical punishments*, such as doing “push-ups or running laps” (C5). The idea of using
285 physical punishments was contested, however, as other coaches opposed these kinds of
286 punishments. Two coaches, therefore, also used *alternative punishments and rewards*: “going
287 from cleaning up the gym to cooking for the other team” (C4). Finally, two talent
288 development coaches said that they would also use *playing time* as a reward: “they have to
289 compete in small games during practice against a direct competitor and the person who wins
290 plays the next game” (C9).

291 **Physical Strain.** During practices or prior to games, coaches also used physical strain
292 as a planned disruption. Some coaches mentioned they would do this by increasing the
293 *physical taxation* and using physically very tough exercises or training sessions as a
294 disruption on itself: “Train extremely hard. At 110%, 120% taxation. Just make it really
295 tough. Then you see who is able to really push their boundaries” (C5). Others would use such
296 exercises in combination with specific technical exercises:

297 We would raise their heartrate. That is something we also do ... have them go
298 physically really hard for a couple of minutes. And then they have to get their heartrate
299 all the way down before they shoot (C1).

300 Interestingly, three coaches also used general *fatigue* as a form of planned disruptions. For
301 example, Coach 4 would “have them go to bed really late. I might organize a really late
302 practice session and keep it going extra long.” Similarly, Coach 6 would also use the quick
303 succession of games during a training camp as a way to increase the pressure on her athletes.

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304 **Stronger Competition.** Coaches also designed planned disruptions by letting their
305 athletes compete against stronger opponents. One strategy to achieve this, mentioned by three
306 coaches, was to actively *seek out stronger competition*:

307 In [their own country] they don't have any competition. With those athletes, you have to
308 go to competitions abroad. Let them struggle a bit there. Just so they realize they still
309 have a long way to go (C3).

310 In line with this quote, the coaches mentioned selecting the tournaments they participated in
311 specifically to expose their athletes to stronger competition. This might, however, also be
312 achieved during practice. Coach 9, for example, would bring in senior level athletes in
313 practice to compete against his youth players:

314 For one of our top talents, we brought in a player from the National senior team and let
315 them bat against each other [...] and you immediately see that it brings with it a whole
316 lot more pressure. And he can't handle it because he tenses up completely.

317 One potential problem with this strategy mentioned by the elite level coaches was the
318 lack of available opponents that are better or stronger than their own athletes. In order to
319 compensate for this fact and still create stronger competition, one coach would also *give*
320 *opponents an advantage* during practice games:

321 Last year we played a practice game and I asked the opponents to play with an extra
322 player. My own players didn't know this. The referee was also informed. So at a certain
323 point they threw in an extra player and we were playing against 12 ... of course in
324 reality you will never play against 12. But something happens and they have to find a
325 solution for themselves (C6).

326 **Distractions.** Another strategy used by coaches was increasing the number of
327 distractions during training or practice games. One approach mentioned by three coaches was
328 using *auditory distractions*: "we will play games with extra noise. Put up some boxes in the
329 gym and put crowd noise on full volume" (C4). Similarly, another coach said he would have

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330 other athletes make noise next to the pitch: “some coaches want it to be quiet before the
331 starting signal. I let it go a little bit. Let there be noise in the background, so they really have
332 to focus” (C7). In addition to using noise, two coaches used *physical distractions*. Coach 6,
333 for example, stated “during penalty corners we would throw balls at the players to get them
334 out of their concentration. And you notice this causes some stress.”

335 **Unfairness.** Another disruption, used by three coaches, was being unfair to the athletes
336 under certain conditions: “just being really unfair to them. Because a referee might also do
337 that” (C6). This disruption was often set up in combination with competition simulation.
338 Coach 5, for example, used this when setting up competition simulations in practice: “tell
339 referees to favour one or disadvantage the other ... those kinds of things we try to integrate in
340 practice and that makes it very difficult for [the athletes].” Similarly, Coach 4 would test his
341 athletes during competitive games in practice by using unfair and random scoring systems to
342 favour one team over the other:

343 we would constantly use situations where one team can win easily. And then change it
344 so the other team can catch up easily [...] count double scores, stuff like that. [They
345 might say] “but this is not fair!” I don’t care what is fair, fairness doesn’t exist.

346 **Restrictions.** Some coaches also used different restrictions as planned disruptions. One
347 such type of restrictions often used by Coach 6 were *communication restrictions*. She would
348 give her athletes instructions to communicate in one specific way: “give one person the
349 instruction to only be negative ... at the same time the one who is normally always negative
350 must be positive the whole day.” Or she would let athletes play with earplugs: “to simulate
351 the European Championship – small stadium, a lot of people – you cannot hear anything, you
352 can’t hear each other, can’t give directions to each other” (C6). Three coaches also used
353 *physical restrictions*. Coach 1, for example, would sometimes force her athletes to make shots
354 from difficult angles or use physical obstacles. Coach 5 on the other hand would limit action
355 possibilities for his athletes: “deliberately limit the number of actions with which they usually

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356 score a lot of points. ‘You can’t do that. That doesn’t count.’ They often have a lot of trouble
357 with that.” Finally, two coaches also used *time restrictions* by setting time limits for difficult
358 exercises: “I would start counting down from 5 and then they just have to shoot. If they are
359 out of time, I would give them a kick up the behind” (C2).

360 **Outside the Box.** Another form of disruptions used by coaches was doing activities
361 outside of their own sports. Three coaches would, for example, let athletes participate in *other*
362 *sports*. To illustrate, Coach 5 would let his athletes “go cycling on a steep velodrome” or
363 Coach 9 would let his athletes try out different sports:

364 Go do some crossfit. Crossfit is not necessarily something we would do to make our
365 athletes better, but it does get them completely f**ed up. So, what are you going to do?
366 Are you going to quit or will you keep going? ... Or do some gymnastics. It is
367 something completely different than baseball and it’s got this element of danger. So
368 they have to learn to handle their fear.

369 Other strategies discussed by the coaches included stepping completely outside of sports and
370 trying *non-sport related* activities. Coach 8 would take athletes on a survival camp or Coach 9
371 would take his athletes on a canoe trip in freezing outside temperatures. Finally, Coach 6
372 organized a helicopter crash simulation for her team. With regard to outside the box
373 disruptions, it should be noted that not all coaches believed in the value these activities. This
374 is perhaps best illustrated by Coach 4 who stated:

375 We might use those kinds of things, but never starting from the idea that we will learn
376 something that you can apply later on because the context is really not the same ...
377 when the context is completely different, I find the transfer to the competition becomes
378 very difficult.

379 **Desired Outcomes**

380 A second aim of this study was to explore the coaches’ reasoning for the use of planned
381 disruptions, by examining the desired outcomes. From the interviews, it became clear that the

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382 coaches used planned disruptions with very specific aims in mind. These can be categorized
383 into four general desired outcomes, as illustrated in Table 3.

384 -- INSERT TABLE 3 AROUND HERE --

385 **Familiarization.** One desired outcome often mentioned by the coaches was helping
386 athletes get used to unpleasant or uncomfortable situations. Coach 8, for example, stated that
387 he would use disruptions in order for athletes to “get used being outside of their comfort
388 zone.” A similar sentiment was reflected by Coach 4:

389 Stress exists. We have a tendency to be afraid of it. To not talk about it. To say as long
390 as you remain focused on your task everything will be fine. But I believe by not facing
391 it, you are just making it bigger ... My approach was to say “guys we are going to be
392 confronted with situations that are going to be uncomfortable. How can we prepare
393 ourselves for that as best as possible?” ... So we tried to become comfortable in
394 uncomfortable situations. That was my starting point.

395 Interestingly, Coach 9 used planned disruptions to familiarize his athletes with the demands of
396 one very specific situation:

397 Our goal for those guys is to let them become professional in the USA. Everything we
398 do is aimed towards that [...] In that world [of professional baseball in the USA] you
399 really have to be adaptable and tolerate change. Organize things really quickly and
400 especially don't get upset easily. Over here [in Europe] we are kind of overprotected
401 compared to that world. So, the things we do is to let them experience that world, to let
402 those guys feel what it's like and how they can handle it.

403 **Creating Awareness.** Another aim of using planned disruptions was creating awareness
404 in athletes about their own behaviour and responses under pressure, as Coach 1 pointed out:
405 “we look for ways to give them insights into their own behaviour. First, they need insight,
406 only then they can start working with it.” To this end, coaches tried to *evoke a behavioural*
407 *response* through planned disruptions, as evidenced by Coach 9: “Constantly expose people to

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408 situations, in a lot of different ways both inside and outside sports, that every time again
409 exposes behaviour.” Similarly, Coach 6 also looked at how athletes responded under pressure:
410 “What is your typical response in certain moments? And what is the response that you
411 actually want to see?” Based on this evoked response, coaches then tried to point things out to
412 athletes and *make behaviour discussable*:

413 I record a lot of things and I might show it back to them. Or I would ask – and they are
414 really quite honest in that – “what was your reaction?” “Well this and this...” “Do you
415 think that will help you? Or “where did that come from?” “Do you think this will make
416 you a better player?” “How might you change it in the future?” (C9).

417 Part of this strategy seemed to be aimed at letting athletes become self-aware of their own
418 responses, as illustrated by Coach 4:

419 We started noticing that they became capable of assessing for themselves, that they
420 became aware of their own behaviour during games. Became aware of their teammates.
421 And they could actually start steering each other.

422 In order to create awareness and facilitate learning, coaches, therefore, stressed the
423 importance of always providing a follow-up and guide athletes to reflect on their own
424 responses to planned disruptions.

425 **Develop and Refine Personal Resources.** Building on creating awareness, coaches
426 also tried to strengthen athletes’ ability to handle stress, by encouraging them to develop and
427 refine personal resources during planned disruptions. Four coaches stressed the importance of
428 *psychological techniques* and used the disruptions to train these techniques:

429 [during planned disruptions] they have to learn to stay in the moment. They have to
430 learn to become aware of whether they are thinking about what happened or thinking
431 about their score and they have to get back to the here and now. Through meditation –
432 we are working a lot on meditation. Through breathing exercises. Visualization,
433 routines, pre-shot routines. These are all things we are working on (C1).

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434 Rather than using disruptions to train psychological techniques, some coaches also focused
435 more on letting athletes develop *problem-solving skills* for themselves, as was evidenced by
436 following quote:

437 Sometimes you can just let the players struggle for a bit. How will you handle this? Will
438 the athletes themselves take action? I will not force it upon them. As soon as they take
439 action I will follow ... Let them be solution oriented (C6).

440 Similarly, Coach 5 argued that planned disruptions might help in making athletes more self-
441 reliant:

442 It can learn them to stand on their own two legs. To encourage them to try and find their
443 own solutions. Make them more self-reliant. In that way they are going to have a much
444 bigger chance to make it, rather than when everything is being done for them.

445 **Promote Team Processes.** Finally, three coaches also used planned disruptions as a
446 strategy to promote certain team processes. In part, coaches seemed to believe that planned
447 disruptions might be an effective way to increase *team connectivity*. As such, planned
448 disruptions were viewed as a “team building” activity (C4) and a way to “improve team
449 cohesion” (C8). This desired outcome was especially mentioned in relation to the outside the
450 box strategies (e.g., helicopter crash simulation). Such activities were also believed to help
451 athletes “learn to trust each other” (C6). Additionally, coaches in team sports also used
452 different planned disruptions in an attempt to *strengthen leadership*, as these disruptions were
453 designed to test the team leaders and to stimulate them to take up their responsibilities under
454 pressure:

455 I have a leadership group and from time to time I throw in some tension for them. Look
456 there are several people in this group, but each person has its role ... And we can use
457 this tension to test these roles (C6).

458 **Additional Considerations**

459 As stated, the aim of the present study was to explore (1) the different types of planned
460 disruptions coaches use and (2) the desired outcomes that underlie the use of these
461 disruptions. However, during data collection and analysis, a number of additional
462 considerations emerged relating to *how* these planned disruptions were used in practice. These
463 themes were not necessarily mentioned by all – or even most – coaches, but they still
464 potentially provide some important practical and theoretical implications. Although not
465 related to the specific aims of the current study, these additional considerations are therefore
466 highlighted here.

467 **Surprise Nature.** One issue mentioned by a number of coaches was the question of
468 whether or not to inform their athletes about upcoming disruptions. Although not a specific
469 type in itself, coaches often used the element of surprise as an additional way to further
470 increase the pressure of planned disruptions: “sometimes I will say nothing at all. I would just
471 let them do something completely different, without any notification. And see how they react
472 to that” (C5). Coach 9 also argued that setting up planned disruptions would be most effective
473 when it was done unexpectedly: “I like surprising them, out of nowhere ... Often with these
474 kinds of things it is useful to not give them the chance to prepare themselves mentally for
475 what is coming.” But at the same time, he also stressed the importance of clarifying his
476 coaching philosophy and informing athletes in advance why such strategies are being used:

477 I think what we do is tell them really clearly what kind of things we will do. Not the
478 specifics of what will happen, but the reason why. So everybody knows [what they
479 might experience]. I will tell them “look guys I don’t do this to bully you. I do this
480 because I really want to help you” (C9).

481 Similarly, Coach 6 used a combination of announced and unannounced disruptions, whereby
482 athletes sometimes even had a say in determining the announced disruptions.

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483 **Periodization.** Four coaches explicitly referenced the fact that they would use planned
484 disruption in a periodic manner. This meant that they would not continuously use disruptions:
485 You should not always do it. I think you cannot bring someone in 100% tension level all
486 of the time. I mean you are creating a lot of stress. We are still dealing with 16 and 17
487 year olds. The question has to be how often we have to do it to get the maximum effect.
488 I don't think it's always 100% (C9).

489 A similar sentiment was reflected by several other coaches, as they would use planned
490 disruptions intermittently. These periodic inclusions of disruptions were also deliberately set
491 up in function of the specific moment during the season. For example, Coach 6 stated: "every
492 year we begin with a training camp. At that point we don't have any tournament pressure. So
493 that would be the most optimal time to do these kinds of things." Other coaches did this in
494 function of the tournaments they competed in. Using a 'tapering' approach, some coaches
495 first increased and consequently gradually decreased the disruptions in the build-up to
496 important tournaments:

497 The further you are [from the tournament] the more extreme the situations. But we do it
498 in a decreasing way ... The stress we use, we stop using it two weeks before the
499 tournament. At that point we just talk about it and used it to reflect with them. But
500 further from the tournament, we did some really extreme things. That way you have the
501 biggest impact ... We do it this way because otherwise the players can't handle it, they
502 just go crazy. But also, because in preparation for the tournament you want peace of
503 mind, clarity in the head. Everything should be learned at this point (C4).

504 **Impact on Personal Relationships.** One final consideration was the potential negative
505 impact planned disruptions might have on personal relationships. This was primarily
506 mentioned by a single coach. However, it is included here as it might have significant
507 implications for the use of planned disruptions. Coach 4 stated that his use of planned
508 disruptions has strained the relationship with some of his athletes:

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509 Our relationship took a big hit. A big hit. Because yeah we are the ones coming up with
510 all these kinds of things. And athletes – especially in team sports – like to stay in their
511 comfort zone. And they also want situations in which they can excel, to consolidate
512 their position in the team. But we deliberately are not giving them these situations ...
513 You are dealing with trust. They constantly have the feeling a game is played with
514 them. So you risk losing their trust. I think it has been a lesson. We have to find a better
515 balance in that and also keep telling them that it is for their own benefit.

516 Although Coach 4 was the only coach referencing the negative impact on the relationship
517 with his athletes, Coach 6 also mentioned that the use of planned disruptions was partially the
518 reason for a strained relationship with one of her staff members.

519 **Discussion**

520 The present study aimed to explore high-performance coaches' use of what we called
521 planned disruptions. More specifically, we were interested in both the different types of
522 planned disruptions coaches used and the desired outcomes that were associated with these
523 disruptions. With regards to the types of planned disruptions, this study demonstrated that
524 coaches have a wide range of strategies at their disposal. In total, nine types of planned
525 disruptions were identified: i.e., *location, competition simulation, punishments & rewards,*
526 *physical strain, stronger competition, distractions, unfairness, restrictions, and outside the*
527 *box*. Although reported as nine distinct themes, coaches can – and often do – use a
528 combination of different types of disruptions. Coaches for example, reported combining
529 competition simulation with punishments and rewards. A number of the strategies reported in
530 the current study have already been suggested in previous literature (Stoker et al., 2016), such
531 as seeking out stronger competition by letting athletes compete in higher age groups (Savage
532 et al., 2017), using fatigue and creating distractions (Crust & Clough, 2011), or using
533 punishments (Bell et al., 2013). However, exploring the broader spectrum of strategies that
534 coaches use in an applied setting can provide a more comprehensive framework to guide

535 further studies examining the effectiveness of planned disruptions in an applied sports setting
536 (see also Stoker et al., 2016).

537 With regards to the question why coaches use planned disruptions, several desired
538 outcomes were identified. It was found that coaches used these strategies as a way to
539 familiarize athletes with higher levels of pressure or stress, to create awareness about athletes'
540 behaviour and functioning under these circumstances, to promote the development and
541 refinement of personal resources, and to promote certain team processes. Looking at the
542 literature, a debate exists with regard to the mechanisms through which planned disruptions
543 might be most effective. Some scholars have argued that stressful experiences can provide an
544 impetus for learning in and of itself (Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers,
545 2010; Seery, 2011), whereas others have questioned this idea and argued that the value of
546 planned disruptions primarily lies in training the psychological skills and techniques which
547 are already possessed and building confidence in the use of these skills (Collins et al., 2016).
548 Results from the present study seem to provide support for both approaches. In some cases,
549 coaches used planned disruptions to train previously learned psychological techniques, such
550 as breathing techniques or effective routines. This is consistent with approaches such as stress
551 inoculation training (Meichenbaum, 1985) or stress exposure training (Driskell et al., 2014),
552 whereby disruptions are typically used after skill acquisition as a way to refine the newly
553 learned psychological skills in a realistic setting. As such, planned disruptions might provide
554 a valuable addition to traditional mental skills training programs in sports.

555 In contrast, coaches also used disruptions without taking into account pre-existing
556 psychological skills. This was done as a way to familiarize athletes to high pressure
557 conditions and to stimulate the development of their own individual problem-solving skills. In
558 these instances, it seemed coaches adopted a learning by guided discovery approach. Guided
559 discovery emphasizes personal responsibility, exploration, and discovery in order for athletes
560 to find their own unique solutions for the presented problem (Williams & Hodges, 2005).

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561 Within this approach, coaches are encouraged to manipulate the practice environment in such
562 a way that desired behaviours emerge through exploration and discovery. Indeed, planned
563 disruptions can be seen as attempts to set constraints on the mental (e.g., unfairness) or
564 physical (e.g., fatigue) characteristics of the player, the environment (e.g., location), or the
565 task (e.g., distractions). As such, planned disruptions fit well within the constraints-led
566 approach (Davids, Button, & Bennett, 2008; Renshaw, Davids, & Savelsbergh, 2010), which
567 takes manipulation of constraints as starting point for motor skill acquisition in sports and
568 physical education. Although this constraints-led approach has its origins in motor learning, it
569 also provides a useful framework to explore how psychological characteristics such as
570 resilience and mental toughness can be developed in an applied sport setting.

571 Another important finding was that coaches stressed the importance of debriefing
572 planned disruptions and engaged in guided reflection with their athletes. During these
573 reflections, coaches tried to develop awareness in their athletes about personal responses to
574 pressure and stress. It has been suggested that metacognitive activities such as reflection and
575 developing awareness are crucial factors for learning (Jonker, Elferink-Gemser, de Roos, &
576 Visscher, 2012). By engaging in reflective processes, athletes might develop a better
577 understanding of the antecedents and consequences of one's thoughts, emotions, and
578 behaviours under high pressure conditions. Such an understanding might help athletes to
579 interpret stress-related symptoms more constructively (Hanton et al., 2007), to seek out,
580 develop, and utilize the necessary resources to adapt to future similar stressors (Cowden &
581 Meyer-Weitz, 2016), and learn to execute (sport-specific) skills under similar stressors
582 (Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers, 2010).

583 Using planned disruptions might provide a learning strategy to develop and refine
584 psychological characteristics that strengthen individual athletes' resilience (Fletcher & Sarkar,
585 2016; Kegelaers & Wylleman, in press) and mental toughness (Bell et al., 2013; Crust &
586 Clough, 2011; Weinberg et al., 2016). However, in addition to individual resources, coaches

587 in our study also looked to influence team processes. More specifically, planned disruptions
588 were used to improve team connectivity, leadership, and shared knowledge of team strategies.
589 From a team resilience perspective, these have all been identified as important collective
590 characteristics which protect high functioning teams against the detrimental effects of stress
591 (Morgan, Fletcher, & Sarkar, 2013).

592 **Limitations and Future Directions**

593 Several limitations and areas for future research can be identified within the present
594 study. First – although not a limitation per se – it is important to recognize that given the
595 exploratory qualitative nature of this study, broad statistical-probabilistic generalizations are
596 not possible. Rather, this study aims for naturalistic generalizability and transferability
597 (Chenail, 2010; Smith, 2018). As such, we aim to present rich descriptions of a phenomenon,
598 which resonate with the reader’s personal experience and which builds on the existing
599 research fields of pressure training (Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers,
600 2010), resilience (Fletcher & Sarkar, 2016), and mental toughness (Crust & Clough, 2011).
601 Further research remains necessary, however, to test both the efficacy and the effectiveness of
602 planned disruptions (see Ivarsson & Andersen, 2016). The present study might provide a
603 useful framework for such applied research.

604 Second, the present was limited to coaches’ perspectives only. Future research might,
605 therefore, also examine athletes’ experiences with and perspectives on how planned
606 disruptions can benefit them personally (if at all). Third, we did not explore when and how
607 often disruptions should be used in order to attain optimal benefit. In line with previous
608 research (Collins et al., 2016), coaches in the present study suggested that planned disruptions
609 might be most effective when set up sporadically and intermittently. As such, future research
610 should look at the periodization of planned disruptions, for example, during the early season
611 or in preparation for major tournaments. Fourth, we did not directly explore how coaches
612 individualized the use of planned disruptions. Previous research has highlighted there is a

613 need for coaches to individualize training strategies such as planned disruptions based on the
614 specific needs and characteristics of the athlete (Kegelaers & Wylleman, in press; Stoker et
615 al., 2016). In this regard it would be interesting to explore how coaches adapt their strategies,
616 both in individual and team sports. Fifth, future research should explore the extent in which
617 planned disruptions set up outside the athletes' own sport (i.e., *outside the box* strategies) can
618 provide transferable benefits. This was not directly addressed in the present study and is
619 particularly salient as previous research has suggested that planned disruptions should reflect
620 the actual performance context as closely as possible (Collins et al., 2016; Driskell et al.,
621 2014; Fletcher & Sarkar, 2016; Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers, 2010).

622 Finally, when looking to utilize planned disruptions in practice, it is important to also
623 recognize the potential dangers of these strategies. It has already been suggested that planned
624 disruptions require a careful balance with a supportive environment (Fletcher & Sarkar, 2016;
625 Savage et al., 2017). Challenge without the proper support can lead to an unrelenting
626 environment, characterized by unhealthy and unethical consequences of pressure exposure
627 (e.g., unhealthy competition, emotional abuse, or creating a “sink-or-swim” culture; Fletcher
628 & Sarkar, 2016). Indeed, many of the planned disruptions seem to contradict traditional views
629 on effective coaching (e.g., De Backer, Boen, De Cuyper, Høigaard, & Vande Broek, 2015).
630 In the present study, one coach in particular stated that using planned disruptions in the past
631 might have strained his relationship with some athletes. From a practical perspective, coaches
632 should thus be aware of these dangers and remain sensitive to the well-being of the athlete.
633 Sarkar and Fletcher (2017) already pointed out that “practitioners will likely need to make
634 difficult decisions relating to whether an intervention enhances sport performance but might
635 compromise mental health or improves mental health but limits sport performance” (p.164).

636 **Conclusion**

637 Building on suggestions made in the theoretical fields of resilience, mental toughness,
638 and training under pressure, the current study aimed to explore how and to what end high

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639 performance coaches utilize planned disruptions. The findings illustrate that coaches use a
640 combination of a number of different types of planned disruptions. These strategies were used
641 to familiarize athletes to higher levels of pressure, to create awareness about one's own
642 thoughts and behaviours in such situations, to develop or refine personal resources, or to
643 promote team processes. The current findings can provide a base for future careful
644 examinations of this training strategy.

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Tables & Figures

802 Table 1

803 *Overview of the Study Participants*

| Name | Gender* | Sport | Gender athletes* | Level** |
|----------------|----------------|-----------------|-------------------------|----------------|
| Coach 1 | F | Golf | M & F | T |
| Coach 2 | M | Archery | M | T & E |
| Coach 3 | F | Track and field | M & F | T & E |
| Coach 4 | M | Korfball | M & F | E |
| Coach 5 | M | Fencing | M & F | T & E |
| Coach 6 | F | Field hockey | F | E |
| Coach 7 | M | Track and field | M & F | T |
| Coach 8 | M | Triathlon | M & F | E |
| Coach 9 | M | Baseball | M & F | T |

* Gender: F = Female; M = Male | ** Level: T = Talent development level; E = Elite senior level

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805 Table 2
806 *Overview of the Types of Planned Disruptions*

| Higher-order themes | Sub-themes | Examples of raw data themes |
|--------------------------------------|---------------------------------------|--|
| Location (5) | Unpleasant location (4) | Poor facilities Sleeping in Barracks |
| | Long travel (2) | Driving all night Jetlag |
| | Deliberate bad organization (2) | Let a bus strand No lights in the gym Book too few rooms |
| Competition simulation (9) | Competition between players (7) | Let players compete head-to-head Make every exercise a competition Use rankings |
| | Competition conditions (3) | Set up practice exactly as if it was competition Include referees |
| Punishments & rewards (5) | Physical punishments (4) | Push-ups, planking, running laps |
| | Alternative punishments & rewards (2) | Clean up the gym Cook for other athletes Play for better accomodation |
| | Playing time (2) | Winner of challenge gets to play next game |
| Physical strain (7) | Physical taxation (5) | Very demanding physical exercises Technical exercises under maximal heartrate |
| | Fatigue (3) | Quick sucesion of games Let athletes go to bed late |
| Stronger competition (4) | Seek out stronger opponents (3) | Play games against higher ranked opponents Have youth players compete against seniors Use better players as motivation |
| | Give opponents an advantage (1) | Let opponents play with extra player |
| Distractions (4) | Auditory distractions (3) | Play crowd noise through speakers Have athletes make noise next to the field |
| | Physical distractions (2) | Throwing balls A lot of activity around the field |
| Unfairness (3) | | Let referees make bad calls Be unfair during practice games |
| Restrictions (5) | Communication restrictionss (1) | Players are only allowed to communicate in certain way Use earplugs |
| | Physical restrictions (3) | Force to make shots from very difficult angles Limit action possibilities |
| | Time restrictions (2) | Set time limits |
| Outside the box (5) | Other sports (3) | Crossfit, gymnastics, velodrome cycling |
| | Non-sport related (4) | Helicoptercrash simulation Survival camp Cold weather outdoor activities |

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COACH PERSPECTIVE ON PLANNED DISRUPTIONS

808 Table 3
809 *Overview of the Desired Outcomes of Planned Disruptions*

| Higher order themes | Sub-themes | Examples of raw data themes |
|--|--------------------------------|---|
| Familiarization (7) | | Get them out of their comfort zone Get used to being stressed Learn to push their boundaries Become comfortable in uncomfortable conditions |
| Creating awareness (5) | Evoked behavioral response (3) | Try to elicit a response Look at typical behavior under stress Look at differences between wanted and unwanted behavior |
| | Make behavior discussable (5) | Point out unwanted behavior Let athletes recognize behavior themselves Create insight into own behavior Always reflect with athlete afterwards |
| Develop & refine personal resources (5) | Psychological techniques (4) | Breathing techniques Routines Meditation Arousal regulation |
| | Problem-solving skills (3) | Actively start looking for solutions Self-reliance Use social support |
| Promote team processes (3) | Team connectivity (3) | Build a team Learn athletes to trust each other |
| | Strengthen leadership (1) | Creates and tests leaders |
| | Team strategies (2) | Develop and test team strategies under stress |

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