

## **Elite coaches' experiences of creating pressure training environments for performance enhancement**

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Elite Coaches' Experiences of Creating Pressure Training Environments

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Running head: COACHES' EXPERIENCES OF PRESSURE TRAINING IN ELITE SPORT

Elite Coaches' Experiences of Creating Pressure Training Environments

**Abstract**

9           Recent research supports the practice of pressure training in sport (Bell, Hardy, &  
10 Beattie, 2013), yet limited knowledge exists regarding how pressure is systematically created.  
11 This study explored how 11 elite coaches developed pressure training environments for the  
12 performance enhancement of their athletes. Following thematic analysis of transcribed semi-  
13 structured interviews, findings detailed how coaches manipulated a variety of stressors (e.g.,  
14 task, forfeit, judgment) to manage the demands and consequences of training. Facilitated by  
15 individual differences, this process created pressure, defined as the perception that it is  
16 important to perform exceptionally. The findings provide a framework for developing  
17 pressure, coping mechanisms, and performance in training environments in preparation for  
18 future sporting competition.

19           *Key words:* pressure, training, stress, stressors, choking, coping, demands,  
20 consequences, individual differences, important to perform, elite, coaching

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34 Elite Coaches' Experiences of Creating Pressure Training Environments

35 Pressure is defined as “any factor or combination of factors that increases the

36 importance of performing well on a particular occasion” (Baumeister, 1984; p. 610).

37 Research has highlighted that pressure can cause individuals to underperform (Greenleaf,

38 Gould, &amp; Dieffenbach, 2001), and evidence of this has been illustrated across a number of

39 performance skills such as climbing (Pijpers, Oudejans, &amp; Bakker, 2005), handgun shooting

40 (Nieuwenhuys &amp; Oudejans, 2011), self-defense (Rendena et al., 2014), dart throwing and

41 basketball shooting (Oudejans &amp; Pijpers, 2009), amongst others.

42 This phenomenon has been described as choking under pressure (DeCaro, Thomas,

43 Albert, &amp; Beilock, 2011). While a number of psychological concepts have been implicated in

44 causing a choke (Hill, Hanton, Fleming, &amp; Matthews, 2009), the key processes appear to be

45 related to attentional disturbances caused by heightened anxiety (Beilock &amp; Gray, 2007).

46 DeCaro and colleagues (2011) have highlighted that there are two primary theories proposed

47 to explain attentional disturbances and choking under pressure. Distraction theories propose

48 that high-pressure situations cause performance to decrease due to working memory

49 becoming over-loaded with task-irrelevant stimuli. The task irrelevant stimuli, comprised of

50 thoughts such as worries about the consequences, compete with the attention needed to

51 execute the task at hand. Explicit monitoring or skill-focus theories suggest that pressure

52 increases self-consciousness about performing correctly (Baumeister, 1984). This causes

53 performers to focus their attention on skill execution to ensure an optimal outcome,

54 disrupting the learning and execution of proceduralized processes that normally run outside

55 of conscious awareness (Hill et al., 2009).

56 There are a limited number of interventions offered to alleviate choking in sport and

57 consequently there have been recommendations to develop such interventions (Hill et al.,

2009). One such intervention is pressure training (PT), which has been shown to be effective in reducing choking and improving performance under pressure (Bell, Hardy, & Beattie, 2013). This approach proposes that by strategically exposing athletes to stressors in training they can enhance their ability to perform under pressure (Bell, et al., 2013; Driskell, Sclafani, & Driskell, 2014; Oudejans & Pijpers, 2009). Looking at the origins of PT, this approach evolved from the concept of medical inoculation. In medicine, inoculation is the process of exposing an individual to a small amount of a virus, such as a vaccine, to build immunity to the virus (Meichenbaum, 1977). The initial exposure prepares the body for future attacks. The concept of inoculation was applied to psychology in the 1950's when Wolpe (1958) used it on clinical populations. Participants were gradually subjected to anxiety-arousing stressors while they practiced relaxation strategies and it was found that this was an effective method for alleviating conditioned fears. This model of clinical inoculation was eventually adopted in sport psychology where researchers exposed individuals to stressors while they trained (Smith, 1980). Initial research indicated that this approach to stress management was effective for enhancing performance across a variety of sports and activities including gymnastics (Mace & Carroll, 1989) and squash (Mace & Carroll, 1986).

Contemporary sport research has corroborated earlier findings and by documenting the effects that PT has on novice (Oudejans & Pijpers, 2010) and elite (Bell et al., 2013; Oudejans & Pijpers, 2009) performers. Oudejans and Pijpers (2009) examined the impact of PT on expert basketball players. Basketball players were exposed to two pre-tests; one with pressure and one without. A five week training protocol followed where several stressors were used to train the experimental group under pressure. In a post-test it was found the control groups' performance still deteriorated under pressure. However, the experimental groups' performance no longer deteriorated, indicating an improvement in the participants' ability to perform under pressure. Current research on mental toughness and resilience

83 corroborates the PT literature in linking experiences of pressure to improvements in coping  
84 and performance under pressure. For example, Bell et al. (2013) define mental toughness as  
85 “the ability to achieve personal goals in the face of pressure from a wide range of different  
86 stressors” (p. 1) and examined how PT developed mental toughness. Results showed that the  
87 experimental group who were trained under pressure made significant improvements in  
88 objective and subjective mental toughness scores. Resilience literature has also shed light on  
89 the link between pressure exposure and coping. Fletcher and Sarkar (2012) investigated  
90 Olympians’ experiences and identified that all of the participants described prolonged periods  
91 of time in which they were required to withstand pressure. The results suggested that these  
92 prolonged experiences of pressure contributed to the development of resilience. These  
93 findings are representative of the wider resilience literature which seems to indicate that  
94 adverse experiences, involving periods of pressure, help individuals develop resilience in the  
95 face of future pressurized situations (Seery, 2011).

96         Given the impact that PT has been shown to have on performance, it is not surprising  
97 that it is currently being utilized in elite sport (Bell et al., 2013) and that the research  
98 community is encouraging further applied endeavors (Sarkar, Fletcher, & Brown, 2014).  
99 Considering this demand for continued applied efforts, however, what is surprising and  
100 worthy of concern is the lack of literature detailing how pressure is created. Indeed, DeCaro  
101 and her colleagues (2011) noted that “most investigations of performance under pressure  
102 have largely ignored the makeup of the pressure situation itself” (p. 391). While more recent  
103 research has documented specific stressors that may play a role in generating pressure (e.g.,  
104 Driskell et al., 2014; Oudejans & Pijpers, 2009), studies are yet to investigate how pressure is  
105 systematically created across sporting environments. It is therefore vital to address this gap in  
106 understanding and explore a theoretical foundation to underpin future PT research.  
107 Accordingly, the present study explored how elite coaches created PT environments for

108 performance enhancement. Given the lack of scholarly knowledge in this area, the present  
109 research adopted a qualitative approach (Braun & Clarke, 2006; Hill et al., 2009).

## 110 **Method**

### 111 **Participants and Sampling**

112 With institutional ethics approval 11 professional, full-time coaches (1 female, 10  
113 male) were included in the sample. The coaches resided in the United Kingdom and were  
114 aged between 30 and 53 years ( $M_{\text{age}}$  41.1;  $SD = 7.5$  years). Elite coaches were chosen as the  
115 sample population given that they are responsible for designing and managing training  
116 sessions and currently practice PT (c.f., Beaumont, Maynard, & Butt, 2015; Bell et al., 2013).  
117 The criteria for inclusion of the coaches were that they had to have worked in elite sport  
118 (Olympic or International level) for a minimum of four years (cf., Olusoga, Maynard, Hays,  
119 & Butt, 2012). Additionally, coaches had to perceive themselves to be successfully  
120 integrating pressure into training for performance enhancement. To identify this criteria, the  
121 following question was used: "Do you perceive yourself to successfully and effectively  
122 integrate pressure into training and if so, why?". A coach's expertise was then discussed  
123 amongst the wider research team to evaluate their suitability for the study. These criteria  
124 ensured that the sampled population had expertise specifically relating to the research area.  
125 Expert purposive sampling (Patton, 2002) was used to identify and recruit participants that  
126 met the specific criteria detailed above. The coaches came from Badminton, Table Tennis,  
127 Rugby Union, Rugby League, Taekwondo, Diving, Paralympic Cycling, Judo, Cricket and  
128 Speed Skating. Collectively the coaches had accumulated 106 years of experience ( $M_{\text{exp}}$  9.6;  
129  $SD = 5.2$ ) coaching at the elite level and had worked in male and female, team and individual,  
130 disability and able-bodied, adolescent and adult elite training environments. At the time of  
131 data collection coaches were at different stages of their competitive season.

### 132 **Procedure**

133 Initial contact was made with a number of Olympic and Elite Sport Governing  
134 Bodies. Coaches were then pre-interviewed either face-to-face or over the phone. This was an  
135 opportunity for the coaches to enquire into the nature of the study and for the principle  
136 investigator to assess whether the participants met the criteria for inclusion. Once informed  
137 consent was granted from the coach and the Performance Director (PD; the chief  
138 performance leader for the Sport Governing Body), an interview was scheduled. Over the  
139 course of the study 20 Sport Bodies were contacted, and there were 16 pre-interviews. At the  
140 start of each interview an explanation of the study aims were provided and confidentiality  
141 agreed. An electronic Dictaphone was used to record the interview. The interview guide was  
142 pilot tested with two coaches and some refinements were made to the phrasing of questions.

#### 143 **Interview Guide**

144 Based on existing literature concerning PT (Bell et al., 2013; Oudejans & Pijpers,  
145 2009) a semi-structured interview guide was developed. A conversational tone was used to  
146 create a natural flow of discussion and coaches were encouraged to elaborate unreservedly on  
147 their experiences (Patton, 2002). Interviews began with introductory questions into coaches'  
148 current and previous coaching experiences. Following this introduction, the coaches' broader  
149 experiences of pressure in elite training environments were discussed (e.g., "What do you  
150 think pressure is?", "How does pressure training affect performance?"). Attention then  
151 shifted towards the specific methods coaches used to create pressure in training sessions (e.g.,  
152 "Can you tell me what you do to create pressure in training?"), and the final section of the  
153 interviews allowed the coaches to expand on, discuss and question any related points. Probes  
154 were used to stimulate elaboration and clarification (Patton, 2002). All interviews were  
155 conducted in person by the first author.

#### 156 **Data Analysis and Trustworthiness**

157 Detailed interviews were conducted ( $M_{\text{mins}} = 68.82$ ) and transcribed verbatim by the  
158 principle investigator. The purpose of the analysis was to build an organized system of  
159 themes that explained how elite coaches created PT environments (Vallée & Bloom, 2005).  
160 To achieve this, analysis began with an initial inductive sweep of the transcripts (Braun &  
161 Clarke, 2006). This sweep involved the identification and annotation of meaningful raw data  
162 units (i.e., quotes that represented a specific aspect of the coaches' experiences of developing  
163 pressure). The raw data was then assessed for commonalities, which led to the development  
164 of lower-order themes. For example, the theme of "reward" was developed via the grouping  
165 of emergent raw data units concerning how coaches incentivized their PT sessions. These  
166 lower-order themes were then assessed for their similarities and differences as higher-order  
167 themes were generated. At this final stage the analysis of the relationships between themes  
168 produced a framework that represented coaches' experiences of creating pressure.

169 The principal investigator had previous training and experience in conducting  
170 interview-based qualitative research (Patton, 2002). To ensure trustworthiness, three  
171 researchers outside of the primary research team independently analyzed the transcripts to  
172 make recommendations for the inclusion, removal, or adaptation of raw data and lower and  
173 higher-order themes (Patton, 2002). This process led to several reorganizations of the raw  
174 data units and lower-order themes. At each stage of the investigation, transcripts, methods,  
175 data analysis, and decision-making processes were presented to and explored by the primary  
176 research team for scrutiny (Gucciardi, Gordon, & Dimmock, 2008). Following this stage, a  
177 formal presentation of the content of the framework was delivered to a wider research panel  
178 and audience and this resulted in critical debate but no further changes. This process has been  
179 successfully used in previous sport psychology research (Fletcher & Sarkar, 2012). Member  
180 checking consisted of emailing the participants their transcripts prior to analysis and the

181 resultant themes and framework post analysis. At both stages coaches were encouraged to  
182 comment and feedback was received over the phone or in person to help verify the results.

### 183 **Results**

184 The raw-data themes were coalesced into six lower-order and four higher-order  
185 themes (see Figure 1). These higher-order themes regarded the demands of training, the  
186 consequences of training, individual differences and pressure. The demands and  
187 consequences of training were themes which highlighted how coaches created pressure. The  
188 demands of training concerned the difficulty of the training session, and the consequences of  
189 training regarded what the outcomes. The six lower-order themes highlighted types of  
190 stressors that coaches manipulated to shape the demands and consequences of training.  
191 Specifically, coaches altered task, performer and environmental stressors to influence the  
192 demands of training, and forfeit, reward and judgment stressors to shape the consequences of  
193 training. Coaches also highlighted that athletes responded differently to stressors due to  
194 individual differences. Consequently, coaches could tailor the manipulation of the demands  
195 and consequences of training to engender specific responses from specific athletes. Through  
196 the management of these themes coaches created pressure and conducted PT for performance  
197 enhancement. Pressure was defined as the perception that it is important to perform  
198 exceptionally. In moving past the descriptive, the analysis process generated a framework  
199 (see Figure 2) conceptualizing how coaches created PT environments. The findings are  
200 reported anonymously to respect the wishes of the sporting bodies involved.

#### 201 **Demands of Training**

202 Two higher-order themes emerged that detailed how elite coaches created pressure:  
203 the demands of training, and the consequences of training. The demands of training were a  
204 higher-order theme that concerned how physically and cognitively challenging the PT was.  
205 Demands were manipulated to replicate the situations that athletes faced at competition, thus

206 encouraging the development of essential and transferable skills. The quote below  
207 highlighted one coach's comments regarding this theme and illustrated how pressure was  
208 developed by continually increasing the difficulty of the training demands:

209       We do apply pressure because we continually ask them [the athlete] to go faster and  
210       faster for longer and longer, and therefore the training demands become a pressure in  
211       themselves. And because we set milestones as coaches do, those milestones are  
212       pressure points that are reflective of what they'll need to do in competition. And if  
213       you hit them great but you know that if you don't hit it that's not great, and you know  
214       you need to hit it.

215       The higher-order theme of the demands of training was made up of three lower-order  
216       themes: task, performer, and environmental stressors.

217       **Task stressors.** Task stressors were a lower-order theme that contributed to the  
218       shaping of the demands of training. Task stressors concerned the guidelines, conditions, and  
219       equipment used within a PT session. The following quote illustrates one coach describing  
220       how he would manipulate task constraints:

221       I might turn around and say, "Right, we're going to do six pressure plays"... "The  
222       rules are defense can't have the ball... I'm going to allow you two stoppages in the  
223       game. If you have two stoppages, I'll allow you to pull the group in together [for a  
224       team talk]". I'll give them thirty seconds, no more, to make it hard... So they're  
225       practicing under pressure the ability to actually communicate what it is they need to  
226       say to each other.

227       **Performer stressors.** Performer stressors were created by manipulating the physical  
228       and psychological characteristics and capabilities of an athlete. By managing these stressors  
229       coaches influenced the demands of training and the difficulty of the session. Pre-fatigue was  
230       a performance stressor used by some coaches. Pre-fatiguing an athlete reduced their physical

231 and psychological capabilities going into the PT session, leaving them with a harder  
232 challenge ahead. Coaches also manipulated the tactical information and options athletes were  
233 provided as a method for constraining their psychological capabilities during the session.  
234 Limiting the information that athletes received around tactics and strategy inhibited decision-  
235 making and in turn made training harder. The following quote illustrated this:

236       So sometimes we'll do a lot of situational stuff like sudden death which forces them  
237       into pressure because they're almost pigeon-holed into a situation. Sometimes we'll do  
238       it where there are secret situations. Team A over there with another coach, and team B  
239       will come to me and I'll tell them a strategy, or a tactical move to apply. And then  
240       team A are in the background thinking, "what is it?". And you see the people who  
241       panic and almost think too much; "what is he trying to do to me!?".

242       **Environmental stressors.** Environmental stressors were created via manipulations to  
243       the environment within which the athletes trained. For example, coaches could manage  
244       sounds, temperatures, and the visual surroundings. In the following quote, a coach explained  
245       how they chose to train at altitude in order to make the training demands tough and create  
246       pressure:

247       We went [abroad] last year and we're going again this year. That for me is the best  
248       way because at that altitude level we can train for less time at a very intense level and  
249       keep the load off the players... And that is, for what we've done as the England  
250       program, that is probably one of the biggest pressures we can achieve. Because it's  
251       tough out there.

252       Environmental stressors were commonly manipulated to replicate the conditions of  
253       competitions. Illustrating this, one coach noted that "If you know you're going to a hot  
254       competition, we can do something with the heating."

255       **Consequences of training**

256 The consequences of training were a second higher-order theme to emerge as being  
257 instrumental in the creation of pressure. Elite coaches created environments where athletes  
258 received positive or negative consequences based on how they performed. Illustrated below is  
259 a quote exemplifying one coach's explanation of the role of consequences in developing  
260 pressure:

261 In training, I'd say it [pressure] is also anything outcome-based or where people are  
262 always being watched, or assessed. That usually creates some kind of apprehension or  
263 anxiety which either makes their heart-rate go higher or they make more mistakes and  
264 they don't deliver what they should do. Which is usually what we try to get to at the  
265 top end because, at the Olympics, everyone's watching them and obviously it's  
266 outcome-based... Whether that be [sport specific tool] allowing them to see their  
267 scoring, or whether there's an outcome-based on it, as in it is for selection.

268 The consequences of training could be understood as being comprised of three lower-  
269 order themes: forfeit, reward and judgment.

270 **Forfeit stressors.** Forfeit stressors included the potential to receive something  
271 negative, such as a physical punishment, or losing something positive, such as having to miss  
272 a training session. The following quote illustrates one coach's description of the ways forfeits  
273 were used to create pressure.

274 At the end of some of the pressure training we would have consequences that the  
275 players know about before they start... [It] might be missing an afternoon's training  
276 that they really want to do. So they would see that as four hours of valued time they're  
277 missing. And they've got to work with the winning team. So they're not the lap dogs,  
278 but they're... not actually going to have a go... So there are a number of ways of  
279 doing it. We set consequences, they also set consequences. Some of those can be very  
280 physical, and some of those can be taking things away.

281 Coaches also highlighted the need for caution and strategy when altering stressors.  
282 Using the example of missing training, one coach commented that, “Restricting contact time  
283 and giving it to somebody else can create that kind of idea of pressure... Though I think that  
284 it’s difficult and can backfire. If you do that and it goes the wrong way you've damaged a  
285 relationship.”

286 **Reward stressors.** Reward stressors were a second lower-order theme that  
287 contributed to the shaping of the consequences of training. These stressors regarded the  
288 potential to win something positive and the following quote highlights one coach’s use of  
289 selection as a reward stressor:

290 And they're playing for places in the team as well... Selection... [keeps] it  
291 competitive. You've kept the ones who think they might be playing [in the  
292 competition] training really well. You've got the ones who think they've got a chance  
293 of competing [training] really well, which increases the quality of your sessions for  
294 longer... Selection. That has to be the biggest pressure going.

295 While some reward stressors were common, such as selection, other stressors were  
296 less so. For example, one coach utilized the reward of being able to shape the larger sporting  
297 training program, including access to support services. Commenting on this, the coach  
298 explained, “What they [the athletes] see is the benefits from being at the top of the tree at the  
299 end of the session. Whether that's the ability to access all services. Whether that's the ability  
300 to dictate the pathway of our program, as well.”

301 **Judgment stressors.** Judgment stressors, a lower-order theme, created the  
302 opportunity for athletes to be evaluated in some way. These stressors contributed to the  
303 shaping of the consequences of training by enabling there to be an outcome of positive or  
304 negative judgment for an athlete. Coaches highlighted that the more important the athlete  
305 viewed the judge to be, the more likely that this stressor will lead to pressure. For example,

306 the presence of a Performance Director would often be a powerful judgment stressor.

307 Illustrating this, one coach described how peer judgments can come from the PD as well as  
308 teammates or coaches:

309         If we stood everyone down and put them in a circle around two people who are being  
310         watched, just by their team mates, the difference is phenomenal. The pressure switch  
311         is on... Obviously you can go further if you've got the ability to bring other people in  
312         like spectators or family members, or the PD of the program, who will assess them  
313         and at the end it could influence his opinion.

314         The impact of a judgment stressor could be emphasized by the coach talking  
315         explicitly with the athlete about their expectations. Discussing this, one coach commented:  
316         “So actually the pressure is applied when you say, ‘This is what you're doing, by your own  
317         volition, and actually you're not hitting the mark. So you need to change something in this  
318         session’. By saying that we’d be clear about the consequences of their actions and that’d  
319         bring the pressure”.

### 320 **Individual differences**

321         The higher-order theme of individual differences regarded how coaches believed that  
322         athletes responded individually to stressors. Coaches believed that athletes responded  
323         differently due to individual differences, and understood that what generated pressure for one  
324         athlete may not for another. The following example highlights one coach’s explanation on  
325         how individuals differed in their assessment of stressors:

326         And I think it's really specific to the individual - so what pushes some peoples’  
327         buttons really doesn’t push other peoples’... It's usually different depending on the  
328         individual, as much as a fingerprint. Obviously because of the way we all take in  
329         information.

330 In understanding this variation, coaches could strategically engineer stressors to target  
331 athletes. On one hand, stressors that shaped the demands of training could be managed to  
332 alter how difficult the training was for certain athletes. On the other hand, stressors that  
333 defined the consequences of training could be manipulated to make the session more  
334 important for specific athletes. For example, one coach targeted an athlete by manipulating  
335 stressors to create a low level of demand. In this instance, the coach would require the athlete  
336 to perform a simple skill and this created pressure for the athlete due to an increased  
337 perception of expectation:

338 [There's] more [pressure] because there is more "should". "I should get this right; I  
339 should be able to do it well". She'd put more pressure on herself because it's an easy  
340 [skill] and therefore she should be able to do it well. She'd probably put less pressure  
341 on herself on a harder one because a lot of people drop that. That would be her  
342 thinking.

### 343 **Important to Perform**

344 This was a higher-order theme which regarded coaches' beliefs regarding what  
345 athletes experienced when under pressure. Coaches defined pressure as the perception of  
346 knowing that it is important to perform ones best. Illustrating this theme, the following quote  
347 highlights one coach's perception of pressure:

348 I think that pressure is the stress of knowing you have to perform due to the outcome  
349 being very important to the game, particularly, and due to the challenges ahead of  
350 you... You're trying to determine what you need to do and how much it matters.

351 It was believed that PT developed coping mechanisms and performance by providing  
352 athletes with the opportunity to practice delivering their skills whilst experiencing a pressure  
353 response. In line with this, while the coaches often replicated the same demands found at  
354 competition, many competition consequences were deemed impossible to replicate. Due to

355 this, the coaches focused instead on using alternative consequences to engender a pressure  
356 response. The following quote exemplifies one coach's perceptions regarding the role of PT  
357 as a means for enhancing performance, and the lack of a need to replicate competition  
358 stressors:

359 I think there are definitely certain things that can be done to replicate things that go on  
360 in [competition] and one hundred percent there are things you can never replicate.  
361 Like the penalty shoot-out in a football match, let's say... But, when you do it  
362 you're aiming for the athlete to practice pressure management. If you have the skill sorted  
363 within that pressure training environment, so that it withstands, then it should prevail  
364 [at competition]. So there are ways of putting your team under pressure constructively  
365 within training."

### 366 Discussion

367 Literature has indicated that experiences of pressure can facilitate the development of  
368 mental toughness, resilience, and an ability to perform under pressure (Bell et al., 2013;  
369 Fletcher & Sarkar, 2012). In line with this, PT is currently used by elite coaches and  
370 additional applied and academic endeavors have been encouraged (Beaumont, et al., 2015;  
371 Driskell et al., 2014; Sarkar et al., 2014). However, no investigations have explored how  
372 pressure is systematically produced by coaches across performance contexts. To further  
373 knowledge in this area the current investigation examined the methods used by elite coaches  
374 to create PT environments for performance enhancement.

375 Results detailed that coaches manipulated variables to generate task, performer,  
376 environmental, forfeit, reward, and judgment stressors. These stressors could be classified as  
377 demands or consequences of training. Coaches also believed that individual differences were  
378 responsible for athletes responding differently to stressors, and coaches would consider these  
379 differences when manipulating stressors. Through this process of stressor management

380 coaches generated pressure and conducted PT. The following section discusses these findings  
381 in relation to previous research, future research and applied practice.

382 Coaches created challenging demands and meaningful consequences to generate  
383 pressure, and current literature echoes this finding. For instance, research applying Newell's  
384 (1986) model of constraints in sport has highlighted how task, performer and environmental  
385 variables can be manipulated to effectively produce challenging training demands.  
386 Exemplifying this, Pinder, Davids, Renshaw and Araújo (2011a) manipulated task variables  
387 to expose cricketers to three different bowling challenges involving a "live" bowler, a ball  
388 projection machine, and a near life-size video. Results showed that each distinct combination  
389 of task constraints led to significant variations in the standard of performance, due to varying  
390 levels of challenge. Additional evidence can be seen in recent research on dart throwers  
391 experiences' of pressure. Environmental stressors were generated by requiring participants to  
392 throw darts from different heights on a climbing wall, and it was found that these  
393 manipulations to height contributed to varying degrees of anxiety (Oudejans & Pijpers, 2009;  
394 2010).

395 Regarding the consequences of training, broader research illustrates the effectiveness  
396 of using forfeits, rewards and judgments in sport and reinforces the role of meaningful  
397 consequences in generating pressure. For instance, forfeit and judgment stressors were used  
398 to create pressure in Bell and colleagues' (2013) research with elite cricketers. Judgment  
399 stressors included having to re-perform a failed test in front of the training group, and forfeits  
400 included having to miss the next training session. Rewards are also evidenced as a viable  
401 stressor for creating pressure. For example, Oudejans and Pijpers (2009) studied the impact  
402 of pressure on expert basketball players' free throw performances. In this study, the  
403 experimental group trained under pressure, partly induced via the presence of a 25 Euro  
404 reward for the individual with the best shooting percentage. Judgment stressors were also

405 used in this study, whereby the players were filmed and informed that their performances  
406 would be evaluated by experts. Collectively, the research highlighted above, together with the  
407 findings from the present study, offer insight into the use of demands and consequences as  
408 mechanisms for generating pressure.

409         The findings of the current investigation transcended current literature in providing  
410 novel information regarding how coaches replicated competition stressors. Specifically, it  
411 was found that the coaches adopted a contrasting approach when choosing how to manipulate  
412 the demands and consequences of training. It could be seen that while coaches commonly  
413 managed training demands to replicate the demands of competition, training consequences  
414 were rarely organized in this way. For example, it was normal for a coach to structure the  
415 training demands in such a way that they present athletes with a situation they might find at  
416 competition, such as having to defend a score, chase a score, or score the next point to win. In  
417 this way, the demands were identical to competition demands. However, when dealing with  
418 consequences of training, coaches rarely endeavored to replicate the consequences found at  
419 competition. This appeared to be due to the difficulty, and sometimes impossibility, of  
420 mobilizing such resources, such as 50,000 spectators or thousands of pounds in prize money.  
421 Accordingly, while competition consequences were occasionally replicated when possible,  
422 predominantly the consequences were not replicative. Instead, coaches' manipulated the  
423 consequences to be as meaningful to the recipient as those found at competition.

424         Bearing in mind the dichotomy between training and competition consequences, these  
425 findings have implications on the issue of transferability. They raise the question as to  
426 whether developed skills will transfer from training to competition. Previous research  
427 illustrates mixed findings on the matter. On one hand there is a literature base proposing that  
428 representative demands (Brunswik, 1956) and action fidelity between the training and  
429 competition environment is key for promoting transferability (Pinder, Davids, Renshaw, &

430 Araújo, 2011b). On the other hand, there is research illustrating that this might not be  
431 necessary. For example, Bell and his colleagues' (2013) study on elite cricketers found that  
432 PT, involving the use of consequences such as punishment, facilitated performance  
433 enhancement at competition. This transference of skill took place despite the competition  
434 consequences differing from those used in the PT. As there is contrasting evidence, additional  
435 research is required to clarify the relationship between replicative training demands and  
436 consequences, and transferability of skills under pressure. This is needed in order to inform  
437 current applied practice and either validate or reject the current approach adopted by elite  
438 coaches as presented in the present study.

439 Another interesting finding concerned coaches' perceptions of why and how PT  
440 improved performance. Coaches believed PT affected performance via allowing athletes to  
441 practice performing whilst experiencing a pressure response. Training in this way ensured  
442 athletes could develop their ability to make decisions and perform specific skills whilst under  
443 pressure and performance gains would then transfer to competition. This finding is important  
444 as it documents novel information at a behavioral level regarding how coaches believed PT  
445 enhanced performance. Wider literature examining performance under pressure supports the  
446 coaches' perceptions and provides an insight into the functions that might underpin this  
447 process at a cognitive level (Baumeister, 1984; Eysenck & Calvo, 1992). Literature  
448 concerning explicit monitoring theories of choking has highlighted that athletes who are often  
449 self-focused under pressure are less likely to choke because they become immune to the  
450 effects of explicit monitoring (Baumeister, 1984). According to this theory, individuals still  
451 experience heightened self-monitoring but are able to function in a way where it longer  
452 affects them. Concerning distraction theories, it has been argued that the adverse effects of  
453 anxiety can be avoided when individuals perform a second stream of processes involving an  
454 increase in effort towards the task (Eysenck & Calvo, 1992). Oudejans and Pijpers (2010)

455 indicate that it is these secondary self-regulatory processes which develop as a result of being  
456 exposed to stressors. As these processes improve, pressure management improves.

#### 457 **Future Research**

458         Based on the findings of this study, future research should explore the reliability and  
459 ecological validity of coaches' methods in generating pressure. Task, performer,  
460 environmental, forfeit, reward and judgment stressors could be manipulated in order to assess  
461 whether demands and consequences of training genuinely create pressure. Such a study  
462 would highlight how these themes (i.e. stressors) enable bespoke, sport specific PT  
463 environments to be produced. Refining knowledge of this sort is important considering that  
464 the area is still largely ignored (DeCaro et al., 2011) yet currently being applied and relied  
465 upon in elite sport (Beaumont, et al., 2015; Bell et al., 2013, Driskell et al., 2014).

466         Additional research examining the effects of specific stressors on choking might also  
467 be of value. This could be important as evidence outside of sport indicates that different  
468 stressors might illicit different types of choking (for a review see Hill, Hanton, Matthews, &  
469 Fleming, 2010). For example, DeCaro et al. (2011) found that the pressure of being watched  
470 by others increased attention to skill processes and consequently increased self-conscious  
471 methods of choking. Alternatively, reward stressors distracted attention away from the task  
472 and consequently lead to distraction forms of choking. This research is important for PT as it  
473 indicates that it might be possible to strategically evoke a specific type of choke. This seems  
474 pertinent as it could empower coaches with the ability to choose what type of coping  
475 mechanisms their athletes develop. For example, a coach could create self-consciousness, via  
476 the use of stressors shown to illicit this specific type of choke, such as judgment (Carver &  
477 Scheier, 1978), in order to provide an athlete with the opportunity to develop the coping  
478 mechanisms to this choke. Being able to control the type of coping mechanisms an athlete  
479 develops could be vital in instances such as when an individual is susceptible to a particular

480 type of choke (e.g., self-consciousness). Accordingly, it is proposed that future research  
481 explores the relationship between specific stressors and choking in sport as this might  
482 facilitate coaches in being able to strategically develop precise coping mechanisms.

483         Two final future research considerations concern development level athletes and the  
484 timing of PT. Firstly, it is worthwhile deliberating how suitable PT is for younger athletes,  
485 and athletes below the elite level. While the present study did not actively pursue information  
486 on this subject, it was evident that coaches put more emphasis on creating challenging  
487 demands of training, and purposefully neglected consequences, when working with  
488 development level athletes. It could be important for future research to address this area  
489 considering that the findings of the present study indicate that coaches don't adopt the same  
490 methods when working with this population. It was also found that coaches believed the  
491 timing of PT was vital due to its ability to impact confidence. A number of coaches  
492 highlighted that PT had the potential to initially lower confidence, depending on the ability of  
493 the athlete. This perception is backed up by research linking pressure to confidence (Hays,  
494 Thomas, Maynard, & Bawden, 2009), and would be an interesting area for future research to  
495 investigate.

#### 496 **Applied Considerations**

497         The findings offer some implications for practitioners desiring to conduct PT. It might  
498 be imperative to start PT with an assessment of individual differences. This will provide  
499 information for understanding how to make PT ethical, meaningful and promote  
500 development. This could include considerations relating to how the athlete responds to  
501 specific demands of training as well as how they attribute meaning to specific rewards,  
502 forfeits and judgments. It might then be useful to evaluate what demands and consequences  
503 on training are available in a respective sport. When selecting demands of training, the  
504 findings indicate the benefit of constructing them to form challenges that are replicative of

505 competition. Additionally, forfeit, reward and judgment stressors could be manipulated to  
506 create consequences that are suited to the culture of the sport and meaningful to the athlete.  
507 The initial information collected on individual differences, accompanied by perceptions  
508 regarding how each athlete is coping with the PT program, could then be used to  
509 appropriately graduate the intensity of these demands and consequences as the athlete  
510 progresses through the training.

511         Once the PT program has begun, the results imply that this process could continue  
512 until each athlete is being exposed to consequences as meaningful as, and demands as  
513 difficult as those present at competition. Throughout this process the practitioner might also  
514 wish to consider where they can support the coach. For example, assistance might be required  
515 when gathering information, tailoring demands and consequences to suit an individual,  
516 negotiating resources to be used as stressors, or monitoring and debriefing sessions with  
517 coaches, athletes and support staff.

518         An additional applied consideration concerns the finding that coaches evaluated  
519 individual differences using their subjective perceptions and athletes' verbal reports. Given  
520 the importance of understanding individual differences, applied practitioners are encouraged  
521 to consider the merits of progressing additional techniques that go beyond that of verbal  
522 report and subjective perception. For example, information could be collected regarding how  
523 susceptible an athlete is to a particular kind of choke. The Movement-Specific Reinvestment  
524 Scale (Masters, Eves, & Maxwell, 2005) is a tool that could be used to provide information  
525 on an individuals' reinvestment style, such as how likely they are to become self-conscious  
526 under pressure. This information could then inform how stressors are selected and adjusted to  
527 facilitate the athletes' development. For instance, those who are more likely to choke due to  
528 heightened self-consciousness could be exposed more slowly to stressors that, in wider  
529 literature, are known to elicit this type of choking (DeCaro et al., 2011). By expanding

530 methods beyond coaches' subjective perception and athletes' verbal reports practitioners  
531 could advance the ability for PT to be efficient, ethical, and meaningful.

### 532 **Limitations**

533         There are two main limitations to the present study. Firstly, data collected is based on  
534 coaches' perceptions and therefore it is not possible to objectively verify the effectiveness of  
535 their methods. Measures were taken during the recruitment process to account for this  
536 limitation. Specifically, the criteria used to select coaches for inclusion ensured that there was  
537 a strict review by the wider research team of each individual coach and their experiences of  
538 successful PT. This limitation reinforces the value of future research testing the reliability and  
539 ecological validity of the methods reported in this study. The second limitation of the study  
540 is that the coaches were interviewed in relation to their experiences delivering PT elite  
541 adolescent and adults exclusively. Therefore, the findings might not generalize to athletes  
542 below elite and to ages below adolescence.

### 543 **Concluding Remarks**

544         Research has highlighted that PT is an effective tool for developing coping  
545 mechanisms and enhancing performance under pressure (e.g. Bell et al., 2013). Despite this,  
546 research had not provided a theoretical foundation detailing how pressure can be  
547 systematically created for performance enhancement across training environments.  
548 Addressing this gap, the findings of this study demonstrate the importance of demands and  
549 consequences of training and begin to highlight, in context, some specific methods that can  
550 be used to generate pressure across sports.

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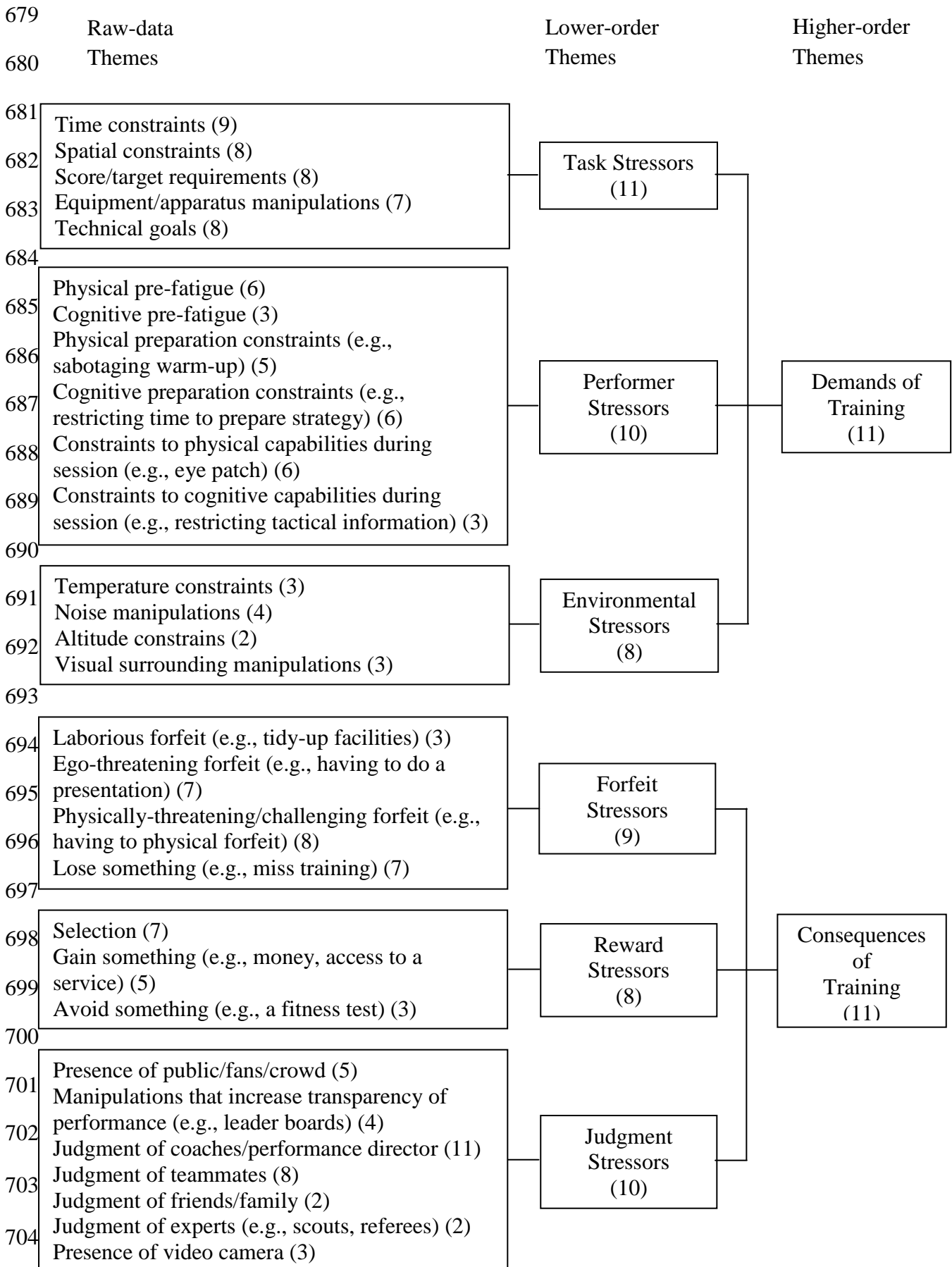
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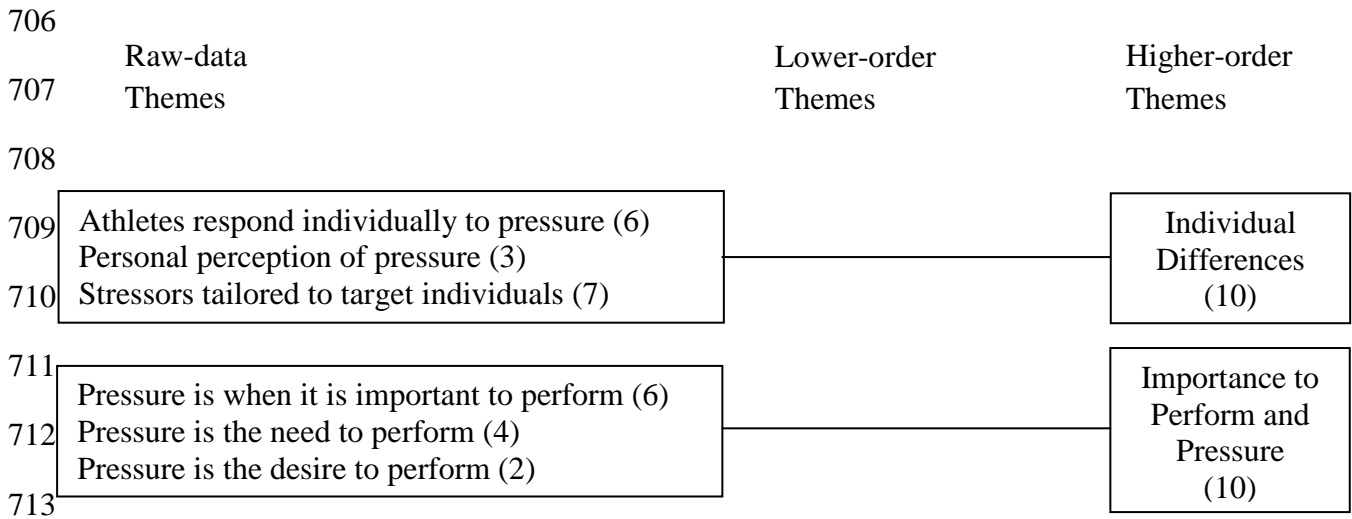
Figure 1: Higher- and lower-order themes (parentheses refer to the number of coaches cited).

Figure 2: Framework illustrating how elite coaches created pressure training environments.

678 Figure 1: Higher- and lower-order themes (parentheses refer to the number of coaches cited).



705 Figure 1: (continued).



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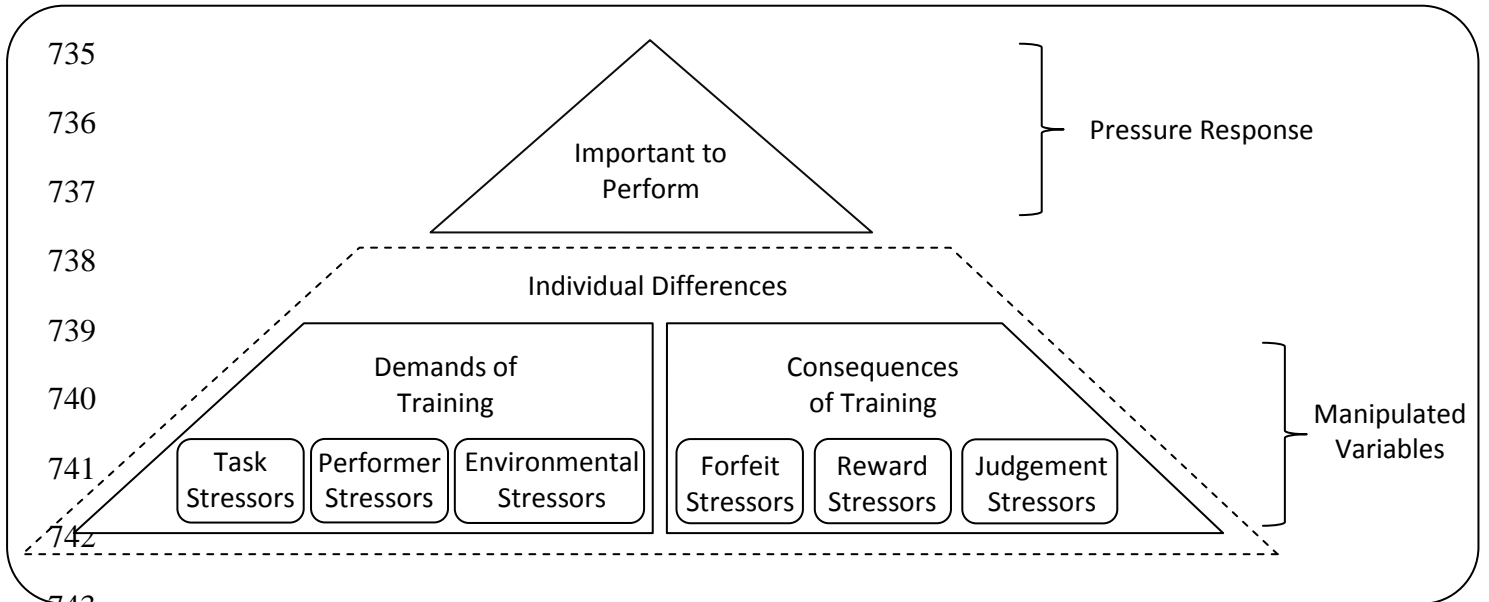
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731 Figure 2: Framework illustrating how elite coaches created pressure training environments.

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