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published in
Journal of Applied Sport Psychology
2021

DOI (link to publisher)
10.1080/10413200.2019.1630864

document version
Publisher's PDF, also known as Version of record

Journal of Applied Sport Psychology

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/uasp20

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To cite this article: Jolan Kegelaers, Paul Wylleman, Alexandra Bunigh & RaÔul R. D. Oudejans (2021) A Mixed Methods Evaluation of a Pressure Training Intervention to Develop Resilience in Female Basketball Players, Journal of Applied Sport Psychology, 33:2, 151-172, DOI: 10.1080/10413200.2019.1630864

To link to this article: https://doi.org/10.1080/10413200.2019.1630864

JOURNAL OF APPLIED SPORT PSYCHOLOGY, 33: 151–172, 2021

ISSN: 1041-3200 print / 1533-1571 online
DOI: 10.1080/10413200.2019.1630864

A Mixed Methods Evaluation of a Pressure Training Intervention to Develop Resilience in Female Basketball Players

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The present study aimed to evaluate the effectiveness of a resilience development intervention, set up around regular exposure to increased pressure. This intervention adopted a quasi-experimental design, delivered within an elite female basketball academy. The mixed methods evaluation combined individual and team resilience measures with semi-structured interviews with athletes and coaches. Quantitative results demonstrated that the intervention was effective in reducing team level vulnerabilities. Qualitative evaluations indicated that the intervention led to increased awareness, emerging leadership, stronger communication channels, and the development and execution of collective plans. Furthermore, potential avenues for intervention improvement were also addressed

Lay Summary: This study aimed to test a resilience training intervention based on pressure exposure during practice. Results within a female elite basketball academy indicated that both athletes and coaches believed the team became more resilient to in-game stressors and less susceptible to team-level vulnerabilities.

The construct of resilience has gained significant attention in sport psychology over the past decade (for a review, see Bryan, O'Shea, & MacIntyre, 2017). This construct has typically been used to understand how athletes or sport teams are able to reach or maintain positive adaptation despite exposure to stress or adversity (Fletcher & Sarkar, 2013).

Received 20 November 2018; accepted 9 June 2019.
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In light of the realization that athletes are required to continually train and perform under high levels of stress (Baker & Young, 2014) and are potentially faced with a number of significant adversities throughout their careers (e.g., Hanton, Fletcher, & Coughlan, 2005; Mellalieu, Neil, Hanton, & Fletcher, 2009; Sarkar & Fletcher, 2014b), evidence suggests that resilience is one of the essential psychological characteristics for athletic success (e.g., Gould, Dieffenbach, & Moffett, 2002; Holt & Dunn, 2004; Rees et al., 2016). Despite the growing interest, there remains a strong need for the development of evidence-based resilience training programs in sports (Galli & Gonzalez, 2015). The purpose of the present study was, therefore, to design and evaluate a preliminary resilience intervention.

On the individual level, resilience has been defined as "the role of mental processes and behavior in promoting personal assets and protecting an individual from the potential negative effect of stressors" (Fletcher & Sarkar, 2012, p. 675; 2013, p. 16). One important contribution of recent work on individual resilience is the realization that, rather than being a personality trait, resilience is more accurately conceptualized as a process (Bryan et al., 2017; Fletcher & Sarkar, 2013). Such a process or state-like view considers resilience as a temporal and contextual phenomenon, resulting from dynamic person–environment interactions (Luthar, Cicchetti, & Becker, 2000). Thus, both personal (e.g., motivation) and environmental (e.g., social support) resilient qualities can positively influence athletes' challenge appraisals, coping strategies, and metacognitive learning strategies in response to adversity (Fletcher & Sarkar, 2012). A comprehensive overview of individual resilient qualities identified in sports is provided by Galli and Gonzalez (2015) and Sarkar and Fletcher (2014b).

In recent years, scholars have argued that resilience is not limited to individuals but can be demonstrated at the collective level as well (Morgan, Fletcher, & Sarkar, 2017). Morgan, Fletcher, and Sarkar (2013) defined such team resilience as "a dynamic, psychosocial process which protects a group of individuals from the potential negative effect of stressors they collectively encounter. It comprises of processes whereby team members use their individual and combined resources to positively adapt when experiencing adversity." (p. 522). In line with this definition, Bowers, Kreutzer, Cannon-Bowers, and Lamb (2017) argued that team resilience reflects a second-order emergent state, resulting from a combination of both individual (i.e., originating from the individuals within a team) and collective (i.e., inherent to the group structure) resilient qualities (e.g., team characteristics and processes). For example, collective resilient characteristics identified in sports include group structure (i.e., shared norms and formal roles), a mastery approach (i.e., continued attitude toward learning and improvement), social capital (i.e., quality of relationships), and collective efficacy (Morgan et al., 2013). These characteristics are underpinned by key psychosocial processes such as transformational leadership, shared leadership, team learning, social identity, and positive emotions (Morgan, Fletcher, & Sarkar, 2015). Furthermore, recent evidence suggests that resilient teams not only demonstrate positive characteristics but also are capable of avoiding team vulnerabilities under pressure (e.g., breakdown in communication, failing leadership; Decroos et al., 2017; Kegelaers, Wylleman, Blijlevens, Boonstoppel, & Hendriks, in press). Collectively, research in both individual and team sports indicates that resilience is a complex, dynamic, and multifaceted construct.

Despite recent advances in resilience research, a surprising lack of scientific attention for resilience development remains. Some scholars have proposed resilience training strategies based on theoretical knowledge (for a special issue, see Fletcher & Sarkar, 2016a). These strategies are typically based on traditional cognitive-behavioral (e.g., Deen, Turner, & Wong, 2017) or mental skills training (e.g., Cox, Neil, Oliver, & Hanton, 2016)

approaches. However, given the complex and multifaceted nature of the construct, it is also crucial to look at the environment in which an athlete operates when attempting to develop resilience (Fletcher & Sarkar, 2016b). In this regard, Fletcher and Sarkar (2016b) argued that efforts to develop resilience should be integrated in existing training activities and require a facilitative environment (i.e., a careful balance between sufficient challenge and support). As such, coaches play an important role in creating an environment wherein resilience can be fostered (Kegelaers & Wylleman, 2018; Sarkar & Fletcher, 2016; White & Bennie, 2015).

It has been suggested that one way to create a facilitative environment is through pressure training (Fletcher & Sarkar, 2016b; Galli & Gonzalez, 2015; Kegelaers & Wylleman, 2018)—an approach closely related to traditional stress inoculation (Meichenbaum, 1985) or stress exposure training (Driskell, Sclafani, & Driskell, 2014). In line with a challenge model of resilience (Fergus & Zimmerman, 2005; Seery, 2011), the underlying assumption of pressure training is that the resulting stress response will lead to the development and refinement of key resilient qualities—provided the stress is not too high to overcome. Despite some contradictory evidence (Beseler, Mesagno, Young, & Harvey, 2016), previous research already demonstrated that pressure training is generally effective in decreasing performance-related anxiety (Mace & Carroll, 1986, 1989) and increasing performance under pressure (Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers, 2009, 2010). There remains, however, a lack of empirical data on the effectiveness of this strategy as a way to develop resilience in sports.

Following the increased attention for pressure training in recent years, some scholars have examined how coaches can use this principle in an applied context (e.g., Kegelaers, Wylleman, & Oudejans, 2019; Stoker, Lindsay, Butt, Bawden, & Maynard, 2016). Kegelaers et al. (2019), for example, explored coaches' use of planned disruptions. These are structured and deliberate activities whereby athletes are exposed to increased and/or changing demands under controlled conditions. Such planned disruptions can be set up by manipulating the physical (e.g., fatigue) or mental (e.g., consequences) demands on the player, the environmental demands (e.g., distractions), or the task demands (e.g., stronger competition). Similarly, other authors have argued that pressure training can be set up by manipulating task demands or by increasing the significance of the appraisal (i.e., adding consequences; Fletcher & Sarkar, 2016b; Stoker et al., 2016), with recent evidence suggesting the latter (i.e., consequences) are more effective in creating pressure (Stoker et al., 2017). These planned disruptions fit within the constraints-led approach, which entails the deliberate manipulation of environmental, personal, or task constraints with the aim to facilitate the acquisition and development of motor skills (Davids, Button, & Bennett, 2008; Renshaw, Davids, & Savelsbergh, 2010). Within this broader approach, planned disruptions specifically aim to increase the demands and challenge levels of practice and to elicit a psychological stress-related (i.e., perceived imbalance of demands and resources) or pressure (i.e., perceived importance of performing well) response (Fletcher & Sarkar, 2016b; Stoker et al., 2016). As such, planned disruptions and pressure training move beyond the original focus on motor skills development per se but also aim to let athletes develop the resources to deal with real-life pressure situations (Kegelaers et al., 2019).

When setting up pressure training through the use of planned disruptions, it is crucial to consider which other facilitative factors have to be present (Kegelaers et al., 2019). It has previously been argued that the stress exposure in and of itself will not necessarily lead to positive development (Collins, MacNamara, & McCarthy, 2016; Sarkar & Fletcher, 2017). In this regard, metacognitive strategies, such as self-reflection, are important resilient qualities as they allow athletes to identify personal strengths and weaknesses and facilitates

learning from stressful experiences, and as such contribute to resilience (Cowden & Meyer-Weitz, 2016; Crane, Searle, Kangas, & Nwiran, 2019; Fletcher & Sarkar, 2012). Kegelaers et al. (2019) found that coaches did not simply use planned disruptions as a way to familiarize athletes to pressure; they also used these training strategies as formal reflection moments to create awareness of athletes' responses under stress. Through these reflections, planned disruptions might be used to promote team processes; develop personal resilient qualities (Kegelaers et al., 2019); and, perhaps most important, provide athletes' with the opportunity to develop confidence in their own ability to withstand pressure (Collins et al., 2016). As such, self-reflection training has previously been integrated successfully within resilience development interventions outside sports (Crane, Boga, et al., 2019).

In sum, there is theoretical (e.g., Fletcher & Sarkar, 2016b) and applied (e.g., Kegelaers & Wylleman, 2018) support for the use of pressure training as a way to develop resilience. There remains, however, a need to empirically test this approach within an applied sports setting. The aim of the present study was, therefore, to set up and evaluate a preliminary pressure training intervention to develop resilience in elite female basketball players. In line with the notion that coaches play an important role in resilience development (Sarkar & Fletcher, 2016), this intervention was designed and implemented in conjunction with the team's head coaches. Based on the principles of planned disruptions (Kegelaers et al., 2019), the main feature of the intervention was the regular exposure to increased pressure during daily practice. These instances of pressure training were complemented by an introductory resilience development workshop (cf. Morgan et al., 2017) and guided reflection moments after each training session (cf. Cowden & Meyer-Weitz, 2016).

METHODOLOGY

Design

Grounded within a pragmatic research paradigm, the present study made use of a mixed methods quasi-experimental design. It has been suggested that mixed methods are an especially useful approach to "address applied research questions from a theoretical perspective" (Giacobbi, Poczwardowski, & Hager, 2005, p. 28). As such, mixed methods designs form an often advocated yet underused methodology in applied sport psychology (Moran, Matthews, & Kirby, 2011). For this study, a "dominant-less dominant" design was adopted (Giacobbi et al., 2005, p. 25), with an emphasis on qualitative research data. Such qualitative methods provide a valuable technique to evaluate the effectiveness, feasibility, and underlying active mechanisms of sport psychology interventions in a real-world setting (Strean, 1998). Quantitative data were used in an attempt to complement and triangulate the qualitative data (Moran et al., 2011).

Participants

The current study was conducted within a Dutch elite-level female basketball academy. In total, 19 athletes participated, divided into two groups. Group A consisted of 10 players with a mean age of 18.37 ($SD = 2.03$) and had an average 10.20 years of experience ($SD = 3.05$). Group B consisted of nine players, of which one player withdrew halfway through the study because of health reasons unrelated to the intervention. This left Group B with eight players with a mean age of 17.76 ($SD = 2.09$) and an average of 10.00 years of experience ($SD = 1.69$). The athletes were nonrandomly divided into both groups. We

recognize that such nonrandom allocation forms a major limitation. At the same time, it is acknowledged that in a context such as elite sports, pure random sampling not only is very difficult to attain but might compromise the ecological validity of applied research (Ivarsson & Andersen, 2016). In the present study, pure random sampling was considered unobtainable for two reasons. First, given the nature of the intervention, it was deemed necessary for both teams to be sufficiently balanced (i.e., have an appropriate distribution of guards, forwards, and centers). Second, selection was informed by practical restrictions, as some players had obligations with their national team during certain points of the intervention. To ensure as much control as possible, athletes in both groups were carefully matched. To this end, coaches—in conjunction with the researchers—purposefully divided players prior to the intervention, in a way that both groups had a similar distribution of playing positions (i.e., same number of guards, forwards, and centers), with a similar mean age and mean experience level.

For the qualitative evaluations, seven of the original 18 athletes participated in semi-structured interviews. Purposeful maximum variation sampling (i.e., heterogenous sampling including multiple different perspectives; Suri, 2011) was used to select athletes from different ages, positions, and roles (i.e., leaders, nonleaders). The seven athletes had a mean age of 18.29 ($SD = 1.99$) and included two guards (one senior, one U20), three forwards (two senior, one U20), and two centers (one senior, one U20). Furthermore, interviews were also conducted with the three coaches involved in the project (i.e., senior team head coach, U20 head coach, senior team assistant coach). The coaches had an average age of 38.01 ($SD = 8.81$) and an average of 15 years ($SD = 7.00$) of coaching experience. The final number of participants was considered appropriate as it allows for in-depth, practically manageable engagement with rich data gathered from a diverse set of perspectives (cf. Levitt, Motulsky, Wertz, Morrow, & Ponterotto, 2017).

Intervention

As highlighted, the main feature of the intervention was regular exposure to increased pressure during daily practice. To facilitate learning and the development of new resilient resources, two additional features were included: (a) a workshop prior to the intervention and (b) formal reflection moments after each training session. Following Morgan et al. (2017), the workshop served to elicit a group discussion on resilience. By drawing on previous experiences, such a discussion can help a team identify both its strengths and weaknesses in response to adversity and, thus, help team members understand their current readiness to deal with stressful events (Alliger, Cerasoli, Tannenbaum, & Vessey, 2015). During the workshop, both individual (e.g., challenge mind-set) and collective resilient qualities (e.g., collective efficacy, shared leadership, effective communication, team support) were discussed. To conclude the workshop, athletes were invited to reflect on their biggest working points as an individual and a team for the upcoming practical sessions.

Following the workshop, eight on-field sessions were organized with the aim to strengthen resilient qualities under pressurized conditions. Each training session consisted of two distinct parts: a simulation training exercise (cf. Jones & Hardy, 1990)—simulating the final 2 min of a game—and a free throw exercise (cf. Crust & Clough, 2011; Oudejans & Pijpers, 2009). In line with previous work (Kegelaers et al., 2019; Stoker et al., 2016), pressure was increased during the training sessions by increasing the mental (e.g., adding consequences) or physical (e.g., fatigue) demands on the players, increasing the demands of the environment (e.g., distractions), or increasing the demands of the task (e.g., time pressure). The specific strategies used per session are further elaborated in Table 1. In line

with recent recommendations (Collins et al., 2016; Kegelaers et al., 2019), the training sessions adopted a guided discovery approach (Williams & Hodges, 2005), focused on letting athletes explore their own solutions to the provided constraints. Every training session was followed by a formal collective guided reflection moment, led by the coach, wherein athletes were encouraged to look back on their functioning during the past session and determine the points of improvement for the upcoming sessions.

Procedure

Prior to the intervention, institutional ethical approval was obtained and informed consents were collected from all participants. The intervention was set up as a switching replications design. Group A was first assigned to the experimental condition, whereas Group B served as control condition. After completion, the intervention was repeated for Group B. The interventions consisted of a 1½-hr workshop and eight on-field sessions, spread over 3 weeks. The on-field sessions were always incorporated into regular practices and typically lasted about 30 min. Game simulations were completed first, followed by the free throw exercises. Surveys were collected from all participants prior to the first intervention (Pre), between the first and second intervention (Post 1), and after the second intervention (Post 2). Interviews with athletes from Group A were conducted at Post 1, whereas interviews with the athletes from Group B and the coaches were conducted at Post 2.

Material

Semistructured Interviews

For the interviews, a three-part semistructured interview guide was developed. The first part aimed at questioning participants on their experiences during the intervention (e.g., "What was it like for you to participate in the past training sessions?"). Follow-up questions were designed to explore the experiences of the different parts of the intervention, such as the workshop, the game simulations, and the free throw exercises. The second part aimed to explore the perceived effectiveness of the intervention (e.g., "How would you say the intervention influenced you or the team, if at all?"). More specifically, participants were questioned on both the effects witnessed during the practice sessions, as well as effects witnessed outside of the intervention (i.e., during competition). Finally, participants were asked about potential weaknesses of the intervention and how the intervention might be improved in the future (e.g., "What did you miss or would you do different in the future, if anything?").

Quantitative Measures

Two questionnaires were used throughout the study to measure the effects of the intervention on both individual and team resilience. During the pretest, additional demographic information was collected, including age, years of experience, years at current organization, and years with current coach.

Individual resilience. Individual resilience was measured using the unidimensional 10-item Connor-Davidson Resilience Scale (CD-RISC-10; Campbell-Sills & Stein, 2007). This abbreviated version of the original CD-RISC (Connor & Davidson, 2003) had the best psychometric properties in different sports settings (Gonzalez, Moore, Newton, & Galli, 2016; Gucciardi, Jackson, Coulter, & Mallett, 2011). Although the CD-RISC-10 was considered the best individual resilience measure, it should be recognized that this scale

Table 1
Overview of the Training Sessions

Session		Strategies used to increase pressure
1	Game simulation	Two minutes left; referee; 5 points back log; both teams in penalty[a]; both teams have 2 time-outs remaining; intervention group starts with possession; play against man-to-man defense; athletes have to run full court length for each point behind at the end of the game
	Free throws	3 × 2 free throws; whole team watching; 1 miss = half-court sprint; 2 misses = full court and half-court sprint
2	Game simulation	Two minutes left; referee; 5 points back log; playing against better team; both teams in penalty[a]; both teams have 2 time-outs remaining; intervention group starts with possession; play against zone defense; athletes have to run full court length for each point behind at the end of the game
	Free throws	2 free throws; whole team watching; 1 miss = full-court and half-court sprint; 2 misses = suicide sprint; continue until 2 × 2 free throws scored in a row
3	Game simulation	Two minutes left; referee; 2 points back log; both teams in penalty[a]; both teams have 2 time-outs remaining; intervention group starts with possession; play against man-to-man defense; referee makes 1 bad call; athletes have to run full court length for each point behind at the end of the game
	Free throws	Whole team runs although 1 athlete shoots; 2 × 2 free throws should be scored in a row; teammates run as long as target is not reached
4	Game simulation	Two minutes left; referee; 3 points back log; playing against better team; both teams in penalty[a]; both teams have 2 time-outs remaining; intervention group starts with possession; play against man-to-man defense; athletes have to run full court length for each point behind at the end of the game
	Free throws	2 × 2 free throws should be scored in a row; whole team watching; miss = whole team runs half court sprint except shooter; max. 6 tries
5	Game simulation	Two minutes left; referee; 3 points back log; both teams in penalty[a]; intervention team has 1 time out remaining; opposing team starts with possession; play against zone defense; athletes have to run full court length for each point behind at the end of the game
	Free throws	2 × 2 free throws should be scored in a row; whole team watching; miss = whole team runs half court sprint except shooter; no max. number of tries
6	Game simulation	Two minutes left; referee; 3 points back log; both teams in penalty[a]; both teams have 1 time-out remaining; opposing team starts with possession; play against man-to-man defense; all starters have four fouls[b]; athletes have to run full court length for each point behind at the end of the game
	Free throws	2 × 2 free throws should be scored in a row; whole team watching; coach stands next to shooter; miss = whole team runs half court sprint except shooter; max. 6 tries
7	Game simulation	Two minutes left; referee; 3 points back log; both teams in penalty[a]; both teams have 1 time-out remaining; other team starts with possession; play against zone defense; all starters have four fouls[b]; athletes have to run full court length for each point behind at the end of the game
	Free throws	Running drill immediately before shooting; 2 × 2 free throws; as a team reach 70%; suicide sprints in case of not reaching target
8	Game simulation and free throws	Same as Session 1

[a]Every subsequent fault results in free throws for the other team.
[b]Every subsequent fault results in exclusion from the game for that player.

might be limited as it is originally developed for use outside sports (Sarkar & Fletcher, 2013). Items on the CD-RISC-10 are rated on a 5-point Likert scale, ranging from 0 (*not true at all*) to 4 (*true nearly all the time*). Within the present sample, internal consistency was questionably ($\alpha = .64$) but still considered acceptable.

Team resilience. Team resilience was measured using the Characteristics of Resilience in Sports Teams Inventory (CREST; Decroos et al., 2017). This sport-specific measure consists of two subscales: Team Resilient Characteristics (12 items) and Team Vulnerabilities (eight items). Items are scored on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores on Team Resilient Characteristics and lower scores on Team Vulnerabilities are indicators for the team's state resilience. Internal consistency on the CREST was high in the present sample ($\alpha = .82$).

Analysis

Qualitative Analysis

The interviews were analyzed by the first author using inductive thematic analysis, as it is an accessible method to discern and analyze meaning patterns, while maintaining theoretical flexibility (Braun, Clarke, & Weate, 2016). Following thematic analysis guidelines, analysis was conducted by first carefully reading and rereading the written transcripts. After familiarization, small segments of data were given a code to represent its meaning. These codes were then inductively clustered into themes and further refined into higher level themes. Finally, all themes were carefully provided with a label, which succinctly represents each theme's scope.

Several strategies were used to ensure the quality of analysis and the trustworthiness of the data (cf. Smith & McGannon, 2017). First, rapport was established with all participants through frequent personal contact prior to the interviews. It was believed that this aided in creating a climate wherein participants felt safe and comfortable to share their personal experiences. Second, the lead researcher—who has extensive experience in qualitative research—used a reflective journal throughout the process of analysis to make explicit his personal assumptions (i.e., bracketing; Tufford & Newman, 2012). Third, the second author served as a critical friend throughout the process of analysis (Smith & McGannon, 2017). As a critical friend, he served to scrutinize the analysis made by the lead researcher and offer potential alternative interpretations of the data. Finally, quotes are provided in the Results section to support the interpretations of the data.

Quantitative Analysis

Statistical analysis was conducted using SPSS version 25.0. First, descriptive statistics were calculated and internal consistency of the questionnaires was determined using Cronbach's alpha coefficients. To assess the effects of the intervention on resilience, a 2×3 mixed-design (Group $\times$ Time) analysis of variance (ANOVA) was deemed most suitable. All assumptions for the use of a mixed-design ANOVA were met. For the CREST, a mixed-design (Group $\times$ Time) of multivariate analysis of variance (MANOVA) was performed on the combined dependent variables of team resilient characteristics and team vulnerabilities. The CD-RISC-10 was subjected to a 2×3 mixed-design (Group $\times$ Time) ANOVA. For both the individual and the team resilience measures, a significant two-way interaction (Group $\times$ Time) was hypothesized. Where appropriate, post hoc tests using Bonferroni corrected pairwise comparisons showed the nature of the effects that were found. Effect sizes (η_p^2) were interpreted to be small with a value for partial eta-squared of 0.01, medium at 0.06, and large at 0.14 (Cohen, 1988, pp. 283–287).

RESULTS

Qualitative Findings

Thematic analysis of the participants' views and experiences led to several higher order themes. These reflected (a) participants' intervention experiences, (b) positive intervention aspects, and (c) intervention improvements. When presenting the qualitative findings, participants are identified by their role (A for athletes, C for coaches) and their respective number. For each subtheme, the number of participants (i.e., athletes and coaches) referencing a particular theme is between brackets.

Intervention Experiences

The first higher order theme reflects the participants' general experiences during the intervention. Subthemes within this higher order theme include (a) general positive evaluation, (b) perceived pressure, and (c) interindividual differences.

General positive evaluation [6A, 3C]. In exploring how coaches and athletes perceived the intervention, there was a clear consensus that participants believed the intervention, as a whole, was beneficial and provided positive results. For example, the senior team head coach stated:

> I liked the workshop and if I refer back to those things "these were the focus points, do you remember? Those are the points that came out." I think they really picked it up in later conversations. … They really got a lot of benefit from the simulation as well. (C1)

This sentiment was also reflected in the accounts of the athletes: "I'm sure these sessions, for us, were very informative" (A3). Several participants stated that the team improved their functioning under pressure, as stated by one of the athletes: "It became much calmer. In the beginning, everyone was just rushing and 'we have to score, we have to do this.' But now everyone became more directed and started thinking more clearly" (A1). Furthermore, several participants mentioned that the positive results of the intervention could also be seen outside training, during actual competition, as illustrated by one of the athletes:

> We became more calm and collected. During an important game we used to be all over the place and not thinking straight. Now we did take a step back "okay we know what we have to do, what we have in our team." And then work from there. (A5)

Perceived pressure [6A, 3C]. The accounts of the participants indicated that, in general, the intervention was effective in raising the pressure during the training sessions: "The first time we had the training sessions, it immediately was like 'oh boy.' We had a lot of stress" (A4). The perceived pressures experienced during the intervention were related to *novelty*, *time pressure*, *pressure to score*, *pressure of consequences*, *unfairness*, and *pressure related to the referee*. This increased pressure was also evidenced in the fact that the intervention at times led to small frustrations and annoyances within the athletes:

> You noticed that when things were not going well, people got cranky because we lost. Because you have to run and you are already starting with a deficit. You get frustrated because you are playing for something. If you are not playing for the points then you are not really aware when things don't go well. But eventually we started playing better so in that way it had a good effect. (A1)

As illustrated in this quote, it seemed that this frustration might actually contribute to positive outcomes. A process of agitation might narrow focus, increase effort, and elicit the use of personal and collective resources to deal with the pressure at hand (Galli & Vealey, 2008).

Although, in general, pressure increased throughout the intervention, most participants added one major remark. Coaches and athletes argued that the pressure induced in training still was not comparable to the pressure perceived during actual competition: "You can never fully re-create the feeling of competition" (A2). Similarly, Coach 2 stated, "Of course it is one of the most difficult things to bring the reality of a game to practice. That is not actually possible. No matter how you turn it; the intensity will always be a little different."

Interindividual differences [5A, 3C]. Coaches and athletes believed that perceived pressure and the effectiveness of the intervention also depended on interindividual differences. In a general sense, the way people react to the intervention and use it as a means for growth can depend on the individual and her personality. For example, Coach 2 stated,

> These [techniques to increase pressure] might work for one person, and another might just brush it off and will not do anything with it. … As a coach I have all these individuals on the court, some I have to yell at, for others I have to be really kind, or the next one needs a conversation. So I'm coaching a team, but I am also coaching individuals.

This also suggests that, although pressure training might be used for a whole team, it is sensible for the coach to remain sensitive to the individual responses of the members within the team. These findings resonate with previous work calling for an individualized approach when developing resilience (Kegelaers & Wylleman, 2018).

In addition to personal differences, variation during the intervention was also believed to be age dependent. For example, several participants suggested that younger players experienced more and different types of pressure, compared to the older athletes. Whereas the older athletes felt more pressure in relation to tactical aspects, the younger athletes seemed to be more sensitive to the consequences, especially those involving other players:

> I believe it was different for different players. Especially with the younger ones, you could really clearly see, during the free throws, that they experienced a lot more pressure. And in the game simulations, especially during the last seconds they experienced a lot more pressure … especially because their teammates had to run. (C2)

Differences were also present in the way athletes experienced both types of exercises. Whereas game simulations succeeded in increasing pressure in all athletes, the impact of the free throw exercises seemed to differ between individuals, as illustrated by one of the athletes: "During free throws, I am generally really calm. So I didn't really feel the pressure there, not at all actually. … But you could see [two other athletes], you could see them panicking. You could see their uncertainty." Finally, one coach believed that there would also be gender differences in the way athletes responded to similar exercises: "If you would something like this with men, such simulations, they would go extremely hard. It's just different" (C1).

Positive Intervention Aspects

The second higher order theme reflects the participants' views on the underlying processes that contributed to the effectiveness of this intervention. Subthemes within

this higher order theme include (a) increased awareness, (b) emerging leadership, (c) stronger communication channels, and (d) developing and executing a collective plan.

Increased awareness [6A, 3C]. A first positive aspect of the intervention, stated by several participants, was that it succeeded in creating awareness. The workshop and the training sessions made some athletes more conscious about the nature of resilience and the underlying promotive factors, as stated by one of the athletes—"Well it became evident [throughout the intervention] what [resilience] exactly means and that it is quite extensive" (A5)—and one of the coaches: "I believe that a number of girls really became more aware, like 'okay when the pressure rises, I know there are a number of tools I can draw on'" (C3). Several athletes mentioned that they became especially aware of the resilient qualities that were missing, both in themselves individually and in the team as a whole: "I think throughout, I became more aware about the situation here. About the team, but also me individually. Especially when we discussed all those [resilient] qualities, that they are almost all missing. It makes you really think." (A1). Such increased awareness might be an important resource for resilience, as it allows athletes to reflect on their strengths and weaknesses in response to adversity, and facilitate learning in response of experiences (Cowden & Meyer-Weitz, 2016; Sarkar & Fletcher, 2014a).

Of interest, this increased awareness was not limited to the athletes. All three coaches reported that, throughout the intervention, they started reflecting more and became more aware, both of their own responses and of the responses of their athletes under pressure: "I started watching a lot, listening, reading what happens, observing emotions. And I think I just had a lot of benefit from that. Gathering that information" (C1). Such increased coach awareness can provide a first step to discuss behavior under pressure and encourage reflection within an athlete (Kegelaers et al., 2019).

Emerging leadership [5A, 2C]. According to the participants, the intervention also succeeded in strengthening the leaders within the team. For example, the senior team head coach recounted,

> The leaders—who we think should be the leaders—also actually were. And they are doing it better now, also during games. They step up. They see that they have to do it and they notice that it has a positive effect. Or that it is being accepted, which can sometimes be quite scary of course. You know you are the leader, but you don't know whether everyone will accept it. And that is what we saw … [name players] and [name player], I really see they are stepping up. The two of them. And they are doing quite well. I really believe that is a direct result of the study (C1).

As evidenced by this quote, coaches believed that the intervention succeeded in having several leaders taking up their responsibility and being accepted within the group. This was further confirmed by several of the athletes themselves: "There was more input from certain players. I think [name] had a big role in that, but that is logic because she is more experienced and she is one of the guards that has to steer everything" (A2). Previous research already demonstrated that leadership is an important underlying psychosocial process in order for a team to adequately respond to adversities (Morgan et al., 2015).

Stronger communication channels [6A, 1C]. Another frequently mentioned positive effect of the intervention was improvement in team communication. Participants felt that throughout the sessions, communication became both more positive and more efficient, as illustrated by one of the athletes:

> In the beginning, it was really bad. At first, we just didn't say anything when things were going bad. Just everybody being a bit turned in themselves. And near the end, you noticed that it became sort of a habit, "We are doing this and this. Okay!" we only needed a couple of words. (A4)

Although some participants believed that communication improved during actual play, most benefits seemed to occur by establishing strong communication channels during dead ball moments. Specifically, during time-outs and free throws, communication became more effective and direct. This was mentioned by several participants: "Near the end you noticed that we always made a huddle during free throws. Quickly discuss some things" (A1), and the following:

> In the beginning, we almost never took a huddle. Whereas now during every free throw or every dead ball we take a moment to talk to each other … and it is also much more direct. At first it didn't really go anywhere, but now it is much more functional. "Which attack works?" That kind of thing. (A5)

Such a finding is consistent with previous research on team resilience. Both establishing strong communication channels (Morgan et al., 2013) and avoiding breakdowns in communication (Decroos et al., 2017; Kegelaers et al., in press) have been found to be important team qualities to positively adapt to in-game challenges.

Developing and executing a collective plan [5A]. Another beneficial result reported by the participants was the fact the intervention led the team to develop stronger strategic plans, which were consequently better executed under pressure. This was evidenced by the quote, "During the intervention sessions we made good agreements and they were followed on the court" (A1), and the following:

> It think the biggest point of improvement was the fact that we created a clear plan of how we were going to play. And we kept refining that plan. You could see that because of that things started going better. (A2)

It was clear that within these agreed-upon plans, the athletes purposefully started to play more in function of their strengths to compensate for the increased pressure: "We started playing deliberately for specific persons, rather than just seeing what happens" (A4). As such, it seemed that the intervention helped the participants to develop and refine stronger shared mental models. Such shared mental models are collective knowledge structures that provide the mental blueprints for a team to select and prioritize action strategies in specific situations (Lim & Klein, 2006). These models can strengthen a team's resilience by facilitating the selection of adaptive strategies to deal with and overcome stressful conditions (Kegelaers et al., in press; Morgan et al., 2015).

Intervention Improvements

The final higher order theme reflects the participants' views on how the intervention might be improved in the future. Subthemes within this higher order theme include (a) strategic periodization, (b) more ways to increase pressure, and (c) increase explicit reflection.

Strategic periodization [3A, 3C]. Several participants reported that the intervention should be used strategically over a prolonged period. Both athletes and coaches recognized that a period of 3 weeks might be too short to achieve long-term changes in behavior: "In such a short period, it is of course difficult to really change everything" (A6). As such,

coaches believed that similar strategies should be used throughout the season: "These things should be planned into the year schedule" (C1). Such a long-term inclusion might also allow for periodized use of these strategies. Several participants argued that the introduction of these disruptions might be better suited near the beginning of the season, as illustrated by one of the athletes:

> I would start earlier with it. Not necessarily towards the end of the season, but more near the beginning. After a couple of games or so. Because then you know how everybody plays, you know the plays, there is somewhat of a hierarchy. So it would be best to start then. (A3)

Similarly, the coaches also suggested establishing these interventions early in the process of building a team and then periodically and strategically repeating them to further refine crucial team processes. Such findings are in line with calls for the exploration of the periodized use of planned disruptions (Collins et al., 2016; Kegelaers et al., 2019). It has been argued that alternating planned disruptions with periods of skill refinement under nonpressure conditions might lead to optimal learning. In addition to testing and refining these newly learned skills, pressure exposure can then again be used to strengthen athletes' confidence in the use of these skills under pressurized conditions (Collins et al., 2016).

More ways to increase pressure [3A, 3C]. Several participants also argued that future interventions could explore ways in which coaches can further increase the pressure. Several athletes argued that the pressure might be increased even higher: "There should be more consequences. I don't know, maybe if someone loses have them run 80 suicides. Of course, that's not possible. But it can be more" (A7). As such, it was suggested that coaches might expand on the strategies used in this study, or explore new strategies to increase pressure. Coaches, for example, suggested the use of more positive rewards as a way to incentivize athletes: "It is really difficult to make the pressure game-like. Maybe we should make the punishments and rewards bigger. Maybe we should focus more on rewarding the other team, that's another possibility. I do believe in that style of positive coaching" (C2). Finally, one coach suggested increasingly involving the athletes themselves in determining how pressure can be increased: "I think for each individual we can ask them before the sessions: 'When do you experience pressure? Or when do you expect to experience pressure?' And then work from there" (C3).

Increase explicit reflection [2A, 3C]. A number of participants suggested that the intervention would benefit from more explicit reflection on the team's functioning under pressure. For example, one athlete suggested, "Maybe we could have done more workshops, do them more often. Just regularly discuss the training sessions." (A3). One of the coaches suggested that pressure training interventions should be integrated with efforts to make team dynamics and personal strengths and weaknesses explicit:

> We could have used some extra sessions: What is their role? What are their tasks? What is their position in the team? What is their role on the court? I think it could be part of the process: having more knowledge of each other the moment you step on the court … maybe everybody should write a self-reflection. Write it out, reread it, make it recognizable for herself. Based on that you can then have a group discussion. How do I see myself, how do others see myself? I think that might help the process and improve the communication. (C3)

Similarly, one of the other coaches linked such efforts to explicit goal-setting:

> I will keep doing it, but in a slightly different manner. I think we have to start working with goal-setting. Team goals but also individual goals. Similar to what we do now for technical

> or tactical goals. Discuss these goals with the girls … We might, for example, film sessions and then have workshops where we discuss how they reacted during the training. Which qualities did they demonstrate? (C1)

In sum, the strategies suggested by the participants seem to reflect attempts to increase metacognitive involvement during the intervention (cf. Fletcher & Sarkar, 2012; MacIntyre, Igou, Campbell, Moran, & Matthews, 2014). It has been recognized that self-reflection and self-insight are important resilient qualities, as they facilitate learning processes in response to adverse experiences (Cowden & Meyer-Weitz, 2016). This finding is in line with Collins et al. (2016), who argued that not the experience of adversity on itself but the reflections made in response to this experience will lead to improved learning.

Quantitative Results

Descriptive statistics of the athletes' characteristics showed no significant differences between Group A and Group B in age, $t(16) = .607$, $p = .552$, or basketball experience, $t(16) = .166$, $p = .870$. Furthermore, Mann–Whitney U tests showed no significant differences between Group A and B for time at the academy ($U = 35.00$, $p = .696$) or time under the current coach ($U = 36.00$, $p = .762$). These variables were, therefore, not taken into account as covariates in the analyses. Mean scores and standard deviations for the resilience measures at each measurement moment are presented in Table 2.

A 2×3 (Group $\times$ Time) mixed-design ANOVA for individual resilience showed no significant main effect for time, $F(2, 32) = 2.599$, $p = .090$, $\eta_p^2 = .140$; no effect for group, $F(1, 16) = 1.606$, $p = .223$, $\eta_p^2 = .091$; and no interaction effect between time and group, $F(2, 32) = 1.648$, $p = .208$, $\eta_p^2 = .091$. Post hoc tests using Bonferroni corrected pairwise comparisons revealed no significant effects for time (Pre vs. Post 1 $p = .639$, Post 1 vs. Post 2 $p = .855$, Pre vs. Post 2 $p = .162$).

To test the intervention effect on the combined dependent variables team resilient characteristics and team vulnerabilities, a 2×3 (Group $\times$ Time) mixed-design MANOVA was conducted. The results showed no effect for time (Wilks's $\lambda = .900$), $F(4, 13) = 0.362$, $p = .831$, $\eta_p^2 = .100$; no effect for group (Wilks's $\lambda = .731$), $F(2, 15) = 2.757$, $p = .096$, $\eta_p^2 = .292$, and a significant multivariate interaction effect between group and time (Wilks's $\lambda = .428$), $F(4, 13) = 4.345$, $p = .019$, $\eta_p^2 = .572$, on the combined dependent variables of team resilient characteristics and team vulnerabilities. For team resilient characteristics, the MANOVA yielded no univariate effect for time, $F(2, 32) = 0.135$, $p = .874$, $\eta_p^2 = .008$; no significant main effect for group, $F(1, 16) = 4.449$, $p = .051$, $\eta_p^2 = .218$; and no interaction between time and group, $F(2, 32) = 0.272$, $p = .763$, $\eta_p^2 = .017$.

For team vulnerabilities, the MANOVA revealed no univariate effect for time, $F(2, 32) = 0.564$, $p = .575$, $\eta_p^2 = .0034$, or group, $F(1, 16) = 0.039$, $p = .845$, $\eta_p^2 = .002$. However, the interaction effect between time and group was significant, $F(2, 32) = 4.988$, $p = .013$, $\eta_p^2 = .238$. Post hoc tests using Bonferroni corrected pairwise comparisons revealed no significant differences for Group A ($p > .05$). However, there was a significant difference for Group B between Post 1 and Post 2 ($p = .044$), whereas there was no significant difference between Pre and Post 1 ($p = 1.000$) or between Pre and Post 2 ($p = .117$). Furthermore, post hoc testing showed that Group A and Group B were significantly different at Post 2 ($p = .023$) but not at Pre ($p = .876$) and Post 1 ($p = .187$). A visual representation of the quantitative results is provided in Figure 1.

Table 2
Means and Standard Deviations for Resilience Measures

	Group A						Group B					
	Pre		Post 1		Post 2		Pre		Post 1		Post 2	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Scale												
CD-RISC-10	3.11	0.30	3.26	0.35	3.48	0.41	3.38	0.23	3.45	0.31	3.43	0.21
CREST												
Team resilient characteristics	4.68	0.94	4.81	0.50	4.83	0.66	4.30	0.44	4.32	0.41	4.24	0.37
Team vulnerabilities	3.48	1.00	3.18	0.71	3.66	0.47	3.55	0.89	3.63	0.66	2.97	0.69

Note. Pre = prior to the first intervention; Post 1 = between the first and second intervention; Post 2 = after the second intervention; CD-RISC-10 = 10-item Connor-Davidson Resilience Scale; CREST = Characteristics of Resilience in Sports Teams Inventory.

GENERAL DISCUSSION

The present study adopted a dominant-less dominant mixed methods research design (Giacobbi et al., 2005) to evaluate the effectiveness of a pressure training intervention to develop resilience. It has previously been suggested that strategically exposing athletes to situations of increased pressure can increase performance under pressure (Nieuwenhuys & Oudejans, 2011; Oudejans & Pijpers, 2009, 2010) and help athletes develop resilience (Fletcher & Sarkar, 2016b; Galli & Gonzalez, 2015). Artificial challenges, such as planned disruptions (Kegelaers et al., 2019), can be used to develop and refine both personal and environmental resources, provided the stress levels are not too high to overcome the stress (Fergus & Zimmerman, 2005). The present study was, to the best of our knowledge, the first study to test this principle to develop resilience in sports, using a quasi-experimental mixed methods design.

Qualitative findings indicated that the intervention was effective in developing certain resilient qualities and might have a positive effect on the team's ability to deal with competitive stressors in real-life situations. Looking in more detail to the underlying processes, the intervention influenced a number of psychosocial qualities that have previously been linked to resilience, including increased awareness (Cowden & Meyer-Weitz, 2016; Sarkar & Fletcher, 2014a), stronger communication channels (Morgan et al., 2013), leadership, and stronger shared mental models (Morgan et al., 2015). These key processes might not only help a team anticipate potential adversities and maintain functioning under these circumstances but also promote restorative and learning functions after adversity exposure (Alliger et al., 2015).

Notably, reported increases in these psychosocial processes were not necessarily reflected in improved scores on quantitative resilience measures. For example, the intervention did not lead to changes in individual resilience scores. It should be recognized that the lack of significant findings might be attributed to a lack of power because of the small number of participants and the questionable internal consistency for the CD-RISC-10. However, a number of other potential explanations can also be offered. First, it is possible that the intervention was more successful in changing collective processes. Looking at the positive intervention effects, these mostly seem to reflect collective processes, with only increased awareness reflecting changes that can be allocated to both the individual and the collective level. As such, the current intervention might be primarily effective at influencing team resilient qualities, with limited influence on individual resilient qualities.

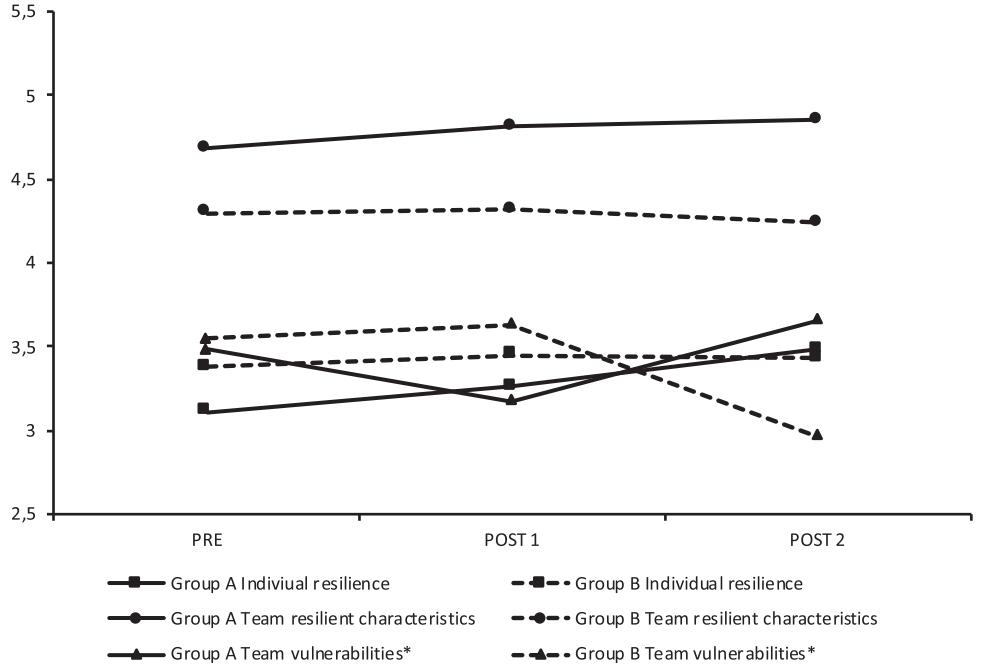

Figure 1. Group A and Group B mean Individual resilience, Team resilient characteristics, and Team vulnerabilities scores during pretest, post-test 1, and post-test 2. *significant interaction of Group x Time ($p < .05$).

A second potential reason that intervention effects were not reflected in changes in individual resilience was because the nonsport specific CD-RISC-10 was used as a measure. Although the psychometric quality of the CD-RISC-10 has been evaluated in the sport setting (Gonzalez et al., 2016; Gucciardi et al., 2011), the items in this scale are worded in relation to general life stressors. The current intervention had a strong emphasis on promoting resilience particularly in relation to sport-specific competitive stressors. As such, the CD-RISC-10 might not be sensitive enough to capture these sport-specific changes (cf. Sarkar & Fletcher, 2013). The current study, therefore, resonates with previous calls for the development of a new sport-specific measure of individual resilience (Galli & Gonzalez, 2015; Gucciardi et al., 2011; Sarkar & Fletcher, 2013).

Contrary to individual resilience, team resilience was measured using a sport-specific scale. The CREST (Decroos et al., 2017) assesses both collective resilient qualities as well as team vulnerabilities. Although the quantitative results did not demonstrate changes in relation to the collective resilient characteristics, the intervention did show that perceived vulnerabilities decreased during the intervention. Looking at the underlying processes, it might be that emerging leadership, stronger shared mental models, or more effective communication channels decrease the likelihood of vulnerabilities occurring such as failing leadership or breakdowns in communication under pressure. Decroos et al. (2017) hypothesized that decreasing a team's susceptibility to vulnerabilities might be a first step in the process of developing resilience, after which more positive adaptive responses to adversity (i.e., team resilient characteristics) can develop. It remains clear, however, that further longitudinal research is needed to examine whether decreases in team vulnerabilities, over time, indeed lead to increases in team resilient characteristics.

Limitations and Future Directions

Going forward, some limitations of the current study should be addressed. The nonrandom allocation of the participants—as addressed in the Methodology section—and the small number of participants were two major limitations. As a quasi-experimental study, we acknowledge that the ability to draw causal inferences and broad statistical-probabilistic generalizations based on the current intervention is limited. At the same time, it should be recognized that pure randomized control trials are not without their limitations as well. Not only can random allocation be difficult to obtain in a specific setting such as elite sports, but the strict protocols might lack transferability to real-world situations and, thus, compromise ecological validity (Ivarsson & Andersen, 2016). As such, mixed methods approaches can be used to evaluate an intervention's effectiveness by examining the lived experiences of the study participants, identifying underlying working mechanisms, and exploring the feasibility of the intervention in a real-world setting (Creswell & Clark, 2011; Ivarsson & Andersen, 2016; Strean, 1998). Researchers should, therefore, continue to pursue a range of different research strategies (i.e., both pure experimental and naturalistic) in order to advance our understanding of resilience development in general and pressure training in particular. Such future research should aim to reproduce and refine the intervention in a number of different settings. For example, researchers might explore the effectiveness of pressure training in different team sports. Similar results would strengthen the evidence for the effectiveness of such an intervention. However, future studies not only should search for similarities but also might explore differences in intervention effectiveness. Scholars might, for example, examine how pressure training differs for individual sports or explore potential gender differences. Such future studies would also benefit from including measures to assess perceived pressure (cf. Oudejans & Pijpers, 2009; Stoker et al., 2017).

Another limitation of the present study was the relatively short duration of the intervention. This might potentially limit long-term expressions of any intervention effects. Indeed, participants in the present study suggested that similar interventions should be structurally integrated within practices over a longer time. The effectiveness of such a prolonged intervention should then be measured using dense repeated measures (Hill, Den Hartigh, Meijer, De Jonge, & Van Yperen, 2018). Such time series data could be used to assess dynamic variations in resilience over time and in relation to changes in the intervention. Examinations of pressure training over prolonged periods would also allow to explore the periodization of such training strategies (cf. Collins et al., 2016; Kegelaers et al., 2019).

It should also be recognized that the current intervention placed a strong emphasis on resilience in relation to performance stressors. Perhaps unsurprisingly, performance has been the main indicator for positive adaptation in resilience research in elite sports (e.g., Fletcher & Sarkar, 2012; Morgan et al., 2015). However, resilience can also be required in the face of nonperformance related adversities, such as injury. It is unknown whether the current intervention can positively influence athletes' ability to deal with such adversities. As such, future efforts could aim to integrate pressure training with other interventions to develop resilience. Fletcher and Sarkar (2016b) argued that resilience training should be set up holistically, focusing on three central aspects: a challenge mind-set, resilient qualities, and a facilitative environment. Further efforts can be made to develop these different aspects. For example, psychologists might set up a series of workshops, specifically aimed to strengthen resilient qualities and create a positive outlook on challenges. Such workshops can be complemented by efforts to train coaches in recognizing and challenging negative mind-sets or conducting constructive debriefings after the occurrence of adversity (Kegelaers & Wylleman, 2018).

Finally, the potential dark side of pressure training and planned disruptions should be explored as well. Fletcher and Sarkar (2016b) argued that creating a facilitative environment requires a careful balance between pressure and support. Increasing pressure on athletes without sufficient support in place may lead to an unrelenting environment, characterized by unhealthy outcomes such as conflicts, unhealthy competition, blaming, and little attention for mental well-being. Indeed, there exists ample evidence of potentially abusive and emotionally harmful coaching practices under the guise of performance enhancement (Stirling & Kerr, 2014). Given these considerations, there is a need to explore how training techniques such as planned disruptions can be integrated in daily training activities in an ethical and healthy manner.

Practical Implications

From a practical perspective, this study provides preliminary support for the inclusion of pressure training when attempting to develop resilience in athletes. To this end, planned disruptions can be set up by manipulating the demands placed on the player (i.e., physical & mental), the environmental demands, or the task demands (Fletcher & Sarkar, 2016b; Kegelaers et al., 2019; Stoker et al., 2016). Although it seems unlikely that such planned disruptions will be able to match actual "real-life" (e.g., game) pressure, it should be noted that some disruptions (e.g., use of consequences) lead to higher pressure compared to others (e.g., manipulation of task demands) (Stoker et al., 2017). Coaches should therefore carefully and strategically manipulate both the types and intensity of planned disruptions, based on the specific needs and taxability of the individual athlete or team. Furthermore, coaches should facilitate the acquisition of key resilient qualities before, during, and after pressure training. To this end, coaches might incorporate formal reflection and learning opportunities and consider periodized use of planned disruptions. Finally, it should be recognized that pressure training can be integrated with other efforts to develop resilience (cf. Fletcher & Sarkar, 2016b), such as education programs (e.g., Morgan et al., 2017) or mental skills training (e.g., Cox et al., 2016).

CONCLUSION

In sum, the present study attempted to evaluate the effectiveness of a preliminary resilience intervention. The main feature of this intervention was the systematic exposure to increased pressure during daily training. Qualitative evaluations provided some promising indications for the effectiveness of the intervention in relation to real-life competitive stressors. More specifically benefits were attributed to increased awareness, emerging leadership, stronger communication channels, and the development and execution of a collective plan. Quantitative results indicated that the intervention was effective in reducing team vulnerabilities but otherwise did not promote individual or collective resilient qualities. However, given the limitations of this exploratory study, future efforts should aim to more rigorously test similar resilience interventions.

ACKNOWLEDGMENTS

We thank the coaches and athletes for their participation and Tim Blomme for his practical support during the intervention.

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