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Abstract

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

Keywords: Mental Toughness; Pressure Training; Resilience; Stress Exposure Training; Stress Inoculation Training

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

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

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

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

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

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

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

In addition to the limited knowledge on how coaches set up planned disruptions within actual training settings (Stoker et al., 2016), even less is known about the reasoning of coaches who use these strategies in their daily work. Understanding how planned disruptions are used within an applied setting is important, not in the least because of the risk of negative side effects (e.g., unhealthy competition) that might be associated with such strategies (Fletcher & Sarkar, 2016). Thus, the current study sought to examine high performance coaches' experiences with the use of planned disruptions. More specifically, we were interested in (1) the different types of planned disruptions coaches use and (2) the desired outcomes that underlie the use of these disruptions. Given the exploratory nature of this study, a qualitative approach was adopted.

Method

Philosophical approach

This study was guided by a pragmatic research paradigm (Giacobbi, Poczwardowski, & Hager, 2005). Ontologically, pragmatism does not adhere to traditional strict realist or relativist views of reality. Rather, pragmatism "argues that a continuum exists between objective and subjective viewpoints" (Giacobbi et al., 2005, p. 22). It is interested in providing useful knowledge which 'works' in the real world, as it can provide solutions to applied research questions within a specific context (Creswell, 2014). Epistemologically, we recognize that knowledge produced through research is "relative and not absolute" (Feilzer, 2010, p. 13). When attempting to understand people's experiences, researchers thus have to engage in an interpretative activity which "is always informed by our own assumptions, values, and commitments" (Braun & Clarke, 2013, p. 285).

Participants

For this study, nine high performance coaches (six male, three female) aged 28-62 (M = 42.9, SD = 8.3) were interviewed. High performance coaches were sampled because they can

provide a valuable source of practical knowledge on planned disruptions, as highlighted by Greenwood, Davids, and Renshaw (2012):

> coaches' experiential knowledge, gained through day-to-day immersion within specific performance contexts, might be useful to scientists as it is based on extensive experience and an intuitive understanding of the influence of performance task constraints on athlete behaviours (p. 412).

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

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Procedure and Data Collection

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

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

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

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

Data Analysis

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

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

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

Results

Types of planned disruptions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Desired Outcomes

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Additional Considerations

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

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

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

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

Periodization. Four coaches explicitly referenced the fact that they would use planned disruption in a periodic manner. This meant that they would not continuously use disruptions:

> You should not always do it. I think you cannot bring someone in 100% tension level all of the time. I mean you are creating a lot of stress. We are still dealing with 16 and 17 year olds. The question has to be how often we have to do it to get the maximum effect. I don't think it's always 100% (C9).

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

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

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

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

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

Discussion

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

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

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

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

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

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

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

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

Limitations and Future Directions

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

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

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

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

Conclusion

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

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.
645

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Tables & Figures

Table 1
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

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 succesion 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

807

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)	Evoke 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
		Aruousal 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

810