

Pressure training in sport: Factors to enhance design and delivery of applied interventions

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Abstract

This thesis examined how sport psychologists can design and deliver pressure training (PT) to maximise PT's impact on performance in sport. Adopting a pragmatic approach to research, four studies were conducted to provide practitioners with guidance for conducting PT. The first study was a meta-analysis of previous PT interventions. PT had a moderate positive effect on performance under pressure when compared to training without pressure. Building on Stoker et al.'s (2016) framework for creating pressure, the second study identified properties of pressure manipulations that international-level athletes and sport psychologists had found to be effective. This study also explored the specific benefits of PT that lead to improved performance. In the third study, athletes and sport psychologists also described effective delivery of PT. Key findings included processes such as collaboration and integration of PT into training sessions, and these processes may counter risks that PT could pose to athletes' wellbeing. The fourth study applied the previous findings to a PT intervention with a professional women's basketball team. Results further extended knowledge on creating pressure and delivering PT. Specifically, pressure may be created more effectively through negative, rather than positive, consequences that have meaningful implications for athletes. This study also highlighted that fully integrating PT into training can include coaches reinforcing pressure manipulations and supporting performance under pressure. Additional applied implications of this thesis include PT's potential to complement mental skills training and the need to distinguish PT from training that simulates other aspects of competition. Future research can investigate the training environments and characteristics of individuals that are conducive to effective PT. More knowledge on creating pressure is especially needed for team sports because of individual differences within a team. Studies can also test the properties of pressure manipulations that were explored qualitatively in this thesis.

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Chapter 1: Introduction

While preparing for the Tokyo Olympics in 2021, gymnast Max Whitlock described expectations for his performance: “I’m expected to bring back gold, so a year of silvers is seen as a failure and the pressure ramps up” (Majendle, 2021). Whitlock’s training reflected the importance of preparing to perform under such pressure. In anticipating the atmosphere of the Olympics affected by the COVID-19 pandemic, Whitlock described “making myself uncomfortable, with a pommel horse in the middle of an empty hall with a live stream on me to try to prepare a bit differently” (Majendle, 2021). He went on to successfully defend his Olympic gold medal. Although sport psychology has provided athletes with a number of techniques for reducing anxiety (Ong & Chua, 2021), Whitlock’s choice to make himself “uncomfortable” suggests there is value in experiencing that anxiety and nervousness.

Psychological pressure is not unique to an Olympic gold medallist. It is inherent to competitive sport, even at lower levels of competition (Hanton et al., 2005). Baumeister (1984) defined pressure as “any factor or combination of factors that increases the importance of performing well on a particular occasion” (p. 610), and it is among the many sources of stress that athletes face (Hanton et al., 2005). Stress is a transaction between an individual and the environment, and individuals feel stress when they determine that they cannot cope with the demands of the environment (Lazarus, 1991). Lazarus (1991) notes that for a situation to be stressful, its outcome must first be important to the individual. In the case of pressure, it is specifically the outcome of performance that the individual perceives as important.

Although pressure may be especially high in elite sport, athletes can feel pressure at any level of competition (Hanton et al., 2005). Youth athletes, for instance, can feel pressure to meet the expectations of parents or coaches (Dunn et al., 2022). Pressure can lead to anxiety, and when athletes cannot cope with this anxiety, the subsequent decrease in performance below their abilities is known as “choking” (Gröpel & Mesagno, 2017).

Many interventions train athletes how to regulate their thoughts, attention, and physiology under pressure to prevent choking. Examples of interventions include pre-performance routines, cue words, and cognitive-behavioural workshops, and there has been mixed support for their effectiveness (Gröpel & Mesagno, 2017; Kent et al., 2018). Interestingly, although intervention groups have often outperformed control groups, Kent et al. (2018) observed that some studies' control groups still did improve compared to their pre-test performance. Exposure to pressure while attempting a skill (i.e., in pre-tests) seemed to enhance the control groups' future performance even without the addition of an intervention. Such improvements are not surprising given that more experience with anxiety, as in high-pressure situations, has been found to help athletes cope with anxiety in the future (Hanton et al., 2007). Rather than wait for athletes to gain experience in competition, coaches and practitioners can create “constructed challenges” in training to provide athletes opportunities to learn to perform despite the challenges (Collins et al., 2016, p. 3).

Similar to Max Whitlock's training that was designed to make him “uncomfortable,” pressure training (PT) is an intervention that represents a “constructed challenge.” In PT, athletes are strategically exposed to pressure in training to improve their coping abilities (Stoker et al., 2016). Early experiments found that PT improved sport performance under pressure (e.g., Lewis & Linder, 1997; Oudejans & Pijpers, 2009), and Bell et al.'s (2013) year-long study on elite youth cricketers showed that PT can be effective in applied settings. To create pressure, studies have offered monetary rewards (Oudejans & Pijpers, 2009), enforced forfeits such as cleaning changing rooms (Bell et al., 2013), and created a sense of judgment via evaluation by authority figures (Alder et al., 2016).

1.1 Purpose of This Thesis

Although research has supported PT's effect on performance, few studies have shown practitioners how to implement PT. Applied settings can present obstacles that are not present

in experimental settings or discussed in reports of interventions that focus on the outcomes of PT. As with applied sport psychology in general, an initial challenge may be gaining buy-in from athletes and coaches to have the opportunity to conduct PT. Athletes and coaches may want to know how and why they in particular could benefit from PT, especially if PT involves more work (for coaches) and discomfort (for athletes) compared to conventional non-pressurised training. However, despite promising effects, little evidence explains how PT produces those benefits.

Once athletes and coaches are open to pressurising training, practitioners need strategies for manipulating pressure. Initial literature on PT represented a collection of specific examples of pressure manipulations, and Stoker et al. (2016) advanced this work by categorising examples into consequences and demands. Stoker et al. (2017, 2019) then found that consequences created pressure whereas demands did not. However, knowing that consequences are essential for creating pressure has only limited value if a practitioner does not know how to determine which consequence(s) to use with a given team or athlete. Thus, more research can build on Stoker et al.'s (2016) framework to inform the process for developing pressure manipulations.

Successful PT in applied settings likely requires more than making athletes feel pressure. For sport psychology in general, effectiveness depends not only on an intervention's content but also on the practitioner's delivery of the intervention (Sharp et al., 2015). Key elements of delivery can include strong working alliances and generating active engagement from athletes (Sharp et al., 2015; Tod et al., 2019). PT especially could require attention to delivery because of the discomfort it may cause athletes, and delivery can help to distinguish PT from simply creating a threatening environment. PT also takes place as part of physical training, in which players and coaches are also focused on other aspects of their sport, whereas other interventions are often taught or conducted in classroom workshops or one-on-

one consultations (Kent et al., 2018). Just as Stoker et al.'s (2016) framework provided the basis for testing techniques for creating pressure, research can help practitioners to understand components of PT delivery. Future research can then test and refine these components.

In light of the challenges when implementing PT, this thesis investigated how to implement PT effectively in applied settings. Rather than focus on one question (e.g., how to create pressure), the research examined both content (i.e., pressure manipulations) and delivery of PT and their influence on PT's effectiveness. This simultaneous consideration of content and delivery more accurately reflected the interaction between them in applied practice. That is, content can influence delivery, and vice versa. Results were intended to inform both theory and practice. In terms of theory, studies sought to extend previous research on creating pressure, PT's mechanisms for improving performance, and the role of delivery. In terms of applied practice, studies were designed to provide practitioners with concrete examples and recommendations for applying findings when working with athletes.

1.2 Structure of This Thesis

The remainder of this thesis consists of a literature review, four empirical studies, and a general discussion. To establish the rationale for conducting PT, the literature review begins by discussing the presence of pressure in sport and choking and clutch performance in sport. An overview of PT research then discusses evidence that the intervention improves performance, and gaps in the literature are discussed to provide the rationale for the research presented in the thesis. Chapter 3 presents the methodology that guided the research. Specifically, it explains pragmatism as the research paradigm and the use of mixed methods research to meet the aims of this thesis.

Chapter 4 presents study 1, which is a systematic review and meta-analysis of PT intervention studies. Although the literature review examines studies that tested PT, study 1

explores the effect of PT in more depth by quantifying the magnitude of PT's effect found across the literature. The study attempted to answer two research questions: a) what is the magnitude of PT's effect on performance under pressure in sport and other high-pressure domains?, and b) how do domain, intervention length, task type, and experience each moderate PT's effect?.

Chapter 5 reports the qualitative research of study 2. Through interviews with sport psychologists and athletes, this study addressed two research questions: a) what are common properties of effective pressure manipulations?, and b) what are PT's mechanisms for improving performance under pressure?. In Chapter 6, study 3 continued to explore PT with the participants from study 2. The research question was: what are the characteristics of effective PT delivery in applied settings?

These two qualitative studies provided recommendations for conducting PT in applied settings, and the next chapter reports study 4's intervention that applied the recommendations to PT for a professional women's basketball team. This mixed-method study advanced the previous findings on creating pressure and delivery of PT. It had three research questions. First, would a PT intervention successfully increase pressure in the team's training? Second, what is the intervention's effect on behaviours that are important for performance in basketball? Finally, how did the delivery of the intervention impact the intervention's effectiveness?

The thesis concludes with a general discussion of the four studies. After a summary of the findings, this section discusses the significance of the research's contributions to the literature on PT. Strengths and limitations of the research are also discussed. Finally, directions for future research are proposed.

Chapter 2: Literature Review

2.1 Psychological Pressure in Sport

Athletes face many stressors related to competition, but pressure is notable because it is inherent to competition and can directly impact performance (Hanton et al., 2005). Many stressors stem from athletes' preparation or events leading up to competition, such as injuries, inadequate training, or problems with equipment (Mellalieu et al., 2009). Yet even if an athlete is healthy and training has proceeded as planned, he or she may still experience pressure due to the flow of competition. For example, pressure on tennis players can increase in a match when they face break point, when the opponent can win the set in the next game, or when they face other conditions related to the outcome of the match (Harris et al., 2021). Additional context, such as league standings or prize money at stake, could magnify this pressure.

Pressure can be present throughout levels of sport and situations within competition. Although the highest pressure may be associated with elite levels, youth and adolescent athletes can still face pressure, such as from parents or coaches (Dunn et al., 2022; Harwood & Knight, 2009). Game-winning penalty kicks or gold-medal matches may be situations known for especially high pressure, but pressure can also increase more routinely or discretely. In Lazarus and Folkman's (1984) transactional approach to stress, perceptions of stress depend on how individuals appraise an event's importance to their wellbeing and how they appraise their ability to cope with the event's demands. A bench player, for example, could feel pressure during rare playing time if he or she perceives future playing time to be at stake. In proposing Attention Control Theory: Sport, Eysenck and Wilson (2016) similarly suggest that athletes are more likely to feel anxious when they appraise a high probability of failure in a high-cost situation. Failure within a competition (e.g., mistakes) increases the probability of overall failure, so anxiety therefore can increase within that competition. Because pressure can be felt across competitive levels and situations, research on pressure

and coping interventions could apply to settings beyond the most high-profile instances of pressure.

2.1.1 Choking and Clutch Performance in Sport

Pressure warrants further study not only because it increases anxiety that can be uncomfortable but also because that anxiety can impair performance (Woodman & Hardy, 2003). Although certain individuals may be more susceptible to choking than others (Mesagno & Marchant, 2013), performance throughout entire leagues has been shown to decrease under high pressure. After reviewing every play from every team over seven seasons of elite American football, Harris et al. (2019) found that teams were more likely to lose the ball or fail to advance it under pressure. Pressure situations included plays when the score was close, little time in the game remained, and/or the team with the ball was close to scoring. Teams failed even more often on plays immediately after failing under pressure. Harris et al.'s (2021) review of 12 Grand Slam tennis tournaments showed that tennis players similarly performed worse under pressure. The span of Harris et al.'s (2019, 2021) data sets suggests that choking is not limited to certain individuals. For example, in over 3500 matches in the tennis tournaments analysed, the rate of unforced errors was 1.75 times higher in high-pressure points than low-pressure points. Given the prevalence of pressure's effect, many athletes could benefit significantly from learning to cope with pressure.

Two categories of theories explain how choking occurs. First, distraction theories state that anxiety diverts attention to internal or external distractions, and these distractions consume working memory needed for performing the task at hand (Hill et al., 2010). Athletes may increase effort to maintain concentration, but they choke when anxiety reaches a level where added effort cannot sustain performance (Williams et al., 2002). The second category is self-focus theories, which state that anxiety prompts athletes to monitor or control skill execution (Beilock & Carr, 2001). Conscious monitoring or conscious control of well-learned

skills disrupts the automatic processes that typically guide performance of those skills. Each category of theories can explain choking, and one category may be more applicable in a given situation depending on moderating factors, such as skill level or individual disposition (e.g., high self-consciousness; Hill et al., 2010).

Interventions have been developed to reduce either self-focus or distraction. Distraction-based interventions, such as pre-performance routines, attempt to limit susceptibility to distractions and focus the athlete's attention on the task (Gröpel & Mesagno, 2017). Self-focus interventions aim to reduce conscious control or monitoring of skill execution (Gröpel & Mesagno, 2017). An example is the use of dual tasks to divert attention away from step-by-step execution and towards an unrelated target or task instead, such as listening to song lyrics while shooting basketball free throws (Mesagno et al., 2009). Other self-focus interventions, such as analogy learning (Lam et al., 2009), attempt to prevent athletes from ever focusing on step-by-step execution when they learn a motor skill (Gröpel & Mesagno, 2017). In Gröpel and Mesagno's (2017) review of choking interventions, pre-performance routines and dual task interventions were among several interventions that consistently improved performance under pressure. Their effectiveness demonstrates that athletes can in fact learn to cope with pressure.

Despite the effectiveness of many choking interventions, avoidance of choking might not be sufficient to meet applied sport psychology's frequent goal of helping athletes achieve peak performance. Whereas choking involves athletes performing below their usual level of performance, peak performance exceeds that usual level (Harmison, 2011). When peak performance occurs under pressure, it is often considered "clutch performance." Otten (2009) defined clutch performance as "any performance increment or superior performance that occurs under pressure circumstances" (emphasis in original; p. 584). This definition distinguishes clutch performance from merely not choking and from performing well in low-

pressure situations. The experience of clutch performance can also be distinct from that of typical performance because clutch performance includes absorption in the competition, enjoyment, intense effort, and complete focus (Swann et al., 2017). Experiments and qualitative studies have provided strong evidence that athletes do experience clutch performance (Schweickle et al., 2021).

Although technical skill execution remains automatic (i.e., minimal conscious control or monitoring), clutch performance is effortful rather than effortless (cf., Swann et al., 2017). In Swann et al.'s (2017) study, athletes reported that they increased effort, such as their amount of expended energy, and increased monitoring and awareness of their psychological state (e.g., concentration) while still feeling pressure during clutch performances. In addition to limiting athletes' distraction and self-focus, practitioners could seek to promote clutch performance by training athletes to intensify effort and generate other underlying aspects of clutch performance that Swann et al. (2017) identified. Studies on choking have focused on each intervention's individual effect on performance (Gröpel & Mesagno, 2017), but athletes have credited combinations of coping strategies and training for enabling clutch performance (Maher et al., 2020).

2.2 Pressure Training

PT is one intervention that may contribute to clutch performance. PT strategically exposes athletes to pressure during training to improve their ability to cope with pressure in competition (Stoker et al., 2016). Even research on other choking interventions has unintentionally suggested benefits of training under pressure. Kent et al. (2018) observed that control groups still improved performance under pressure after experiencing that pressure in pre-tests, so improvements of intervention groups could partly be attributed to exposure to pressure. Researchers have also purposefully investigated training under pressure (e.g., Lawrence et al., 2014; Oudejans & Pijpers, 2010). They have referred to PT as “anxiety

training” (e.g., Oudejans & Pijpers, 2009), “acclimatization training” (e.g., Beseler et al., 2016), and “self-consciousness training” (e.g., Beilock & Carr, 2001). Despite their different names, these interventions all attempted to increase perceived pressure in training to enable participants to maintain or even improve performance under pressure.

PT parallels exposure therapy that is used with clinical populations to treat anxiety disorders, such as post-traumatic stress disorder (Foa, 2011). Exposure therapy is based on emotional processing theory, which states that two conditions are required to reduce an individual’s fears. The first is that the fear must be activated or experienced so that it can be modified, and the second condition is the presence of new information (e.g., lack of harm) that the individual can associate with the event or object that triggers the fear (Foa, 2011). Exposure therapy introduces these conditions through in vivo exposures, in which clients gradually approach safe “real-life” situations that seem threatening to the clients. For survivors of car accidents, an in vivo exposure could be riding in a car (Cook et al., 2004). The exposure provides clients with evidence that disconfirms their expectations of harm from the situation. Exposure therapy also includes imaginal exposure, which takes place in a therapy session and involves the client imagining the past trauma or the anxiety-provoking situation. With the therapist’s help, clients learn to realise that recalling the situation is not dangerous and learn to adopt new perspectives (e.g., that the trauma was not their fault; Cook et al., 2004; Cook et al., 2004; Foa, 2011).

In PT, increased pressure is analogous to in vivo exposures, and athletes can have opportunities to process and learn from PT as clients do after imaginal exposure. Pressure has been created through manipulations that include offering monetary rewards for high performance (e.g., Oudejans & Pijpers, 2009), recording training for a coach to evaluate performance (e.g., Alder et al., 2016), and posting each player’s scores on training drills in the team’s changing room (e.g., Beseler et al., 2016). Over time, training under these

pressures can provide athletes with evidence that they can still perform despite pressure.

Sport psychologists have conducted debriefs after PT to encourage athletes to reflect on their responses to pressure and learn from their experience in the PT session (e.g., van Rens et al., 2021).

PT is also similar to stress inoculation training (SIT; Meichenbaum & Deffenbacher, 1988). SIT includes imaginal and in vivo exposure similar to exposure therapy, but SIT first involves understanding the anxiety and learning coping skills, such as cognitive restructuring and relaxation. In the first phase of SIT, the therapist and client break down the client's anxiety into components, such as events that trigger it and thoughts that accompany it. This collaboration reconceptualises the anxiety to help the client to better understand the anxiety and to be less overwhelmed by it (Meichenbaum & Deffenbacher, 1988). In the second phase, the client learns skills for coping with anxiety (e.g., relaxation and cognitive restructuring). The final phase involves the exposure, which allows the client to practice those coping skills.

For sport, Driskell et al. (2014) have proposed a model of PT or “stress exposure training” that mirrors the three phases of SIT. It starts with educating athletes about stress, teaches coping skills (e.g., attentional training), and incorporates pressure and sport-specific demands into training. Supporting the teaching of skills, Kent et al. (2021) have provided preliminary evidence that mental skills training (MST) combined with PT leads to better performance than PT alone. At the same time, studies have also tested PT without MST and still found positive effects (e.g., Beilock & Carr, 2001; Oudejans & Pijpers, 2009). Testing PT independently verifies that PT itself can contribute to improved performance, even if a combination with MST maximises improvements in applied practice.

PT specifically creates pressure, and pressure distinguishes PT from other training that also simulates conditions of competition. In a constraints-led approach to skill

acquisition (Davids et al., 2008), a football coach might train players' ball control by limiting the number of touches that each player can take at a time. However, whereas a constraints-led approach develops technical skills, PT trains the ability to cope with pressure while performing those skills. Other conditions or "planned disruptions" (Kegelaers et al., 2020) target psychological skills but not necessarily the skill of coping with pressure. For example, coaches have trained athletes' concentration by adding auditory or physical distractions to training (Kegelaers et al., 2020). Although concentration is essential for performance, distractions do not necessarily simulate the increased importance that defines pressure according to Baumeister (1984). In fact, Gröpel and Mesagno (2017) found that interventions that increase anxiety or self-consciousness in training improved performance under pressure whereas training with distractions did not. Because there are many performance conditions that coaches can manipulate, recognising PT's specific purpose can guide selection of manipulations that achieve that purpose (i.e., train performing under pressure).

2.2.1 Measurement and Evidence of Effectiveness

Systematic reviews have found that PT does improve performance under pressure (Gröpel & Mesagno, 2017; Kent et al., 2018). In Gröpel and Mesagno's (2017) review of choking interventions, eight out of nine PT studies ("acclimatisation training" or "self-consciousness training") led to statistically significant improvements in performance under pressure. For example, Bell et al. (2013) found that elite youth cricketers outperformed a control group in competition and sport-specific skill assessments after one year of PT. In Oudejans and Pijpers' (2009) experiment on basketball free throw shooting, players who received PT outperformed a control group while under high pressure. The PT-trained players also performed equally well under high pressure as they did under low pressure. In Kent et al.'s (2018) review, all five PT or "simulation training" interventions improved performance under pressure. Four of these studies were not included in Gröpel and Mesagno's (2017)

review, so they added to support for PT's effectiveness. In contrast, a smaller percentage of cognitive-behavioural workshops and consultancy sessions that taught mental skills, such as thought-stopping and relaxation techniques, improved performance (Kent et al., 2018).

Many measures of PT's effects have represented objective changes in performance, but these measures still have limitations. Many early studies were lab experiments that measured scores on a task. For golf putting, Lawrence et al. (2014) counted the number of successful putts and measured the ball's mean radial distance to the hole after missed putts. For darts, Oudejans and Pijpers (2010) totalled each participant's score after a series of throws. Few studies, however, have measured effects of PT in competition. Bell et al.'s (2013) study on cricket is an exception that tracked competitive performance statistics, such as total runs scored and batting average. Still, the researchers acknowledged that these statistics represented overall performance, not performance under pressure. For an intervention with a single team or athlete, measuring competitive performance under pressure can be challenging. To study effects of pressure in competition, Harris et al. (2019, 2021) reviewed every competition in a whole season for every team or player for multiple seasons. In contrast, PT interventions tend to last only several weeks for one team (e.g., Kegelaers et al., 2021; van Rens et al., 2021), and one team may not encounter enough high-pressure situations to yield meaningful data during that time.

One solution for assessing PT's effects is to measure psychological constructs that are related to performance under pressure. Using psychometric instruments before and after interventions, Kegelaers et al. (2021) measured resilience, and van Rens et al. (2021) measured challenge and threat states. Changes in levels of these constructs can indicate more incremental effects of PT. Although improving performance outcomes may be the end goal of PT, these outcomes may take time to improve and be subject to uncontrollable factors (e.g., opponents, weather). Changes in constructs could indicate that PT is leading to changes that

can eventually improve performance. They may also indicate how PT produces its effect if they describe the attitudes, thinking patterns, and behaviours that facilitate performance under pressure.

2.2.2 Mechanisms for Enhancing Performance

In addition to the measurement of constructs, some authors have proposed theories that may explain how PT improves performance. Whereas other choking interventions are guided by either self-focus theories or distraction theories, PT does not necessarily target a specific mechanism for choking (Gröpel & Mesagno, 2017). Gröpel and Mesagno (2017) suggested that PT decreases perceptions of pressure and, consequently, limits either distraction or self-focus. However, Oudejans and Pijpers (2009) found that PT-trained participants outperformed a control group while still feeling equally anxious. According to Oudejans and Pijpers (2009), processing efficiency theory (PET; Eysenck et al., 2007) could explain how PT helps individuals acclimate to performing with that anxiety. PET is a distraction theory that posits that individuals under pressure increase effort to maintain performance despite anxiety, and PT could train athletes to direct this effort to coping productively. The increased effort to maintain their usual performance means they are less “efficient,” but they maintain that performance nonetheless (Oudejans & Pijpers, 2009). Without PT, increased effort may be unproductive (e.g., excessive worrying).

Alternatively, Lawrence et al. (2014) proposed that PT influences learning of the motor skill itself. The specificity of practice hypothesis states that a skill is linked to a learner’s mood while learning it, and feeling the same mood in performance strengthens recall of the motor patterns for that skill. Lawrence et al. (2014) found that this hypothesis applies to anxiety and performing with anxiety. Novice rock climbers who trained under anxiety performed better with high anxiety than the control group did. The opposite was true

for performance without anxiety: the control group outperformed the intervention group (Lawrence et al., 2014).

Despite the evidence provided by Lawrence et al. (2014) and Oudejans and Pijpers (2009), there is still room to better understand PT's mechanisms for improving performance. Oudejans and Pijpers (2009) acknowledged that although athletes appear to learn to cope with pressure, the nature of the learning processes and adaptive coping strategies were still unclear. When Lawrence et al. (2014) examined the specificity of practice hypothesis, participants were novices. Novices' learning of a skill might not explain PT's benefits for experienced athletes who have already learned the skills that they train under pressure (e.g., Alder et al., 2016). More research is needed because increasing athletes' receptiveness to an intervention may require practitioners to explain how the intervention improves performance. Gröpel and Mesagno (2017) argue that explaining an intervention's mechanisms is especially important when an intervention seems counterintuitive, such as dual task interventions that encourage less focus on a sport-specific task. In PT, creating pressure may seem counterintuitive, or at least uncomfortable, to athletes who perform better without pressure. Although the idea of acclimating to pressure may be enough to appeal to some athletes, articulating the processes behind acclimation could be more convincing.

2.2.3 Practical Application of PT

Research to support practitioners is relevant in light of growing interest in translating PT to applied settings. Recent interventions have incorporated PT into athletes' existing training. Kegelaers et al. (2021) conducted PT for basketball players, and van Rens et al. (2021) worked with coaches to pressurise training for a national-level cricket team. Through workshops and debriefs, these interventions supported participants in preparing for and learning from PT. Unlike findings in lab experiments (e.g., Beilock & Carr, 2001), this support reflects the wider context of applied settings, where practitioners and coaches are

likely to be present to help athletes maximise benefits from PT. For youth academy footballers, Kent et al. (2021) aligned PT with the skills that were the focus of players' performance cycle and found some evidence that PT improved performance more when MST supplemented it. By taking place in applied settings, these recent interventions demonstrated that PT can be feasible for competitive teams to implement in their existing training.

Although numerous studies have tested PT, Stoker et al. (2016) observed that little research had examined how to create pressure. After interviewing coaches who regularly pressurised training, Stoker et al. (2016) developed a framework that categorised pressure manipulations into consequences and demands. Consequences include rewards or forfeits administered according to performance in training. Judgment of that performance could also be a consequence. Demands are physical or cognitive challenges, such as rules or time constraints, that are added to a task. When Stoker et al. (2017, 2019) tested this framework, consequences, especially judgment and forfeit, created pressure most effectively. Demands did not increase pressure but did make tasks more difficult to perform well. This difference between consequences and demands reinforces that not all challenges or planned disruptions add the increased importance that defines pressure. Creating pressure therefore may require practitioners and coaches to plan and consider what will increase that importance for their athletes.

The importance or meaningfulness of a consequence is subjective (Kent et al., 2018), so one consequence could be effective for some individuals but not for others. This subjectivity aligns with Lazarus and Folkman's (1984) transactional approach in which perceptions of stress depend on one's appraisals of a situation. In applied practice, individual differences in such appraisals underscore the need for processes to identify effective pressure manipulations. That is, practitioners need to understand how to develop pressure manipulations rather than relying on the same few manipulations for every team or athlete.

Fletcher and Arnold (2021) recommended working with coaches and athletes to tailor pressure manipulations to each specific context.

Although creating pressure is integral to PT, effectiveness likely depends on practitioners or coaches' delivery of the intervention too. In sport psychology, delivery consists of many elements of science and "art" beyond the psychological tools or skills that a practitioner teaches (Poczwadowski & Sherman, 2016), and practitioners have attributed success of interventions to aspects of delivery such as strong working alliances and active engagement from athletes (Sharp et al., 2015; Tod et al., 2019). Other factors, including involvement of coaches, can create an environment conducive to athletes' engagement and relationship with practitioners (Henriksen et al., 2019).

PT may be one intervention that especially depends on delivery to be effective. Practitioners need to work with athletes and coaches not only to tailor the intervention to the context but also to keep athletes receptive to the intervention. Particularly when forfeits are applied, creating pressure could be mistaken for bullying athletes. Because such a misperception could affect athletes' relationships with practitioners and engagement in PT, practitioners may need to prioritise gaining and maintaining athletes' buy-in to PT. Bell et al. (2013) delivered PT with a transformational leadership style in which coaches expressed belief in players and connected PT to an inspirational vision for the team's future performance. That Bell et al. (2013) described this delivery as part of the intervention highlights that PT consists of a series of processes, communication, and support in addition to pressurised drills.

To bridge the gap between research and applied practice, authors have proposed models of PT that consider delivery. Fletcher and Arnold's (2021) approach consists of three phases. In phase one, the practitioner works with coaches to design PT and prepare athletes for it. As Bell et al. (2013) demonstrated, preparation can include shaping a team's culture

that encourages athletes to embrace the challenge of pressure and view performing under pressure as an opportunity (Fletcher & Arnold, 2021). Designing PT includes the practitioner listening to athletes and coaches to learn how to fit PT to the team's specific context. As pressurised drills take place in phase two, pressure is gradually increased as athletes adjust to it. The practitioner and coaches also monitor responses to the pressure. In phase three, the practitioner debriefs and reviews PT with the athletes. These discussions can review the delivery of the intervention and are a time to support athletes as they reflect on their responses to pressure.

Attention to delivery contrasts the use of forfeits or rewards to discipline or motivate athletes. Throughout their three phases, Fletcher and Arnold (2021) reinforced the practitioner's role to support and collaborate with athletes and coaches. Driskell et al.'s (2014) model similarly outlined steps to prepare and support athletes before exposing them to pressure. These approaches can complement Stoker et al.'s (2016) framework for creating pressure as they outline the practitioner's role after pressure manipulations have been selected and implemented.

2.3 Purpose of This Thesis

To facilitate conducting PT for competitive athletes, this thesis aimed to advance previous studies and existing approaches to PT in three ways. First, the thesis explored the strength of PT's effect on performance. Fletcher and Arnold (2021) encouraged educating athletes on the purpose and process of PT, but there remain gaps in understanding what precisely athletes can expect to gain from PT. Although studies have shown statistically significant differences between PT and non-pressurised training (Alder et al., 2016; Bell et al., 2013), statistical significance does not describe the practical significance in competition. In other words, few studies have contextualised PT's effect in competition and in relation to

other interventions. Research in this thesis also sought to understand how PT produces its effect.

Second, this thesis attempted to extend Stoker et al.'s (2016) framework for creating pressure. While Stoker et al. (2017, 2019) found evidence that practitioners should rely on consequences to create pressure, the category of consequences still encompasses many possible rewards, forfeits, and sources of judgment. Fletcher and Arnold (2021) suggested collaborating with athletes and coaches to manipulate properties or dimensions of stressors to create pressure. However, more research could help practitioners identify which properties or dimensions to manipulate and how to manipulate them. Such information could help practitioners increase the likelihood that manipulations specifically create pressure instead of other challenges. This guidance would advance applied practice because some common strategies for creating pressure, such as adding demands, may not actually increase pressure (Stoker et al., 2016, 2017). When designing PT with athletes and coaches, practitioners may need to ensure that pressure manipulations are not only agreeable to the athletes and coaches but also are likely to be effective.

The third focus of this thesis was the effective delivery of PT. Delivery moderates the effectiveness of applied sport psychology in general, but few PT studies have accounted for delivery when assessing their interventions. Studies in sport psychology have tended to ignore the practitioner's role in an intervention in favour of focusing on the intervention's content to explain results (Ivarsson & Andersen, 2016). Although Driskell et al. (2014) and Fletcher and Arnold (2021) developed models of delivery based on theory and previous interventions, no empirical studies have directly examined delivery of PT. This thesis therefore attempted to build on the principles outlined in existing approaches by detailing the processes that help practitioners navigate the challenges of applied settings.

In summary, this thesis examined how PT can benefit performance and how to implement PT to achieve its benefits. Previous studies have demonstrated PT's potential to enhance performance, but applied settings pose challenges to translating interventions and replicating results. The studies that follow considered many of the factors that could impact PT's effectiveness, including pressure manipulations and the delivery of the intervention before, during, and after pressurised drills. The research attempted to identify recommendations for practitioners and coaches when pressurising training and preparing to do so. By considering factors beyond creating pressure, it also attempted to add balance to PT literature and address some challenges to implementing PT.

Chapter 3: Methodology of This Thesis

3.1 Introduction

This chapter describes the research paradigm and methodology of this thesis. The research adopted pragmatism as its paradigm (Burke Johnson et al., 2017; Giacobbi et al., 2005) and mixed-methods research (MMR) as its methodology. Morgan (2014) has observed that pragmatism is often oversimplified into doing what “works” or is “practical,” so one purpose of this chapter is to describe pragmatism in more depth. Although variations exist within pragmatism, this chapter provides a brief overview of pragmatism and its compatibility with the aims of this thesis. Whereas paradigms are concerned with ontology (i.e., nature of reality) and epistemology (i.e., nature of knowledge of reality), methodology is a framework that links a paradigm with methods. Accordingly, the chapters that follow describe the specific methods used in each study, with the current chapter discussing how the methodology of MMR guided the overall direction of the thesis.

3.2 Pragmatism

In terms of ontology and epistemology, pragmatism moves along a continuum between positivism and constructivism (Giacobbi et al., 2005). Positivists generally pursue absolute and objective truths about reality whereas constructivists argue that reality is subjective and depends on context (Lincoln et al., 2017). Context can refer to a specific community or study (Lincoln et al., 2017). Pragmatism, however, does not adhere strictly to a single understanding of reality and knowledge (Giacobbi et al., 2005). In contrast to positivism, pragmatism does not assume that absolute and objective truths exist. Pragmatists are more concerned with the value of knowledge for a particular context even if it is not an absolute truth that can be generalised to all other contexts. In contrast to strict constructivists who would argue that all knowledge is subjective, pragmatists believe that scientific communities can reach enough agreement, even if it is not total, for knowledge to be useful in a specific context (Giacobbi et al., 2005).

Pragmatism's philosophical foundation underpins its priorities and epistemological flexibility. That is, whereas positivists and constructivists distinguish themselves from each other through their ontologies and epistemologies, the early pragmatic philosopher John Dewey rejected such metaphysical concerns and instead prioritised understanding of human experience (Morgan, 2014). To Dewey, human experience is the ongoing cycle of interaction between people's beliefs and actions (Burke Johnson et al., 2017; Morgan, 2014). When beliefs become problematic, the process of inquiry can examine the beliefs in question and resolve the problems through action (Morgan, 2014). Without the burden of discovering a single "truth," pragmatism embraces flexibility to best answer questions that are relevant to human experience.

Research is a careful form of inquiry, so pragmatism's philosophical foundation has implications for research. First, the interest in human experience guides the nature of research questions. Pragmatism examines questions whose answers can provide information that is useful to stakeholders, such as athletes, coaches, and practitioners in sport. Second, these questions drive research methods. Dewey dissolved dualisms (e.g., quantitative versus qualitative) by encouraging use of aspects of each paradigm that are useful for answering a given question (Burke Johnson et al., 2017). Lastly, pragmatism reorients expectations for research. Rather than search for definitive answers, pragmatic research seeks to "continually advance knowledge and practice" (emphasis in original; Burke Johnson et al., 2017, p. 75). Thus, research is valuable when it yields findings that can enhance human experience, even if those findings are not definitive or universal.

3.3 Pragmatism and This Thesis

The theoretical underpinnings and applied objectives of this thesis align with pragmatism's aims and flexibility. The theories that underpin pressure and PT are consistent with pragmatism's view that "what works" depends on context and individuals. In Lazarus

and Folkman's (1984) transactional approach to stress, levels of stress depend on individuals' appraisals of situations. Lazarus and Folkman (1984) recognised there is no single truth of what is "stressful." At the same time, underlying properties of stressors represent the potential to approach agreement on knowledge that can inform practice while still appreciating individual differences and variation between contexts. In line with pragmatism's aim to advance knowledge, this thesis aimed to advance knowledge about the effects and delivery of PT interventions. It did not seek to establish universal truths about PT and instead sought to inform practitioners while acknowledging contexts of findings (e.g., elite versus lower-level sport).

This thesis follows a trend of pragmatic approaches in sport psychology since Giacobbi et al. (2005) outlined pragmatism's applicability to the field. As an example of how the approach has been used, Brown et al. (2018) adopted pragmatism in a qualitative study on thriving in sport to generate findings relevant and accessible to athletes, coaches, and practitioners. Within literature on PT, van Rens et al. (2021) and Kegelaers et al. (2021) demonstrated pragmatism's methodological flexibility by using mixed methods to evaluate their interventions in applied settings. Both studies used psychometric instruments to quantitatively assess changes in constructs, such as resilience or challenge and threat states, and post-intervention focus groups or interviews then provided qualitative data on participants' experiences of the PT.

Sparkes (2015), however, highlighted issues to consider before assuming that any mixing of methods necessarily improves a study's design. In light of Morgan's (2014) caution against equating pragmatism with practicality, careful consideration of how to mix methods could keep research more aligned with pragmatism's rationale for epistemological flexibility (i.e., to answer research questions most effectively and advance knowledge of

human experience). Therefore, the next section examines some common pitfalls of mixed method research (MMR) and how this thesis addressed them.

3.4 Mixed-Methods Research

Leech and Onwuegbuzie (2009) define MMR as “collecting, analyzing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon” (p. 267). This thesis presents a series of studies that mix a variety of methods to investigate PT. In Chapter 4, study 1 conducted a meta-analysis to quantitatively assess PT’s effects on performance. In Chapter 5 and Chapter 6, respectively, studies 2 and 3 used qualitative interviews to elicit perspectives of athletes and sport psychologists on PT. Study 4 itself was a mixed-method study to evaluate a PT intervention. Moran et al. (2011) described several advantages of MMR, including complementarity (i.e., methods clarifying or enhancing each other’s results) and initiation (i.e., finding new insights into a phenomenon). In this thesis, an example of complementarity is study 2’s qualitative findings that proposed how PT might produce effects found in study 1. Study 3 demonstrated initiation by exploring aspects of effective PT delivery, which were difficult to assess quantitatively in study 1.

One common pitfall of MMR is the subordination of qualitative methods in favour of quantitative methods. Dominant-less-dominant designs can be merited when one method serves a specific purpose in supporting the dominant method. For example, van Rens et al. (2021) used focus groups, in part, to elicit players’ feedback about a PT intervention’s areas for improvement. However, the tendency to reduce qualitative methods to a “supporting role” raises the question of whether studies truly embrace multiple epistemologies or instead reflect veiled post-positivism (Sparkes, 2015). To avoid this pitfall, this thesis establishes rationale for each study’s method and outlines expectations of how each method extends previous literature or other studies within the thesis. For example, studies 2 and 3 used qualitative

methods because athlete and sport psychologist perspectives were needed to identify properties of pressure manipulations and delivery in order for those properties to then be tested and assessed quantitatively.

Even when designs do give equal weight to both methods, many studies do not integrate findings from the different methods (Moran et al., 2011; Sparkes, 2015). Studies self-described as MMR frequently present qualitative and quantitative studies separately within a report (Sparkes, 2015). Researchers may fall short of integrating findings because the researchers prefer one method over the other, want to appeal to different stakeholders, or face other barriers such as different timelines for quantitative and qualitative analysis (Bryman, 2007). Still, integration is important for results of each method to illuminate each other and contribute to understanding of the phenomenon being studied. Otherwise, findings amount to separate quantitative and qualitative studies (Sparkes, 2015). This thesis attempted to integrate findings as a whole and also within study 4. As a whole, the findings of each study informed the subsequent study. Studies 2 and 3 addressed limitations of quantitatively assessing moderators of PT effectiveness. In study 4, qualitative and quantitative findings from a PT intervention are presented together according to each key finding. For example, qualitative findings provide potential explanations for participants' quantitative levels of pressure.

3.5 Summary

In summary, pragmatism guided the research questions and methodology of this thesis. Not only were methods driven by the research questions, but pragmatism drove the nature of the research questions in the first place. The current thesis addresses questions whose answers can advance applied practice in sport psychology, and MMR was used to best answer these questions. MMR allowed quantitative and qualitative methods to complement each other. Each type of method also contributed knowledge that was not generated by the

other. This research attempted to capitalise on the advantages of MMR by embracing the significance of findings from each method and integrating those findings.

Chapter 4: Study 1

Pressure Training for Performance Domains: A Meta-Analysis

4.1 Abstract

Studies have tested pressure training (PT) interventions in which performers practice physical or technical skills under simulated psychological pressure, but research has not yet synthesised the results of these studies. This meta-analysis assessed the magnitude of PT's effect on performance in sport and other high-pressure domains (e.g., law enforcement). A secondary purpose was to investigate how domain, intervention length, experience, and the type of task moderated the effectiveness of interventions. A study was included if it was peer-reviewed, conducted a PT intervention for sport or another high-pressure domain, and quantitatively compared a PT group to a control group on post-tests under pressure. Fourteen studies in sport ($k = 10$) and law enforcement ($k = 4$) were included. Participants ($n = 394$) were novices, semi-professional athletes, elite athletes, and police officers. After removal of an outlier, the mean effect was moderate ($g = 0.67$, 95% CI [0.43, 0.94]) with low heterogeneity ($I^2 = 17.1\%$). Subgroup analysis did not indicate clear moderators of performance but did reinforce that PT can benefit both novice and experienced participants on open and closed tasks across different domains. The results suggest coaches and instructors should create pressurised training environments rather than relying on greater amounts of training to help performers adjust to pressure. Future research should develop guidance for creating practical pressure manipulations for applied settings. Studies can also assess the role of other potential moderators that are not easily quantifiable but potentially impactful.

4.2 Preamble

This chapter reports a published study (Low et al., 2021). In this chapter, changes to the publication include: a) updates to the introduction [e.g., inclusion of Ong and Chua's (2021) study], and b) added discussion of how this study informed the subsequent studies in this thesis (p. 64).

4.3 Introduction

The adages “practice how you play” or “train as you fight” reflect that domains such as sport and military understand that training should replicate performance as closely as possible to improve performance. Coaches might demand high effort or simulate tactical situations to habituate athletes to conditions of competition. In medicine, mannequins or other simulators allow trainees to practice examining specific pathologies or responding to problems that they might encounter as professionals (Issenberg et al., 2005; McKinney et al., 2013). Training would also better represent performance by incorporating the emotional conditions experienced when performing (Headrick et al., 2015). Psychological pressure is one such condition that can influence achievement in sport and safety in high-risk domains including medicine and law enforcement (Arora et al., 2009; Hardy et al., 2017; Nieuwenhuys & Oudejans, 2011; Vickers & Lewinski, 2012).

Research has found that training under pressure can improve performance. Bell et al. (2013) conducted PT for elite youth cricketers throughout a year, and PT-trained players outperformed a control group in batting drills and in competition. For police officers training handgun shooting, Oudejans (2008) found that accuracy decreased when officers first faced an opponent who could fire back, but they regained accuracy after training under this same pressure. Even studies that tested different interventions, such as cognitive-behavioural workshops, have unintentionally supported the effects of training under pressure. Kent et al. (2018) noted that control groups also improved performance in some of these studies, which

implies that experience performing a skill under pressure (i.e., in pre-tests) may partly explain why intervention groups improved performance in post-tests.

Coaches or instructors can increase pressure by adding consequences to an individual or team's performance in training (Stoker et al., 2017). In competitions, athletes can face loss of playing time, negative press, crowd derision or other consequences if they perform poorly. To simulate the pressure of these consequences, interventions have added monetary rewards (e.g., Oudejans & Pijpers, 2010), punishments (e.g., Bell et al., 2013), and perceived evaluation by coaches (e.g., Beseler et al., 2016). Manipulation checks have shown that such consequences in training do increase anxiety associated with perceived pressure (e.g., Lawrence et al., 2014; Oudejans & Pijpers, 2010). In high-risk domains, PT consequences can be inherent to the task and felt immediately (e.g., an antagonist firing back at police; Nieuwenhuys & Oudejans, 2011).

Although PT is not the only intervention to improve performance under pressure, it may offer certain advantages. Some interventions, including quiet eye training, pre-performance routines, and dual tasks, can prevent choking (Gröpel & Mesagno, 2017), but their applicability may be limited to closed-skill tasks (i.e., tasks that are self-paced, such as golf putting). In contrast, coaches or instructors can pressurise open-skill tasks that require participants to read situations and make decisions, such as returning badminton serves (Alder et al., 2016). Another potential advantage is that PT is not necessarily a separate exercise from a performer's normal training regimen because the drills that they already do can be pressurised. For instance, if a basketball team already practices free throws, then practicing free throws under pressure does not necessarily take much more time. As a result, PT enhances existing training rather than introducing a completely new and unfamiliar exercise.

Although PT does not strictly teach physical or technical skills, it must combine the exposure to pressure with the simultaneous practice of such skills. Oudejans and Pijpers

(2009) found that dart players who practiced under pressure maintained subsequent performance in a pressurised post-test whereas performance declined for players who were made to feel anxious but did not have to perform. PT does not just train the ability to cope with anxiety. Instead, it trains the ability to cope while simultaneously performing well.

Systematic reviews have supported the effectiveness of PT (Gröpel & Mesagno, 2017; Kent et al., 2018). In Kent et al. (2018), all five PT or “simulation training” interventions improved performance under pressure whereas all other interventions, such as cognitive-behavioural workshops and emotional regulation strategies, produced mixed results. In Gröpel and Mesagno’s (2017) systematic review of choking interventions, eight out of nine PT studies (“acclimatisation training” or “self-consciousness training”) led to statistically significant improvements in performance under pressure.

Even though these findings are promising, they do not illustrate the magnitude of PT’s effect on performance. Kent et al. (2018) acknowledged that a meta-analysis would have been inappropriate in their review because the variety of interventions and populations produced significant heterogeneity, and Gröpel and Mesagno (2017) similarly reviewed various types of interventions. A review focused exclusively on PT could have enough homogeneity to quantify their effect on performance, and results could have applied implications. Ong and Chua (2021) also meta-analysed the effects of various coping interventions on athletes’ competitive anxiety and found that interventions reduced anxiety regardless of factors such as gender, sport, or study design. However, while focusing on measures of anxiety, Ong and Chua’s (2021) study did not assess how reducing anxiety impacted performance. Brown and Fletcher (2017) did find that psychological interventions have a moderate effect on performance (Hedges’ $g = 0.57$). A practitioner’s choice to use PT could depend on its effectiveness relative to other options for improving performance. When

a practitioner explains PT to stakeholders, articulating PT's potential benefit may help convince them to invest time and effort in the intervention.

Comparing the reviews by Kent et al. (2018) and Gröpel and Mesagno (2017) also reveals a need to more thoroughly assess PT research. These two reviews included only one of the same PT studies (i.e., Bell et al., 2013), and relevant literature could also include research on domains other than sport. Law enforcement and other domains inherently operate under pressure and already simulate their operating environments in training (e.g., Saus et al., 2006). Systematic reviews in these domains have examined training of non-technical skills, such as teamwork (O'Dea et al., 2014), but no study has reviewed training for the domains' psychological pressures.

Sport does not have the same life-or-death risks associated with law enforcement, medicine, or aviation, but all of these domains require coping with pressure and have already learned from each other to improve training (Arora et al., 2009; Hanton et al., 2005). Medicine has adopted aviation's crew resource management training (Hamman, 2004; O'Dea et al., 2014) as well as athletes' cognitive training techniques, such as mental imagery (Wallace et al., 2017). Sport psychology has also informed military training (e.g., Fitzwater et al., 2018). Despite the prevalence of pressure and the interest in improving training, little research has compared how these domains create and train in pressurised environments.

Even if PT has unique effects in sport compared to other domains, any differences could stimulate learning across domains. Some heterogeneity is to be expected in a meta-analysis because included studies rarely all use the same methods and study the same participants (Higgins, 2008), and such heterogeneity would be expected especially for PT because these interventions can vary on several characteristics. Intervention length, or the number of PT sessions, has ranged from a single session (e.g., Beilock & Carr, 2001) to multiple sessions per week for several months (e.g., Bell et al., 2013). PT has been examined

in novices and professionals (Liu et al., 2018; Oudejans, 2008), and PT can train performance of closed or open tasks under pressure (e.g., Alder et al., 2016; Lewis & Linder, 1997). In closed tasks (e.g., golf putting), the performer chooses when to start executing a skill. In open tasks, the performer must execute a skill in response to a changing environment. Hitting a groundstroke in tennis is an open skill because the player must respond to the speed and location of an opponent's shot. Reviewing PT research could identify characteristics of PT associated with certain domains. Subgroup analysis could then quantify whether these characteristics moderated PT's effect, and results could provide rationale for one domain to adopt the best practices of another.

Findings of such a review could illustrate PT's value relative to other interventions and guide the timing, context, and design of PT. From a theoretical perspective, this synthesis could support or challenge potential explanations for PT's effects. Therefore, the current study's purpose was to assess the magnitude of PT's effect on performance under pressure in sport and other high-pressure domains. PT was defined as physically practicing domain-specific skills under simulated pressure. A secondary purpose was to explore if and how domain, intervention length, task type, and experience each moderated PT's effect.

4.4 Method

4.4.1 Literature Search

The method of this review followed PRISMA guidelines (Liberati et al., 2009). Search terms were based on titles and keywords of PT studies already known to the authors, and six Boolean combinations were used to search MEDLINE, PsycINFO, PsycARTICLES, and SPORTDiscus. These databases were searched together in one search of EBSCOHost in August 2019. Boolean combinations were: 1) "pressure training" OR "practice with anxiety" OR "acclimatization training" OR "resilience training", 2) performance under pressure AND sport AND training, 3) "practice under pressure" OR "performance under pressure" OR

“anxiety training” OR “acclimatization training,” 4) performance under pressure AND anxiety AND training, 5) (simulation training or simulation education or simulation learning) AND anxiety, and 6) (“stress exposure training” or “stress inoculation training” or “stress training”) AND performance. Searches were limited to scholarly journals, and they were not limited to any particular dates because this review was the first to examine PT exclusively.

Figure 4.1 illustrates the search and sifting process. The researcher and a co-researcher independently sifted the search results by title and abstract, compared results, and resolved disagreements through discussion. Full text was examined when titles and abstracts were insufficient to determine eligibility. The researcher also conducted backward and forward reference searching of studies after the final set of included studies from the search was determined. For the backward search, reference lists of these studies were scanned for other eligible studies. For the forward search, the “cited by” functions in the databases SCOPUS, Web of Science, and Google Scholar were used to identify articles that have since cited any of the already-included studies. Results were first sifted by title and abstract. When needed, full text was examined to determine eligibility.

4.4.2 Inclusion Criteria

Studies were included if they: 1) trained and tested individuals on domain-specific skills, 2) conducted an intervention in which participants physically trained under simulated pressure, 3) compared an experimental group with a control group in a randomised or non-randomised study, 4) quantitatively measured each group’s performance outcomes in a high-pressure post-test, 5) were written in English, and 6) were peer-reviewed and empirical. Inclusion was not limited to participants’ level of experience because subgroup analysis was determined a priori to analyse level of experience. The fourth criterion specified performance in post-tests because few sport psychology studies have measured performance in actual competition or real-life scenarios (Martin et al., 2005).

4.4.3 Data Items and Collection

The following pre-determined information was collected from each included study: 1) experimental design, 2) total n, 3) domain, 4) experience, 5) task, 6) task type (open or closed), 7) intervention length, and 8) pressure manipulations. According to the framework developed by Stoker et al. (2016), pressure manipulations were classified as forfeits (e.g., cleaning a changing room; Bell et al., 2013), rewards (e.g., money), judgment (e.g., evaluation by coaches), task stressors (e.g., time to complete a task), performer stressors (e.g., fatigue), or environmental stressors (e.g., noise). The researcher completed a coding sheet with each variable for each study, and another researcher verified the data. Six disagreements were resolved through discussion.

Mean post-test scores and standard deviations were extracted from articles or obtained by e-mailing authors. Four authors were e-mailed, and two responded with the requested data. GetData Graph Digitizer (<http://getdata-graph-digitizer.com>) was used to estimate data from graphs when means could not be obtained from articles or contact with authors. Standard errors and sample sizes were used to calculate standard deviations for each group for studies that did not report standard deviations.

4.4.4 Assessment of Bias

Risk of bias in randomised studies was assessed using the Cochrane Collaboration's tool for assessing risk of bias (Higgins & Green, 2011). For each study, the researcher and a co-researcher assessed risks of selection, performance, detection, and attrition biases as low, high, or unclear. The researchers evaluated non-randomised studies for the same biases using the Risk of Bias Assessment Tool for Nonrandomized Studies (Kim et al., 2013). Studies that did not explicitly state if they were randomised were considered to be non-randomised.

Most studies were anticipated to have unclear or high risks for many categories of bias because psychological studies do not typically follow procedures such as allocation

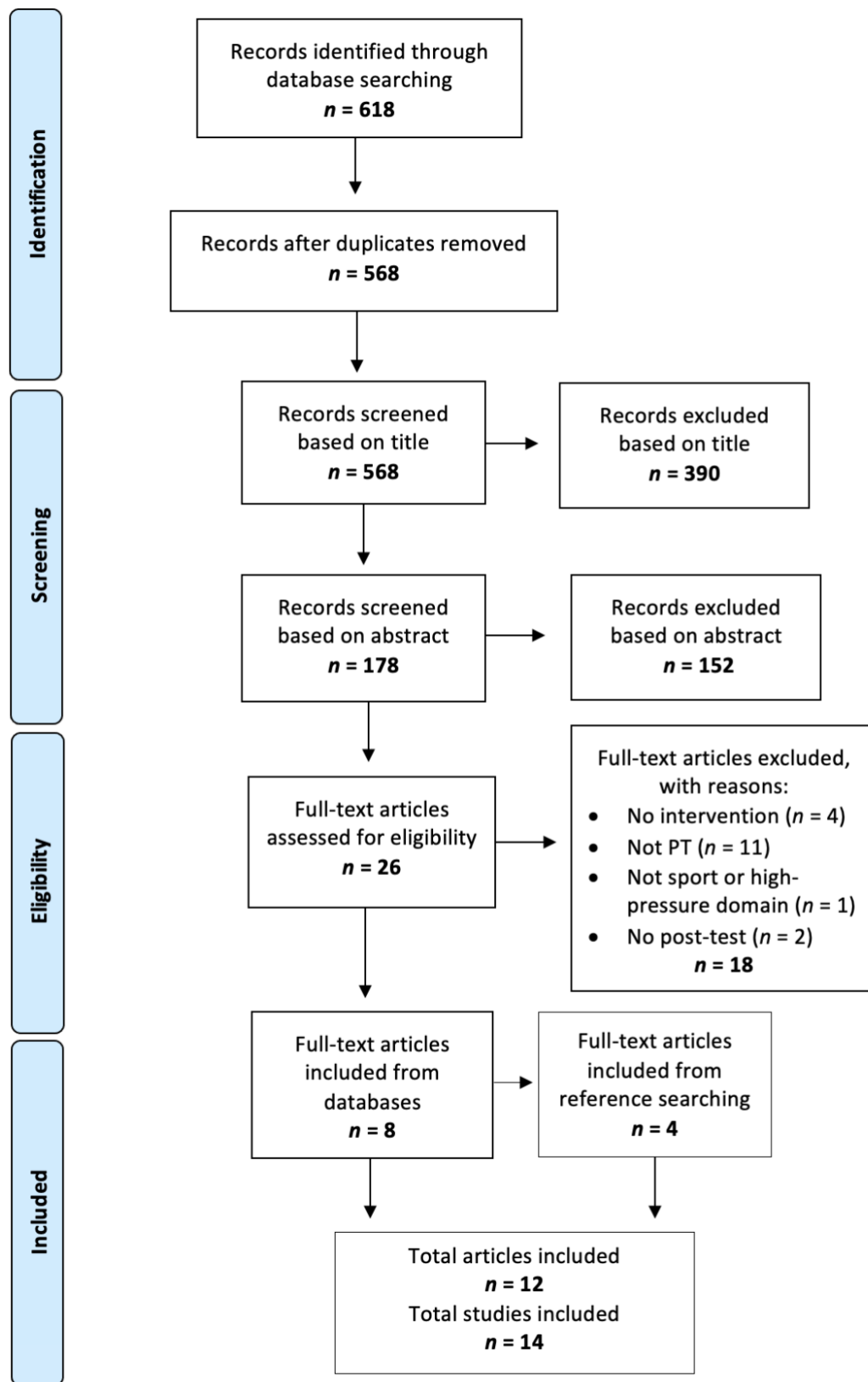


Figure 4.1
Identification of Studies Included in Meta-Analysis

concealment or blinding of researchers. Therefore, this assessment was intended to compare the included studies with each other and identify any bias that could distinguish studies within the review. For example, if risk of one bias was high in half the studies and low in the other half, then that bias would warrant further analysis to see if it affected results.

To assess bias across studies, a funnel plot displayed each study's effect size against the study's precision (i.e., standard error). Poor methodological designs or poor analysis can inflate effect sizes in small studies, and publication bias may prevent publication of studies with statistically non-significant results. Asymmetry in the funnel plot and a significant result from Egger's test would suggest the presence of publication bias or small-study effects.

4.4.5 Summary Measures and Planned Method of Analysis

The effect of PT was measured by the standardised mean difference (Hedges' g) between post-test performance scores of control and experimental groups. Each study was also inspected for differences between experimental and control groups at baseline. Hedges' g was used because it corrects for bias from small samples (Lakens, 2013). Using the DerSimonian and Laird approach in Stata, a random-effects model calculated an effect size and 95% confidence interval for each study as well as a pooled effect size and its 95% confidence interval. The heterogeneity of study characteristics supported a random-effects model, which assumes that all the studies represent different, but related, interventions (Higgins & Green, 2011). A random-effects model also allows inferences to generalise beyond included studies whereas results of fixed-effects models only apply to included studies (Field & Gillett, 2010). Effect sizes of 0.2, 0.5, and 0.8 were interpreted as small, medium, and large, respectively (Cohen, 1988). I^2 was calculated to measure heterogeneity. Expressed as a percentage, I^2 represents the variation across results due to heterogeneity among studies rather than chance (Higgins et al., 2003).

Pre-specified additional analyses tested four potential moderators of PT effectiveness: domain, intervention length, experience, and task type. Domain referred to sport or another field (e.g., aviation, law enforcement, medicine) and was examined because differences in population, technical skills, and consequences of performance might influence PT's effectiveness. Intervention length referred to the number of PT sessions, and it was analysed to help coaches and sport psychology practitioners determine how much PT they should conduct to improve performance. Analysing length would also guide future research because interventions that are too short or too long could confound results of otherwise well-designed PT. Participants' experience in the domain being tested was examined because psychological interventions have had different effects for novices and experienced performers (e.g., Feltz & Landers, 1983). Many sports and occupations involve a mix of open and closed tasks, so task type was examined because the applicability of PT to each domain may depend on whether PT can improve performance on either type of task. A pooled Hedges' g , 95% confidence interval, and I^2 were calculated for each subgroup.

Five special circumstances required processing data to make them suitable for the meta-analysis. First, some performance measures (e.g., mean distance to target in golf putting; Beilock & Carr, 2001) were reversed so that greater values represented better performance, which aligned with measures in the other studies. Second, only two groups were compared even if a study had more than two groups (e.g., control, low-anxiety training, and high-anxiety training; Lawrence et al., 2014). Groups that physically trained under low pressure were used as the control group, instead of groups that did not train at all. Third, measures were averaged when a study had multiple continuous measures of performance (Bell et al., 2013). Fourth, performance was compared on post-tests, rather than retention tests, because only one study conducted a retention test (Nieuwenhuys & Oudejans, 2011). Post-tests assessed the effects of PT immediately after the intervention whereas a retention

test would take place weeks or months after the intervention to assess how long effects were sustained. Finally, for studies that tested participants under low and high pressure (e.g., Oudejans & Pijpers, 2009), only scores from high-pressure post-tests were used to calculate effect sizes.

4.5 Results

A total of fourteen studies were included in the meta-analysis. Ten studies were found in the database search. Four studies were found via backward searching. Zero studies were found via forward searching. Interrater agreement was 89% after reviewing titles, 97% after reviewing abstracts, and 92% after reviewing full texts. Case studies did not meet all inclusion criteria, but some case studies provided additional examples of PT interventions (Mace et al., 1986; Mace & Carroll, 1986).

4.5.1 Study Characteristics

Table 4.1 illustrates characteristics of the included studies. Ten examined sport, and four examined law enforcement. Studies in any high-pressure domain were eligible for inclusion, but sport and law enforcement were the only ones with studies that met all the inclusion criteria. The included studies had a total of 394 participants and mean sample size of 28 participants ($SD = 20$). Participants were novices, trainees, semi-professionals, professionals, and international-level athletes. Lengths of interventions ranged from one to 46 sessions of PT. Some studies used multiple pressure manipulations, and other studies used only one. Judgment was the most common ($k = 8$), followed by rewards ($k = 6$) and forfeits ($k = 5$).

4.5.2 Risk of Bias

Table 4.2 illustrates the results of the bias assessments. No single type of within-study bias distinguished studies into subgroups because there was little variation in their ratings on each category. Interrater agreement was 86%. A relatively symmetrical funnel plot and a non-

significant Egger's test result ($p = 0.12$) showed no indication of significant publication bias or small-study effects across studies.

4.5.3 Mean Effect

The forest plot in Figure 4.2 presents the individual and pooled effect sizes, 95% confidence intervals, and the weight of each study. Across the included studies, PT had a large positive effect on performance under pressure for experimental groups when compared to control groups that did not receive PT ($g = 0.85$, 95% CI [0.37, 1.34]). Only Bell et al. (2013) had a significant difference between experimental and control groups at baseline on one performance measure, and this difference was balanced by no significant difference between groups on a second measure. Heterogeneity between studies' effects was high ($I^2 = 78.4\%$).

The forest plot showed that one study (Liu et al., 2018) could be responsible for much of the high heterogeneity, so sensitivity analysis was conducted to measure the influence of each study on the mean effect. The mean effect was re-calculated while omitting each study one at a time. Omission of Liu et al. (2018) decreased Hedges' g from 0.85 to 0.67 and the upper limit of the 95% confidence interval from 1.33 to 0.94. In contrast, when any other study was omitted, Hedges' g was at least 0.83, and the upper limit of the 95% confidence interval was at least 1.34. Omission of Liu et al. (2018) also decreased I^2 from 78.4% to 17.1%. This more conservative estimate indicates a moderate effect with a more precise 95% confidence interval ([0.41, 0.94]).

Because of Liu et al. (2018)'s disproportional influence, it was omitted from the pre-planned subgroup analyses. When heterogeneity is due to study characteristics, subgroup analysis can identify which characteristics are responsible, but high heterogeneity due to a single study would make results of the analysis difficult to interpret. Thus, this omission made subgroup analysis of the remaining studies more robust.

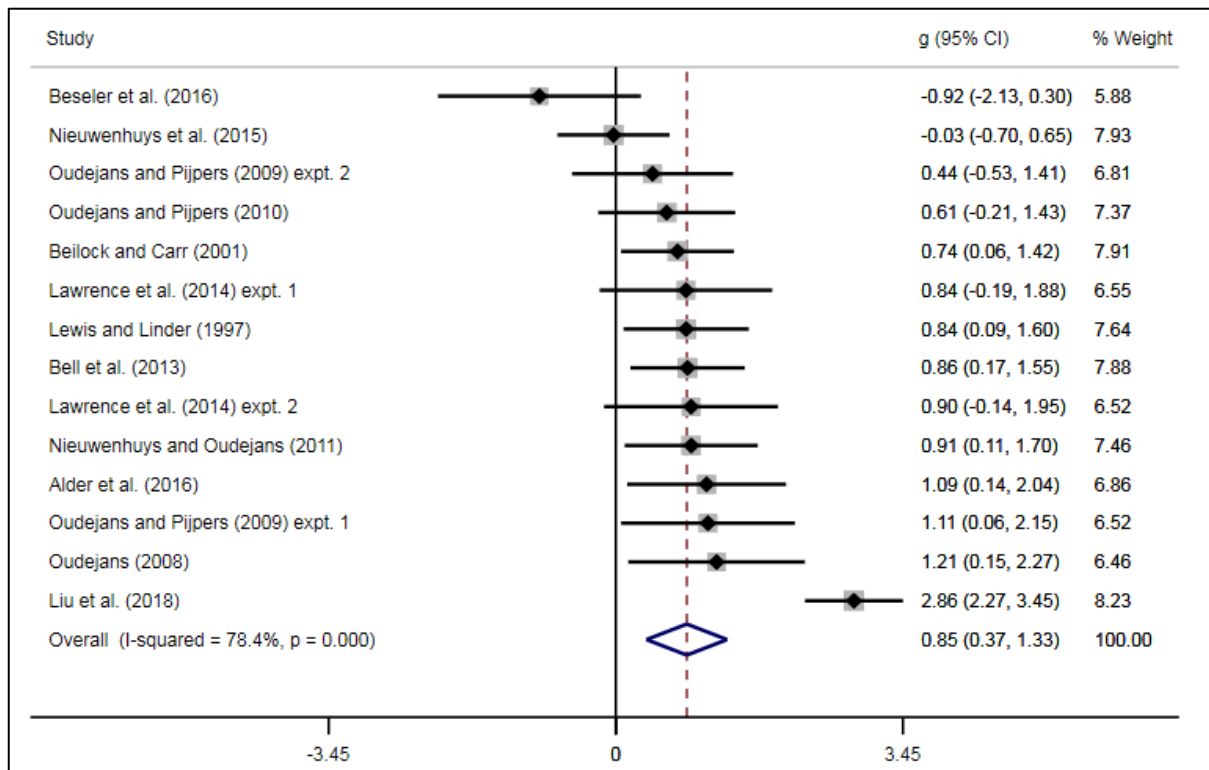


Figure 4.2
Forest Plot of Study Effect Sizes in Ascending Order

4.5.4 Subgroup Analysis

Table 4.3 summarises the effects of PT in each subgroup for the pre-planned moderator variables: domain, length, task type, and experience. Domain was coded as either “sport” or “law enforcement.” Length was coded as “short” (one PT session), “medium” (2-5 sessions), or “long” (over five sessions). Task type was either “open” or “closed.” For experience, participants were divided into “novice” or “experienced” subgroups. All but one subgroup (long interventions) had moderate effects, so none of these variables significantly moderated performance under pressure. For each variable, one subgroup’s confidence interval encompassed the entire confidence interval of the other subgroup(s). This overlap suggests that little difference, if any, existed between PT’s effects among subgroups. However, heterogeneity did distinguish subgroups and warrants interpreting similarities in effect size with caution. Long interventions had the smallest effect of any subgroup ($g = 0.42$, 95% CI [-0.65, 1.50]) but also had the fewest studies ($k = 3$) and the highest heterogeneity (I^2

= 73.1%). Although heterogeneity was only moderate among experienced participants ($I^2 = 48.9\%$), it was lower for novices ($I^2 = 0.0\%$). It should also be noted that all studies with novices overlapped with short interventions.

4.6 Discussion

The main purpose of this meta-analysis was to assess the effectiveness of PT for enhancing performance under pressure. A secondary purpose was to explore if and how domain, intervention length, task type, and experience each moderated the magnitude and direction of PT's effect. Fourteen studies were included. Although studies from any high-pressure domain were eligible for inclusion, sport and law enforcement were the only domains represented. The range of the law enforcement studies was narrow: they all trained shooting skills, and three of the four studies were conducted by the same authors (Nieuwenhuys et al., 2015; Nieuwenhuys & Oudejans, 2011; Oudejans, 2008). Studies have examined PT in firefighting and medicine (Baumann et al., 2011; DeMaria et al., 2010), but they did not meet all inclusion criteria.

Results supported previous systematic reviews that found that PT interventions consistently improved performance under pressure (Gröpel & Mesagno, 2017; Kent et al., 2018). Both previous reviews compared PT with other choking or coping interventions, but their reliance on comparing statistical significance limited conclusions. Meta-analysis allowed the current review to measure the magnitude of PT's effect on performance under pressure. Before removal of an outlier, the included studies had a large positive effect ($g = 0.85$, 95% CI [0.37, 1.34]). This effect represents between-group differences on high-pressure post-tests, so it suggests that performers who receive PT outperform others who do not receive PT. It does not, however, describe how that performance under high pressure compares to performance under low pressure. Included studies whose effect sizes were

Table 4.1
Characteristics of Studies Included in Meta-Analysis

Study	Design	<i>N</i>	Domain	Experience	Task	Task Type	Length	Pressure Manipulation
Alder et al. (2016)	R	20	Badminton	International	Reading location of opponent serves	Open	3	Judgment
Beilock and Carr (2001): experiment 3	R	36	Golf	Novice	Putting	Closed	1	Judgment
Bell et al. (2013)	NR	41	Cricket	Elite youth	Batting against pace and batting against spin	Open	46	Forfeit
Beseler et al. (2016)	R	12	Australian football	Semi-professional	Set shots	Closed	14	Environmental, judgment, reward
Lawrence et al. (2014): expt. 1	R	16	Golf	Novice	Putting	Closed	1	Judgment, reward
Lawrence et al. (2014): expt. 2	R	16	Rock climbing	Novice	Horizontal indoor climbing	Closed	1	Judgment, reward
Lewis and Linder (1997)	NR	30	Golf	Novice	Putting	Closed	1	Judgment, reward
Liu et al. (2018)	R	92	SWAT team	In training	Shooting in hostage rescue	Open	3	Environmental
Nieuwenhuys and Oudejans (2011)	R	27	Police	Experienced professionals	Handgun shooting	Open	4	Forfeit
Nieuwenhuys et al. (2015)	NR	34	Police	Experienced professionals	Shoot/don't-shoot decisions	Open	3	Forfeit
Oudejans (2008)	NR	17	Police	Experienced professionals	Handgun shooting	Open	3	Forfeit

Oudejans and Pijpers (2009): experiment 1	NR	17	Basketball	“Expert”	Free throws	Closed	9	Judgment, reward
Oudejans and Pijpers (2009): experiment 2	NR	17	Darts	“Experienced ”	Dart throwing	Closed	1	Environmental
Oudejans and Pijpers (2010)	R	24	Darts	Novice	Dart throwing	Closed	1	Judgment, reward

Note. R = randomised; NR = non-randomised; *N* = total number of participants in control and experimental groups included in the meta-analysis.

Table 4.2
Results of Risk of Bias Assessments

Randomised Studies							
Study	Selection: randomisation	Selection: allocation	Performance	Detection	Attrition	Reporting	Other
Alder et al. (2016)	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low
Beilock & Carr (2001)	Unclear	Unclear	Unclear	Unclear	Unclear	Low	High
Beseler et al. (2016)	Unclear	Unclear	High	Unclear	High	High	Low
Lawrence et al. (2014): expt. 1	Unclear	Unclear	Unclear	Unclear	Unclear	Low	High
Lawrence et al. (2014): expt. 2	Unclear	Unclear	Low	Low	Unclear	Low	High
Liu et al. (2018)	Unclear	Unclear	Unclear	Low	High	Low	Low
Nieuwenhuys & Oudejans (2011)	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low
Oudejans & Pijpers (2010)	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low
Non-Randomised Studies							
Study	Selection	Confounds	Measurement Exposure	Blinding	Incomplete Data	Selective Reporting	
Bell et al. (2013)	Low	Low	Low	Unclear	High	Low	
Lewis & Linder (1997)	Unclear	Unclear	Low	Low	Low	Low	
Nieuwenhuys et al. (2015)	Unclear	Unclear	Low	Low	Unclear	Low	
Oudejans (2008)	Unclear	Unclear	Low	Low	Unclear	Low	
Oudejans & Pijpers (2009): expt. 1	High	Low	Low	Low	Unclear	Low	
Oudejans & Pijpers (2009): expt. 2	Unclear	Low	Low	Low	Unclear	Low	

Table 4.3
Effect of Moderator Variables

Moderator	Subgroup	<i>k</i>	<i>N</i>	<i>g</i>	95% CI	Effect descriptor	<i>P</i>	Within-group <i>I</i> ² (%)
Domain	Sport	10	224	0.72	[0.45, 1.00]	Moderate	< 0.001	0.0
	Law enforcement	3	78	0.63	[-0.14, 1.39]	Moderate	0.107	60.5
Experience	Experienced	8	180	0.61	[0.17, 1.05]	Moderate	0.007	48.9
	Novice	5	122	0.77	[0.40, 1.14]	Moderate	< 0.001	0.0
Length	Short	6	139	0.73	[0.38, 1.08]	Moderate	< 0.001	0.0
	Medium	4	98	0.72	[0.11, 1.33]	Moderate	0.021	51.3
	Long	3	65	0.42	[-0.65, 1.50]	Small	0.440	73.1
Task Type	Open	5	134	0.74	[0.27, 1.20]	Moderate	0.002	38.2
	Closed	8	168	0.65	[0.30, 0.99]	Moderate	< 0.001	12.2

Note. *k* = number of studies; *N* = total number of participants; *g* = Hedges' *g*; CI = confidence interval

similar to this overall effect illustrate the meaning of the result more concretely. In Lawrence et al.'s (2014) experiment 1, the experimental group made more than 2.5 more putts than the control group did out of 25 total putts. In Nieuwenhuys and Oudejans (2011), police officers who received PT were 14% more accurate firing at an opponent than the control group was in the post-test.

After Liu et al.'s (2018) study was removed because of its especially large positive effect, the overall effect of PT was moderate ($g = 0.67$, 95% CI [0.41, 0.94]). Differences between the SWAT trainees in Liu et al.'s (2018) study and novices in other studies could explain the large effect size. For example, the trainees may have been more motivated than other novices because the task was related to the trainees' careers.

This moderate effect of PT approximated the effects of other interventions for performance enhancement. It is within the 95% confidence interval of 0.22–0.92 (Hedges' g) that Brown and Fletcher (2017) found in their meta-analysis of various psychological and psychosocial interventions in sport, including pre-performance routines, self-talk, and imagery. Rather than compete with these interventions, PT may complement them in applied practice because PT could provide a more ecologically valid setting to practice routines, attentional training, or other techniques used during performance.

Bell et al. (2013) found that PT was effective when combined with mental skills training (MST); however, the remaining studies suggested that PT alone can improve performance. According to Nieuwenhuys and Oudejans' (2017) model, pressure prompts performers to increase mental effort as they become more concerned with performing well, and PT may train performers to direct this effort to completing their task rather than worrying about the pressure. Oudejans and Pijpers (2009) found that their control and experimental groups both increased effort in post-tests under anxiety, but only the experimental group's efforts improved performance. Meanwhile, the two groups both remained anxious in post-

tests. Thus, rather than reduce anxiety, PT appeared to acclimate participants to performing with anxiety.

PT effects were also consistent across domains. Police and athletes both performed better under pressure after PT. They did test under the same pressure manipulations used in their PT rather than real-life or competitive pressures (e.g., “soap” bullets instead of real bullets), which warrants research on how well PT would translate to competition or an encounter with a suspect. The differences between control and experimental groups do confirm that pressure can limit performance, so the results at least highlight the need to prepare for such pressure in both domains. One difference between the domains is that all police interventions trained open tasks whereas most sport studies trained closed tasks. The open tasks were “extended” in that they involved a continuous series of opportunities to perform skills (e.g., firing multiple shots, reloading the weapon, and moving after each shot; Nieuwenhuys & Oudejans, 2011). Because many sports involve mostly extended open-task sequences, training these tasks in PT could prepare athletes for a wider variety of situations and train the ability to sustain that performance throughout a sequence.

Novices and experts both improved moderately after PT. The positive effect on experienced participants demonstrated that performers who are physically or technically skilled could still improve under pressure. Experience in one’s domain does not guarantee quality performance under pressure (e.g., Alder et al., 2016). For novices, improvements could be explained by the specificity of practice hypothesis, which posits that individuals perform better when they have learned under the same conditions in which they perform (e.g., high pressure; Cassell et al., 2018).

Surprisingly, interventions with five or more PT sessions had the smallest effect on performance under pressure. This finding contrasts recommendations in sport psychology for consistent, long-term interventions (Fifer et al., 2008), but the small number of these studies

and their varied results show that more research is needed to determine appropriate amounts of PT. Furthermore, results potentially could differ if they were measured on retention tests because the advantage of long interventions could be in sustaining performance under pressure throughout a competitive season or career. Many of the scenarios simulated in PT studies (e.g., game-winning free throws) may only occur occasionally and unpredictably for each individual performer, so he or she may need to train under pressure consistently to stay prepared for such scenarios when they do occur.

4.6.1 Applied Implications

Because control groups physically practiced as much as experimental groups did, the between-group differences in performance should encourage leaders to increase pressure in practice, not just the amount of practice. Challenges help individuals develop psychological skills, and “constructed challenges,” such as PT, develop these skills more intentionally than waiting for opportunities to occur naturally (Collins et al., 2016, p. 3). PT also contrasts approaches to learning that centre around leaders or practitioners providing verbal explanations or demonstrations. While Bell et al. (2013) complemented PT with MST, the remaining studies suggested that a practitioner would not have to explicitly teach mental skills for participants to acclimate to pressure during PT. That is, participants seemed to acclimate on their own. When preparing performers for pressure, leaders can create a pressurised atmosphere in which performers can independently learn to perform. This PT should take place in a facilitative environment in which leaders balance the challenge of pressure with support, such as strong coach-athlete relationships and encouragement to learn from mistakes (Fletcher & Sarkar, 2016).

Coaches or instructors could consider introducing appropriate amounts of pressure while a learner develops technical skills. For a complex task, a mix of low and high anxiety in training can be more effective for performance under pressure than training with only high

anxiety or low anxiety (Lawrence et al., 2014). Although Lawrence et al. (2014) found that low-anxiety performance worsened if individuals received PT from the very beginning of learning a skill, PT's effectiveness for novices in the current study implied that they might not have to master a skill before training it under pressure. Future research could further investigate if there are benefits of training technical skills and coping skills in parallel, compared to learning to perform under pressure after an individual has already grown accustomed to low pressure. Furthermore, when learners train while feeling emotions of competition, they may be more engaged and also discover the emotions, thoughts, and behaviour that they need to perform optimally (Headrick et al., 2015).

Simulating pressure may be more feasible if coaches and practitioners utilise stressors inherent to the task being trained. Despite increasing anxiety successfully, sport studies relied on external sources of pressure, including monetary rewards, that would be impractical for coaches to replicate regularly. Police, in contrast, faced consequences that were directly connected to their experimental task, such as shooting a live "hostage" (with a "soap" bullet) if they missed their target (Liu et al., 2018). These tasks also took place in simulated performance contexts, including realistic physical surroundings and verbal communication with suspects when first encountered (Nieuwenhuys et al., 2015). Similarly, situating PT in a simulated performance context could provide sources of pressure that are absent when individuals train a skill isolated from the flow of competition. For example, if basketball players pressure trained free throws during a practice 5-v-5 game during a training session, they would face stressors inherent to the game itself (e.g., failing to score easy points) as well as external stressors (e.g., judgment from coaches).

4.6.2 Future Directions and Limitations

Results of study 1 supported the use of PT to improve performance but also highlighted gaps in knowledge that were addressed by the research in the remainder of this

thesis. In addition to the magnitude of the positive effect on performance, the consistency of the effect showed that PT could be reliable across a variety of skills, domains, and levels of expertise. Although meta-analysis enabled evaluation of the magnitude of PT's effect, this method also was limited in the evidence it could review. To compare studies, results of post-tests were analysed instead of performance in competition because only one out of 10 studies on sport (Bell et al., 2013) had measured competitive performance. This reliance on post-tests is not surprising given that even studies with experts took place in experimental settings (e.g., Alder et al., 2016) rather than in athletes' training to prepare for competition. In the wider literature, interventions have been integrated into training, but these studies were not included in the meta-analysis because they measured psychological constructs rather than performance on any specific task (van Rens et al., 2021). This thesis aimed to advance PT intervention studies toward exploring effects on meaningful outcomes, such as competitive performance.

Before an intervention was conducted to translate PT from experimental settings to athletes' training, studies 2 and 3 of this thesis were conducted to facilitate that translation. When answering whether a PT intervention improves performance, researchers need to be confident that pressure was in fact created. Practitioners would increase the chance that an intervention would create pressure if they used evidence-based pressure manipulations. Because study 1 did not evaluate intensity of pressure created, study 2 (Chapter 5) was designed to explore pressure manipulations in more depth. Stoker et al. (2017, 2019) determined that consequences create pressure whereas demands do not. However, the category of consequences contains many potential forfeits, rewards, and sources of judgment. Study 2 therefore aimed to inform the process of selecting or developing pressure manipulations appropriate for a given context.

Another limitation of study 1 is that its systematic review and meta-analysis were limited to examining variables that could be categorised and had been reported by the

included studies. For example, subgroup analysis distinguished between experts and novices or short, medium, and long interventions. It could not, however, analyse less defined but potentially impactful variables, such as a practitioner's working alliance and interaction with athletes during delivery of the intervention. The absence of this or any variable in analysis does not represent an absence of impact on the intervention. Thus, study 3 (Chapter 6) sought to explore how practitioners' delivery can promote effectiveness of PT.

In short, research in applied settings is needed to strengthen study 1's evidence that PT can improve performance. Applied interventions need to be designed such that they answer the question of whether training under pressure does increase performance. If pressure is not created successfully, its impact on performance cannot be measured. If an intervention is not delivered through a working alliance that promotes effectiveness, results may reflect poor delivery as much as they reflect effects of pressure. Studies 2 and 3 addressed these issues to establish a base of evidence for future interventions and research.

Beyond this thesis, more research is needed to measure how long athletes remain acclimated to pressure. Only one study conducted a retention test (Nieuwenhuys & Oudejans, 2011), and such retention tests could help identify amounts of PT that generate permanent learning without diminishing the effects of pressure manipulations. Research could also test whether improvements under pressure transfer across skills within a sport or domain. Existing studies have measured PT effectiveness by testing the same skills that were practiced during PT, so it is still unknown whether performance gains illustrate a general or situation-specific ability to perform under pressure. If PT trains a general ability, then training one skill (e.g., tennis serves) under pressure could enhance other skills (e.g., groundstrokes) under pressure too. If it trains a skill-specific ability, then performers may need to pressure train many skills to prepare for the variety of situations that they could face.

Transfer tests should therefore be conducted to examine how pressure-trained skills compare with skills not trained under pressure.

4.6.3 Conclusion

Meta-analysis of 14 studies found that PT improved performance under pressure for a wide range of participants and tasks in sport and law enforcement. The mean effect was moderate after an outlier was excluded. Although more research should examine the role of mental skills training in enhancing PT, individuals seemed to learn independently to perform under pressure when they trained under pressure. Interventions varied in their domain, length, participants' experience, and task type, but no single characteristic increased or decreased PT's effectiveness. More clear moderators may emerge if studies examine the sustainability of PT's effect over time and transferability across domain-specific skills.

Chapter 5: Study 2

The Role and Creation of Pressure in Training

5.1 Abstract

To prepare athletes for psychological pressure of competition, pressure training (PT) systematically applies pressure on athletes during training. This study explored how to create pressure for PT and how PT improves performance in competition. Specifically, it aimed to explore the views of sport psychologists and athletes on: a) common properties of effective pressure manipulations, and b) PT's mechanisms for improving performance under pressure. Eight sport psychologists and eight international-level athletes participated in semi-structured interviews. Thematic analysis identified three properties of effective pressure manipulations: a) extending the reach of consequences, b) simulating psychological demands of competition, and c) approximating, but not replicating, intensity of competition pressure. Analysis also produced three themes that described how PT benefits performance: a) learn and practice coping skills, b) "change the relationship" with pressure, and c) increase the quality of training. Understanding these benefits can help communicate to athletes why they should participate in PT.

5.2 Preamble

This chapter reports a published study (Low, Freeman, et al., 2022). The chapter is mostly identical to the publication, except for an added discussion on the delivery of PT (p. 95). This addition previews study 3 of this thesis.

5.3 Introduction

Study 1 showed that PT can improve performance under pressure for various tasks in different domains. The moderate magnitude of PT's effect (Hedges' $g = 0.67$) was similar to the effect that Brown and Fletcher (2017) found for other performance-enhancement interventions (Hedges' $g = 0.57$). Although the exact effect may vary across each individual study, all but one of the 14 included studies showed that PT improved performance to some extent. Similarly, Kent et al. (2018) reviewed different categories of interventions and found that all five PT studies enhanced performance whereas the other interventions (e.g., cognitive-behavioural workshops) had mixed results. Rather than replace these interventions that teach mental skills, PT can complement them by allowing athletes to practice those mental skills in environments that represent the mental demands of competition.

Despite PT's effectiveness in experimental or training settings, more research is still needed because there is only limited evidence that PT improves performance under pressure in competition (Kent et al., 2018). Bell et al. (2013) did find that PT improved performance in competition but did not specifically measure performance in pressure situations. Recent interventions (e.g., Kegelaers et al., 2021; Kent et al., 2021) have lasted several weeks, which may be too short to measure enough pressure situations and expect improvements. One possible barrier to longer interventions is that extending PT could require more than repeating the procedures of shorter ones. The level of pressure from some manipulations may fade over time (van Rens et al., 2021), and other manipulations may not increase pressure for some individuals who do not find them meaningful or incentivising (Kent et al., 2018). Thus, practitioners need versatility in how they create pressure. Understanding how and why

effective pressure manipulations create pressure could provide such versatility. Although pressure is central to PT, little research has guided practitioners in creating pressure in applied settings.

Early PT studies in experimental settings created pressure but focused on evaluating that pressure's effects. Manipulations included monetary rewards (e.g., Oudejans & Pijpers, 2009), judgment from a coach (e.g., Alder et al., 2016), and posting results in the team's changing room (e.g., Beseler et al., 2016). Manipulation checks indicated that pressure increased, but studies did not thoroughly explain how pressure manipulations were chosen and developed. Combining manipulations in a single study also obscured each one's contribution to the increased pressure. These studies aimed to establish whether training under pressure has the potential to improve performance under pressure, so researchers did not necessarily claim that their pressure manipulations would generalize beyond their study. For example, some pressure manipulations, such as monetary rewards, would not be practical for a team with limited resources. As study 1 found, interventions did still improve performance and therefore supported subsequent research to examine implementing PT with athletes in their existing training.

Applied interventions have continued to focus on PT's effects, but few have provided rationale for their pressure manipulations that produced those effects. Bell et al.'s (2013) study again provides an exception. In this study, cricketers were punished if they did not meet standards in batting drills. The intervention was grounded in systematic desensitization training, which exposes individuals to stressors to overcome phobias and anxieties. The threat of punishments allowed the players to practice coping with professional cricket's threatening environment in which mistakes could be costly to one's career. However, no subsequent studies have further explored the use of punishments or similarly explained their pressure manipulations. Van Rens et al. (2021) had cricketers choose which forfeits to use because such autonomy could increase motivation during the training, but allowing players to choose

the forfeits assumed that the players knew sources of pressure for themselves and feasible ways of simulating those sources. The absence of manipulation checks left the effectiveness of the chosen forfeits unclear. Providing stronger rationale for pressure manipulations could help practitioners translate interventions to other sports and populations.

Recognising the lack of attention to the systematic creation of pressure, Stoker et al. (2016) interviewed coaches who had used PT about ways to create pressure. The resulting framework classified pressure manipulations into consequences and demands. Consequences included rewards, forfeits, or judgment. Demands increased the difficulty to perform, such as by adding noise to the surroundings or rules to follow during a drill. In research that tested this framework, consequences or a combination of consequences and demands created pressure whereas demands alone did not (Stoker et al., 2017, 2019).

Because the category of consequences still encompasses many potential pressure manipulations and combinations of them, more guidance is needed to develop ones that successfully create pressure. Forfeits have included cleaning changing rooms (Bell et al., 2013), running sprints (Kegelaers et al., 2021), and not starting the team's next game (Kent et al., 2021). Evaluation by coaches and leaderboards that display performance scores have been used to produce a sense of judgment (e.g., Alder et al., 2016; Beseler et al., 2016; Kent et al., 2021). Differences between individuals, sports, and levels of performance could mean that one of these consequences might work in one context but not in another. Therefore, practitioners may benefit most from learning how to adapt, rather than duplicate, a previously-used pressure manipulation to fit their particular sport setting.

Numerous conceptualisations of stress exist, but Lazarus and Folkman's (1984) transactional approach is one that could guide creating pressure. An individual's level of stress depends on one's appraisal of the current situation (Lazarus & Folkman, 1984), and individual differences mean that any given event cannot be assumed to be a "stressor" for everyone. Alternatively, there may be more value in identifying the properties of stressors

that prompt individuals to appraise them as stressful (e.g., novelty or ambiguity; Lazarus & Folkman, 1984). Thatcher and Day (2008) applied this conceptualization to sport and suggested that practitioners can help athletes reduce stress by reducing the presence of the properties in situations leading up to competition. For PT, Fletcher and Arnold (2021) have suggested that practitioners can instead manipulate properties of stressors to intentionally create pressure. There are many possible pressure manipulations for PT, but effective ones might share certain properties. Practitioners could aim to create manipulations that have one or more of these properties.

Unpleasantness may seem like an obvious property of effective pressure manipulations, but it alone might not be sufficient for raising pressure. If the unpleasantness of a consequence is too mild or temporary, the threat of it might not create the increased importance that defines pressure (Baumeister, 1984). Practitioners also cannot always rely on increasing the degree of unpleasantness (e.g., making athletes run more and more sprints) because of the risk to athletes' wellbeing (cf., van Rens et al., 2021). Considering that Thatcher and Day (2008) found support for as many as 10 properties of stressful events, effective pressure manipulations likely have more properties than only unpleasantness. Practitioners could apply knowledge of properties when designing and preparing PT. In Fletcher and Arnold's (2021) multi-phased approach to PT, practitioners work with coaches to tailor pressure to the specific context, such as the sport or level of competition. Properties could provide practitioners with a wider vocabulary for guiding discussions on creating pressure. As coaches contribute knowledge of the sport and athletes, practitioners can then identify specific consequences and demands that have the properties that would likely increase pressure.

In addition to creating pressure, practitioners and coaches might increase PT's effectiveness if they understand how PT improves performance. Preparation can include educating athletes and significant others (e.g., parents) about the purpose and procedures of

PT (Fletcher & Arnold, 2021). Explaining the role of PT might generate buy-in because it is difficult to expect athletes to embrace a new way of training if practitioners themselves cannot explain how it achieves its results. Furthermore, transparency about PT's role could communicate the supportive culture that Fletcher and Arnold (2021) recommend should balance the challenge of PT. If athletes realize that PT is a form of training, not punishment, they may more likely view it as a challenge and opportunity to perform.

Despite potential benefits of understanding the mechanisms through which PT helps athletes perform, those mechanisms are still unclear (e.g., behaviours or psychological constructs that are developed). Several studies have explored the question, but they have had little consensus. Oudejans and Pijpers (2009, 2010) suggested processing efficiency theory as one explanation for improved performance. This theory states that athletes naturally increase effort to maintain performance, and PT teaches them how to direct this effort toward productive coping strategies. Other studies have measured psychological constructs related to coping, but they have each measured different ones. Kegelaers et al. (2021) measured resilience whereas van Rens et al. (2021) measured emotion regulation, challenge and threat states, and confidence. Although multiple mechanisms could exist, studies are unlikely to narrow down the possibilities if each study tests a different one.

To address the gaps in the literature outlined above, the current study's purpose was to explore sport psychologists and athletes' views on: a) common properties of effective pressure manipulations, and b) PT's mechanisms for improving performance under pressure in competition.

5.4 Method

5.4.1 Philosophical approach

In line with the pragmatic approach to this thesis, the current study attempted to identify useful information that practitioners can apply when conducting PT. Rather than pursue underlying truths about reality, pragmatism focuses on providing solutions to practical

problems (Giacobbi et al., 2005). Pragmatic methods are driven by the research question and chosen to provide a “practical level of truth” that can be judged on its usefulness, and dialogue among stakeholders and the scientific community helps test this “truth” (Giacobbi et al., 2005, p. 22). The current study advanced the dialogue on PT by adding the perspectives of sport psychologists and athletes to Stoker et al.’s (2016) study of coaches.

5.4.2 Participants

Participants were eight sport psychologists (four male, four female) and eight international-level athletes (three male, five female). They were purposefully sampled to ensure that they had conducted or participated in PT. Two factors influenced the sample size (eight athletes, eight sport psychologists). First, the sample was subject to pragmatic concerns (i.e., time and resources), as is common in most research (Braun & Clarke, 2019b). Second, after preliminary analysis, the researchers determined that the data collected provided enough insight to construct deep and nuanced themes. Although data saturation is a common benchmark for sample size in qualitative research, Braun and Clarke (2019) have questioned the possibility for saturation in thematic analysis because “there is always the potential for new understandings or insights.” Data collection and analysis was instead aimed at constructing themes that could be useful to practitioners and coaches.

For psychologists to be included, they needed to have experience conducting PT with international-level athletes or junior/podium athletes preparing for future international competitions. They also needed to be chartered as a sport psychologist by the British Psychological Society and registered with the Health & Care Professions Council, the regulatory professional body for practitioners in the UK. The psychologists had conducted their PT in various individual and team sports. Ages ranged from 31 to 40 years ($M = 34.8$ years; $SD = 3.8$). Experience as a sport psychologist ranged from six to 17 years ($M = 9.3$ years; $SD = 3.8$).

For athletes to be included, they needed to have: a) trained under pressure that sport psychologists and/or coaches had intentionally created, and b) competed at the international-level. Each athlete had competed in major international competition, including Olympics, World Championships, or Paralympics. One athlete had retired from sport two years before data collection, and the rest were still active. They competed in various para and able-bodied sports including table tennis, boxing, shooting, basketball, trampoline, archery, gymnastics, and taekwondo. Ages ranged from 19 to 47 ($M = 28.5$ years; $SD = 8.7$). Experience in their sport ranged from seven to 20 years ($M = 11.5$ years; $SD = 4.1$).

The sample's variation in sports and roles (sport psychologist or athlete) offered advantages for achieving the study's purposes. When variation is maximized, themes can be especially notable because they represent common patterns found across a diverse sample (Patton, 2015). The differences in participants' specific examples of PT encouraged researchers to analyse data beyond descriptive themes in favour of latent or implicit themes that would better represent underlying properties and mechanisms of PT (Braun & Clarke, 2021). The sampling of both athletes and sport psychologists could provide balanced data with perspectives of two of the key stakeholders for PT. Psychologists were anticipated to have observations of athletes' responses to PT insight and have insight into developing pressure manipulations. Meanwhile, athletes are the ones who participate in PT, so they may have had experiences that are not visible to psychologists.

5.4.3 Procedure

The research was approved by a university ethics committee. Data was collected jointly for studies 2 and 3 in the same interviews with the same participants. The researchers identified eight sport psychologists known to have conducted PT. Although not all used the term "pressure training," all had intentionally increased pressure on athletes during training to improve the athletes' performance in competition. Athletes were identified through the researchers' contacts or through snowball sampling by asking the sport psychologists to

recommend athletes who had participated in PT. A request for an interview was sent to each participant via e-mail or text message. Each sport psychologists and athlete agreed to participate. Informed consent was obtained, and each individual participated in a one-on-one semi-structured interview with the first author via Skype or Zoom.

An interview guide was developed for sport psychologists, and another one was developed for athletes. After the first author developed an initial draft of each guide, the co-authors reviewed it and provided feedback on its length and content of questions. Multiple drafts of each guide were created before they were finalised. The final guide for psychologists consisted of two sections (See [Appendix A](#) for full versions). The first asked the psychologists about their intentional creation of pressure during PT (e.g., “What methods have you used to intentionally increase pressure during training?”). These questions focused on the demands and consequences used to create pressure and their properties that increased pressure. The second section focused on the role of PT in preparing athletes for competition (e.g., “How has pressure training impacted the way athletes perform in competition?”).

The athlete interview guide asked about athletes’ first-hand experience of participating in PT. The guide consisted of two sections that resembled the interview guide for psychologists. The first section asked athletes to describe their PT sessions, such as methods used to create pressure. The next section focused on role of PT in preparing for competition (e.g., “How has PT helped you cope with pressure, if at all?”). Questions were open-ended to provide participants with flexibility to discuss the ideas that they felt were most relevant and to encourage participants to provide in-depth answers (Smith & Caddick, 2012). The semi-structured nature of interviews allowed the researcher to ask follow-up questions for the participants to elaborate on answers. An example was, “What is it about [these pressure manipulations] that increases pressure on athletes?” Interviews lasted 35-55 minutes. They were recorded and then transcribed verbatim by the first author. Names of participants were replaced with ID numbers, such as “A1” and “SP1”.

5.4.4 Analysis

Reflexive thematic analysis of interview transcripts was conducted according to Braun and Clarke's (2012) guidelines. This method of analysis systematically identifies patterns across a data set, which aligns with the study's aim to find patterns among the sample's varied experiences of PT. Compared to more complex methods (e.g., grounded theory), thematic analysis better aligned with pragmatism because results can be accessible to wider audiences, such as practitioners and coaches (Braun & Clarke, 2012). The first author conducted the initial analysis by first reading and re-reading each transcript to gain familiarity with the data. Next, he coded the transcripts. Segments of text that related to the research purpose were assigned codes that described the segments' meanings. Some codes were semantic (i.e., described what participants said) and helped identify what participants did in PT (e.g., "make athletes perform on demand"; Byrne, 2022). Other codes were latent (i.e., interpreted meaning or underlying ideas of what participants said), and these codes helped understand how and why participants made choices or had a certain experience.

The third phase of analysis involved reviewing the codes to find similarities, and themes were then constructed to reflect patterns in the data. Next, these themes were reviewed to assess their quality. To ensure themes were supported by the data, they were organised on a Word document with their associated codes and text segments. Construction of themes depended more on their contribution to answering the research questions than their number of codes or text segments (Byrne, 2022). Related themes were collapsed into one, and themes that did not answer the research question were discarded. Although each analytical step served a distinct purpose, analysis was not a linear process (Byrne, 2022). Instead, coding and theming were frequently repeated and refined throughout analysis.

Thematic analysis was also a reflexive process. Constructing themes involved frequently reflecting on assumptions and aims of the research when making analytical decisions (Braun & Clarke, 2019; Trainor & Bundon, 2021). In a reflexive journal (Culver et

al., 2012), the researcher wrote memos after conducting and coding interviews to record questions and observations about the data. In a memo after initially coding the first two interviews, one example of a note was: “Value of discussing demands and consequences? Repetitive of Stoker et al. (2016) study on coaches?” The research team discussed this question of whether the initial analysis merely rehashed previous findings, and a subsequent memo recorded the decision to “either extend or find alternatives to Stoker et al. framework.” This decision led to an effort to generate themes that described “a core, shared meaning” between data (e.g., “consequences with ‘extended reach’”) rather than mere categories (e.g., “consequences”; Braun & Clarke, 2016, p. 740). Categories, or general dimensions, did help to organise themes, but it was the themes themselves that met the study’s purposes by answering how consequences and demands created pressure or helped performance.

To enhance trustworthiness of the analysis, the second and third authors also reviewed the initial analysis as “critical friends” (Smith & McGannon, 2018). They read and analysed one of the transcripts to share their approach to coding and theming, and they also reviewed the themes presented by the first author. Researchers play an active role in constructing themes (Braun & Clarke, 2019), and the different perspectives from critical friends helped the first author see patterns and alternative interpretations of data. The first author and critical friends met several times and produced multiple iterations of analysis. The intent was not to reach total agreement but to enhance the defensibility of findings and their relevance to the research purpose (Smith & McGannon, 2018). For example, an initial theme described the “permanence” of consequences, but critical friends’ questioning of this language led to the final theme of “extending the reach of consequences” that better communicated the theme’s meaning.

5.5 Findings

Thematic analysis generated two general dimensions: a) properties of effective pressure manipulations, and 2) benefits for athletes’ performance. Table 5.1 displays each

dimension's three themes. These themes were supported by data from both athletes and psychologists. Raw data quotes are presented below to clarify the meaning of themes and allow readers to interpret data independently. The data that support the findings of this study are available upon request from the corresponding author.

5.5.1 Properties of Effective Pressure Manipulations

Although participants described different rewards, forfeits, demands or other sources of pressure, many of these pressure manipulations shared common properties. These properties are described by three themes: a) extending the reach of consequences, b) simulating psychological demands of competition, and c) approximating, but not replicating, intensity of competition pressure.

Table 5.1
General Dimensions and Themes from Thematic Analysis of Interviews

General dimension	Theme	Description
Properties of effective pressure manipulations	Extending the reach of consequences	Consequences that affected more individuals than the athlete practicing under pressure or consequences that prolonged a sense of judgment beyond a single practice or drill.
	Simulating psychological demands of competition	Demands were effective when they simulated <i>psychological</i> challenges of high-pressure situations.
	Approximating, but not replicating, intensity of competition pressure	Athletes still benefited from PT even though pressure was lower than pressure in competition.
Benefits for athletes' performance	Learn and practice coping skills	PT was an opportunity to develop coping skills for pressure in sport-specific settings.
	"Change the relationship" with pressure	Athletes learned to view pressure as a condition that they could accept and cope with.
	Increase quality of training	Athletes were more focused and gave more effort when they felt pressure to perform in training.

5.5.1.1 Extending the Reach of Consequences

Data from a majority of psychologists and half of the athletes supported this theme that described one way of creating the increased sense of importance that defines pressure. Sport psychologists did not necessarily rely on the intensity of consequences (i.e., severity of forfeits or value of rewards). Instead, pressure could be increased if consequences impacted athletes beyond a brief moment in time or affected more people than the individual who was practicing under pressure at that moment. For example, performance could be monitored. SP4 described tracking each soccer player's success rate on penalty kicks throughout a training camp. Even if no other reward or forfeit was attached to it, "The sheer knowing and visibility of it is...quite a stressor and quite a pressure for some." This monitoring could remind athletes that performance in a given drill could continue to impact coaches' judgment of them over time, not just in that moment. Athletes might repeat a skill frequently over the course of a training session, but they could feel more pressure on each repetition if monitoring allowed coaches to remember or account for each athlete's performance even after a drill or session finished.

Sport psychologists also made monitoring visible. Leaderboards displayed each athlete's scores in drills and enabled comparisons with teammates, which increased competitiveness during training. Use of social media made performance visible to an even wider audience. When athletes did not perform up to standard in training, their consequence was sometimes to make a social media post that explained their performance. For A6, this forfeit was "the most pressureful." She explained, "I'm not one for social media, so...the mere idea of it, like, freaks me out. Like, having to post to the world that I failed in my target is just, like, the worst thing." Posts before practice could increase commitment to a training exercise in the first place:

I've asked athletes, if they would put out a commitment to their Facebook followers or Twitter followers...to say, "Okay, on this training session, I'm now going to do this." And we might video [training] or they'll put an announcement after, and they would have committed to make a contribution to something if they don't make the task. So I think there's some really big opportunities through social media and that social presence that combine a bit of social judgment and actually athletes committing to what they're going to do, which is quite powerful. –SP6

If monitoring and visibility extended importance of performance beyond one moment in time, then consequences for teammates extended the importance beyond one individual. One athlete might be asked to perform, but his or her performance could result in a forfeit for teammates. SP7 attributed a corresponding increase in pressure to athletes' fear of letting their team down. While the nature of a given reward or punishment itself may not create pressure for the athlete, the idea of causing others to experience that consequence could increase the pressure. SP2 said:

There's a lot of athletes in diving who love competing, so doing a "Right, we're doing a competition. Winner gets a coffee," they'd be like "Right, this is the best thing ever." And they won't actually have a pressure response that will hurt their performance. They'll just fly. Whereas...if you change the scenario of actually, "Yeah, there's a forfeit here for your friend," that might trigger them.

In short, extending the reach of consequences made judgment or forfeits more meaningful. A consequence on its own could be temporarily unpleasant (e.g., tiring or mildly embarrassing), but consequences with extended reach often kept attention on the athlete's performance. When a forfeit for teammates was at stake, an athlete had a chance to show teammates that they could count on him or her. Similarly, athletes might regularly face potential judgment from coaches and teammates, but monitoring performance and making it visible amplified perceptions of that judgment. While athletes could "get through" a forfeit, extending the reach of consequences meant the consequences had implications directly related to the sport (e.g., selection), rather than just temporary unpleasantness.

As with any pressure manipulation, these consequences represent only one component of PT. Practitioners and coaches should also balance the challenge of PT with an environment that encourages athletes to learn from that challenge (Fletcher & Sarkar, 2016). Fletcher and

Sarkar (2016) have also emphasized the gradual exposure to pressure, so the specific consequences that participants discussed (e.g., posting on social media) are not necessarily the first or only consequences that practitioners should use. In line with Fletcher and Arnold's (2021) approach to PT, psychologists stressed the importance of collaborating with athletes to agree on any consequences, such as posting on social media, before expecting athletes to participate in PT.

5.5.1.2 Simulating Psychological Demands of Competition

Athletes and psychologists discussed demands that simulated the psychological conditions or challenges that athletes would face in competition. The physical surroundings and flow of a practice could be structured to resemble competition settings. SP5 arranged table tennis courts as “match courts” that resembled the set-up that players would see in competition. SP1 simulated the lead-up to a fight when preparing a boxer for a pressurised spar in training, including reminding the boxer about the spar early in the day, going over tactics, and having the boxer warm up properly. Other techniques included bringing in referees or judges to officiate during PT. Simulating competition settings could familiarize athletes with competition settings and seemed to signal the importance of the training session. However, these settings were not necessarily enough on their own to constitute PT. In diving, SP2 contrasted PT with “run-throughs,” which simulated competition procedures (e.g., announcing the name of the diver) but without pressure manipulations.

Half of the psychologists and half of the athletes discussed how demands that directly targeted psychological aspects of competition complemented simulated performance settings. Competitiveness in several examples was increased by creating competition between teammates, simulating specific types of opponents (e.g., an aggressive and vocal player), and simulating high-pressure tactical situations. Increasing competitiveness within training could magnify both the level of challenge and athletes' motivation to win or perform their best. This competitiveness could be missing from some non-PT sessions, as A2 acknowledged:

“Normally in sparring, it can be quite relaxed and [I] pretty much do what I want, because...I’m not taking it very serious.” Competing against teammates could also increase the perceived importance of a consequence. A small reward could be even more desirable if teammates were also competing for it. SP6 said, “You know, even if it’s just for a pound, that becomes the most important pound in the world if their mate has put it in the mix.”

Competitiveness and consequences seemed to interact to increase pressure: Neither the chance to win money nor the presence of teammates may have increased pressure as much as competing with those teammates for that money.

Sport psychologists also manipulated demands to add uncertainty, unfairness, or other uncontrollable factors that the athletes could not avoid or stop. SP4 observed performance decline rapidly for female football players when teams for small-sided games were made unfair. When players were taken out of the game to disadvantage their team, “then there is just a desperation and then you get sloppy passing, you get sloppy decision making, you get frustration, you get irritability.” Another way to accentuate uncontrollable factors was to manipulate the score of a match during training. SP5 conducted a table tennis drill in which players would draw a card to see how many points they needed to win, without knowing how many points their opponents needed. Because an opponent might be close to winning, this uncertainty resembled the end of a match with a close score in which “all of a sudden this perception of how important that point is goes massively up.”

Another uncontrollable situation was when athletes had to perform on demand without advanced notice or multiple chances. Instead of letting BMX freestylers try and fail multiple times, SP8 would sometimes request that they “deliver that [trick] now and practice that ability to execute it at a specific point in time.” Performing on demand resembled competition because athletes often do not have multiple chances to perform their best when competing. SP8 explained:

When someone goes, “I want you to do that now, like warm up and ten minutes time we’re going to ask you to do that trick on request,” that then brings in an element of pressure doesn’t it? Because all of a sudden...you’ve been asked to do something and you’re going to get judged on—pass or fail—whether you do it.

Whether they were uncontrollable factors, performing on demand, or competitiveness, the demands did not just make a task more difficult in any way possible. They targeted situations and the ensuing psychological challenges that athletes would face in competition. If consequences seemed to increase the importance of the outcome of a drill, then demands seemed to increase the importance of executing physical skills or applying mental skills to achieve that outcome. For example, proper technique was more important if athletes had only one chance to complete a task, or the ability to focus was especially needed if they faced more uncontrollable factors than in a normal practice. Consequences and these demands were not mutually exclusive. Sport psychologists often combined pressure manipulations, requiring athletes to cope with demands during a drill while facing the threat of a consequence if they did not win or meet performance standards in the drill.

5.5.1.3 Approximating, but Not Replicating, Intensity of Competition Pressure

Intensity referred to the amount of pressure that PT created during a given session, and some psychologists and athletes reported that the pressure in PT did not match the level of pressure of competition. True replication of competition often was not possible. A8 said, “You can’t create it when you’ve got... 10,000 people watching and if you lose this fight, you don’t make it to the European Championships.” But true replication was not necessary. A8 added that PT “will give you, you know, the best possible chance of practicing your psychology strategy.” SP4 further explained how athletes can still benefit:

It’s [competition’s] always going to be slightly unique, but what you can do is understand, learn about, really deeply understand where the individual goes to under stress, what stress and pressure looks like for that individual, and then [do] capacity building to manage that response.

As this observation from SP4 suggested, athletes, psychologists, and/or coaches played an active role in learning from experiences during PT. Perfectly replicating

competition pressure was less critical than having athletes practice the thinking and behaviours that would help them cope with that pressure. Approximation was also usually sufficient because building up to performance under pressure was a process. Psychologists were not attempting to inoculate athletes to the highest pressures possible all at once. The next section details how this process improved athletes' performance.

5.5.2 Benefits for Athletes' Performance

PT did not necessarily lower the amount of pressure that athletes feel in competition. A8 explained, "You're not going to step onto a competition area and then be like, 'Oh bloody hell, I've done three pressure situations last month, and now I just feel normal and I'm not even worried.'" Three themes did explain how PT helps athletes improve performance: a) learn and practice coping skills, b) "change the relationship" with pressure, and c) increase quality of training.

5.5.2.1 Learn and Practice Coping Skills

Some psychologists and all of the athletes reported that PT helped athletes learn coping skills to manage anxiety, attention, and self-talk while under pressure. A3 described the routine that she practiced when distracted during PT: "Put the gun back down, [deep breath], bring it back to self." Developing this routine took time, and PT allowed her to deliberately add or remove elements, such as the deep breath, to see how she would respond and determine if they were needed to help her cope. A5 discussed how practice coping with pressure in practice translated to coping in competition:

The closer it comes to the competition or the practice competition, these thoughts will be more active and happen more frequently. Or be stronger and more intense but also, like, it means I'll get more practice in to be able to deal with it quicker. And so that almost if I'm better at understanding it and navigating those thoughts quicker, it means I don't get as big of a physiological response, so I won't have to lower my nerves, or my anxiety as, as much.

Practicing these coping skills led to observable changes in behaviour in competition.

SP2 described how coaches could notice the difference:

And the coaches, often they'll focus in on those main moments. "Ah they [the divers] were much better...they kept focus 'til the end of the competition" or, you know, "Last time they were in this situation, I felt like I couldn't get through to them" or "Last time they were in this situation, they didn't listen to what I had to say. I could see that they weren't concentrating. Whereas this time, they made eye contact." So you often have conversations around those crucial moments and the differences that the athletes are doing, that the coaches are seeing, as the evidence of what they've been practicing in the meantime.

Although sport psychologists can introduce coping skills in workshops or other settings, PT had several advantages for learning and developing these skills. First, PT increased athletes' self-awareness of their responses to pressure. It highlighted tendencies under pressure that were less evident when training was not pressurised. A8 explained that the desire to win a match in PT would tempt him to watch the scoreboard, and this distraction would allow his opponent to score. Coaches and psychologists could point out such tendencies during debriefs, but PT also helped athletes notice their responses in the moment during a drill or practice competition. For A1, this self-awareness allowed him to adjust appropriately: "I can sort of go, 'Okay, I know I'm nervous,' so I can take a step back, take a deep breath now and go play this way, and I'll do this tactic compared to this tactic."

Another advantage of PT was that the pressure prompted athletes to practice their coping strategies while training their sport. Merely talking about self-talk or emotion regulation was not necessarily sufficient for athletes to apply strategies under pressure in competition. Practicing these strategies under pressure allowed athletes to develop them into reliable skills that they knew how and when to use. Without pressure in training, competition might be the only time athletes would find themselves having to learn how to cope:

I know how to manage and deal with it [pressure] a lot better now that I've had more exposure to it and sort of—not on a daily basis—but I feel it weekly or maybe even monthly sometimes, but a lot more often than I used to. Which is a lot better. I think before we did start the pressure training, the only time I ever really felt that much pressure was in competition. -A6

This focus on learning to cope with pressure distinguished PT from other training that was intended to develop tactics or physical skills. A5 summed up PT as training her "skill at

competing.” She and other participants recognized that more and more physical repetitions were not sufficient to prepare for competition. Practicing specific behaviours or mental skills increased their ability to perform physical skills in competition consistently.

5.5.2.2 “Change the Relationship” with Pressure

Data from all athletes and some psychologists supported the idea that increasing exposure to pressure could “change the relationship athletes have with that pressure,” as SP2 described it. PT did not just train a behavioural response to pressure (e.g., coping strategies). Athletes changed how they view and interpret pressure. SP2 explained that athletes reached an understanding “between not necessarily ‘good’ and ‘bad’ pressure, but that feeling you get when you think you’re under pressure but actually just not assuming that’s going to hurt your performance.” A1 experienced this change: “I used to treat it like nerves is a bad thing, and the pressure training taught me to feel the pressure’s natural and there’s a way I can handle it by doing X, Y, and Z rather than sort of going into my shell and sort of playing defensive.”

Developing this kind of “relationship” with pressure took time. Some athletes admitted to being sceptical of PT initially, either because they doubted that PT would help or because they did not want to feel pressure while training. But the exposure to pressure shifted how athletes viewed pressure and their ability to perform under it. Rather than sport psychologists simply telling athletes to look at pressure differently, PT provided athletes with evidence that they could cope with the pressure. A7 said, “I think everyone kind of dreads it at the beginning, but then I think you, you do get better with the pressure. It does get you used to the pressure, and you feel more comfortable in that atmosphere.”

PT did not completely erase discomfort. A5 admitted, “I think I would always prefer to not feel the pressure and just go out there and, like, just try and do my best and not worry about the outcomes.” But she also understood that pressure is “something I have to deal with and accept it and kind of veer my way through it.” Athletes acclimated to the feeling of being under pressure and performing under it. In particular, exposing athletes to a specific source of

pressure during PT gave them confidence when they encountered that same source in competition. A1 gave an example of dealing with pressure from adversity:

I remember coming into one tournament...when I won a match from 9-7 down, I'd come back and I'd be like, "Did that last Friday about 10 times, didn't we?"...It's just like, if you're almost in that, in that split second, be like, "I've been in this situation so many times, I know I can do well in it. I'm so used to winning in from 9-7 down. This situation is not different."

This changed relationship with pressure was evident when some athletes would initiate PT. SP6 said, "I think when I've seen it done best and when I felt it's had its most impact is when I've actually had athletes say to me, 'Cool, we could really do this or...what about if we tried this?'" Athletes seemed to realize that they could not avoid pressure or the discomfort associated with it, so they would prefer to have sufficient time to practice adjusting to it. A5 said, "And I would prefer to be uncomfortable and do more [PT] because, because of it benefitting me in such a way that I'm either going to learn from it or I'm going to gain confidence from it."

5.5.2.3 Increase Quality of Training

Although the main purpose of PT was to prepare athletes for pressure in competition, most athletes and one psychologist said that the added pressure also increased the quality of training itself. The athletes had reached elite levels in their sports but acknowledged that they still did not always have the same effort and energy in every training session. Repeatedly training each day could become monotonous, and a session might become too relaxed when it did not represent competition. Some drills were inherently less competitive than the simulated competition often used in PT. For example, combat-sport athletes sometimes took sparring less seriously when they would not keep score. They admitted to reducing effort when they became tired or did not face consequences, which contrasted spars or "test matches" that had consequences for either losing or failing to meet standards. Being around familiar teammates also sometimes created a social atmosphere that distracted athletes from training. Added pressure, however, focused athletes on performing their best:

There's an increasing level of application and seriousness that is more aligned to what you might get in a competition as opposed to a training session where things might slip a little bit. Processes delivered much more effectively and in line with how it would be to be delivered effectively in competition. So I think increased levels of attention are what I see. So there's definitely a change, or I sense much more committed behaviour. –SP6

Athletes also reported that they were more motivated to perform well and increase their effort during PT. Because PT often involved simulating competitions (as opposed to drills), it allowed athletes to gauge their readiness for competition. A5 said, "Leading up to the Olympics last time, I felt really prepared and it was almost like 'Let's see how I can do at this practice competition because it gives me a real good indicator of how I might do it at the competition.'" After gaining experience with these practice competitions, she felt they could boost her confidence if she performed well in them. It is true that coaches could have athletes practice full routines or matches without added pressure, but adding consequences further increased athletes' motivation to perform well in that instance. For A7, PT included an audience of her family and friends, which she said "gives you that more motive to do it better" because it was her "chance to kind of show them what I'm doing."

Athletes did not advocate for pressurizing all training. They noted the importance of balancing PT with physical recovery and chances to learn and develop skills. Nevertheless, the increased focus and motivation during PT did also contribute to developing physical and technical skills:

I think what it did help me with though is the actual...the actual like physical bit in boxing. Because sometimes I can go into a spar and just do what I like, but this time around I had to practice more on the important things that are going to help me when I fight, so, therefore, like, say for example, keeping my hands up, moving my feet when I need to—sometimes I wouldn't move my feet—so if I don't move my feet on a spar, it's going to be...there's going to be less chance I do it when I fight...But when I had the pressure on me—"You need to move feet. You need to defend."—when I got into a fight, I was better at it. –A2

5.6 Discussion

Through interviews with athletes and sport psychologists, this study examined creating pressure in training and that pressure's role in enhancing performance. Findings advanced Stoker et al.'s (2016) framework for creating pressure by identifying common properties that might distinguish some effective manipulations from the multitude of demands and consequences available to practitioners. This study also examined how PT helps athletes and found that they developed coping skills and learned to challenge their assumptions about pressure. Guided by pragmatism (Giacobbi et al., 2005), thematic analysis led to themes that could inform how practitioners and coaches design and prepare for PT. Themes were constructed in a reflexive process that involved multiple iterations of analysis as the researcher searched for the "core, shared meaning" between data (Braun & Clarke, 2016, p. 740). Iterations were informed by perspectives offered by supervisors who acted as "critical friends," and writing memos in a reflexive journal allowed the researcher to organise and reflect on interpretations of data and alternative perspectives during each iteration.

Many effective demands described by the participants simulated psychological challenges of competition. Coaches might already change the task (e.g., rules of a drill), environment (e.g., noise), or performer (e.g., fatigue), but these physical or tactical demands do not increase pressure unless combined with consequences (Stoker et al., 2016, 2017). Psychologists in the current study more directly targeted psychological demands by fostering competitiveness, adding uncontrollable factors, or requiring athletes to perform on demand. Baumeister (1984) defined pressure as an increased importance to perform well, and psychological demands increased this importance of a task without changing the task itself. For instance, performing a skill on demand could magnify a single repetition because the athlete would not have multiple chances to try again, refocus, or learn from a first attempt as they would in a repetitive drill. The emphasis on psychological demands distinguishes PT from other training that simulates competition, such as a constraints-led approach. Whereas a

constraints-led approach trains technical skills and relies on manipulating environments and tasks (Renshaw et al., 2019), PT seeks to train abilities to perform such skills under pressure.

When implementing a consequence, psychologists often extended its reach beyond one individual or moment in time. One consequence with extended reach was athletes having to post about training on social media. Posts exposed one's performance to a wider audience for judgment and for a longer length of time than just the training session. Similar to psychological demands, extended reach seemed to raise the importance of performing well in training. When training with a forfeit at stake for teammates, athletes faced not just the forfeit's unpleasantness but also the possibility of letting down teammates. When results of drills were monitored and displayed publicly, athletes could not as easily downplay or forget about poor results because those results remained visible to coaches and teammates.

Many psychological demands and consequences with extended reach resembled the pressures of competition. Stoker et al. (2016) considered whether benefits of PT transfer to competition better if sources of pressure are similar in PT and competition. Some forfeits, such as running sprints, may increase pressure, but they are unrelated to consequences of competition. In contrast, athletes may realistically feel pressure to impress coaches or avoid letting down teammates such as when facing certain consequences with extended reach. Psychologists also structured psychological demands based on scenarios that athletes are likely to face in competition. When describing benefits of PT, A5 indicated why representative pressure might help those benefits transfer to competition. PT gave her practice coping with negative thoughts that would also arise in competition, so she was able to train the response that she needed to cope with those specific thoughts.

Although PT could simulate the sources of pressure encountered in competition, it did not have to replicate the intensity of competition's pressure. Oudejans and Pijpers (2010) found that training with mild anxiety can improve performance under higher levels of anxiety, and participants in the current study also described PT that only approximated

competition's pressure. Athletes practiced how they want to think and behave under pressure, and this effort may contribute to PT's effectiveness as much as the amount of pressure. In fact, the purpose of developing coping skills supports that pressure should be increased gradually, rather than maximised immediately, to promote learning. Gradual increases parallel exposure, in which clients may first imagine a stressor before confronting it in real life. Driskell et al. (2014) modelled PT or "stress exposure training" on stress inoculation training. They advocated progressing in phases that allow athletes to acquire physical and mental skills and then practice them under "realistic stressors" (p. 35). Until athletes can perform optimally under moderate pressure, practitioners need not worry about the difficulty of maximising pressure. Strategic approaches to pressurising training contrast occasional punishments or incentives that practitioners or coaches might implement without a clear intent to improve coping skills.

Developing coping skills also supports processing efficiency theory as an explanation of PT's effect on performance. Psychologists and athletes in this study observed a learning process that paralleled findings of recent interventions (Kegelaers et al., 2021; van Rens et al., 2021). First, PT increased athletes' self-awareness of the need for coping skills by highlighting sources of pressure and unproductive tendencies under pressure. Next, athletes practiced those coping skills under pressure in sport-specific settings and learned to quickly apply them when in competition. The current study demonstrated that this experience was consistent across several sports at international levels of competition. Although study 1 showed that more research is needed to determine optimal amounts of PT, the view of PT as a skill-building process suggests that athletes would need to train under pressure long enough to learn, practice, and refine how they will cope with pressure.

PT did not necessarily change the amount of pressure that athletes felt in competition, but it did change their "relationship" with pressure. As the athletes described, critical situations in competition were unlikely to feel any less important after facing pressure in

training. PT did, however, show athletes that pressure would not necessarily hurt performance. Oudejans and Pijpers (2009) similarly found that PT-trained athletes outperformed a control group under high-anxiety despite still feeling as anxious as they did before the intervention. PT seems to provide athletes with evidence that they have already coped with challenging tactical situations and pressure-induced anxiety, and such mastery experiences can be a primary source of self-efficacy (Bandura, 1977). If increased self-efficacy does explain PT's effects on performance, it further supports introducing PT both early and regularly enough so that athletes experience mastery under pressure before competition.

5.6.1 Applied Implications

To create pressure in training, practitioners should increase importance of performing well in drills. Importance should not be confused with a drill's difficulty. As Stoker et al. (2017, 2019) demonstrated, demands that increase difficulty often do not increase pressure. Athletes may perform worse but not feel pressure if they do not have more reason than usual to maintain performance. Coaches and practitioners also should not assume that a consequence will create pressure just because it is unpleasant to athletes. A mild forfeit can be unpleasant but only temporarily. In contrast, consequences with extended reach amplify an impact that might already matter to athletes (e.g., judgment from coaches). In the preparatory phase of PT, Fletcher and Arnold (2021) suggest that coaches should learn about pressure and its effects on performance. This education should include distinguishing between increasing importance to perform and other aspects of stressors. Understanding this distinction can help coaches identify the most relevant aspects of the competitive environment that will train athletes to cope with pressure, not just acclimate to other aspects of that environment (e.g., crowd noise).

Practitioners should collaborate with coaches and athletes to design PT (Fletcher & Arnold, 2021), and underlying properties found in this study can guide the creation of

pressure. Fletcher and Arnold (2021) suggest that pressure can be created by manipulating stressors' "relevance, importance, and consequences" or "type, property, or dimension" (p. 276). The current study's findings provide insight into how to manipulate those aspects so that pressure manipulations are likely to increase pressure. Collaboration involves practitioners, coaches, and athletes discussing possible manipulations, and considering underlying properties could lead to relevant pressure manipulations. Whereas the question "what creates pressure for you?" might be too broad and abstract for athletes, properties could provide direction during discussions. For example, practitioners should steer discussions about adding demands towards psychological ones.

Regardless of the pressure manipulations that they use, coaches and practitioners do not have to take an "all-or-nothing" approach to creating pressure. That is, PT seems to prepare athletes even if the pressure only approximates the levels of pressure in competition. The level of pressure should be increased as athletes develop their coping skills (Fletcher & Arnold, 2021). Thus, practitioners and coaches should continue to manipulate conditions to increase pressure, but they should also recognise that lower levels of pressure can still be beneficial and even desirable when athletes are in early stages of developing coping skills. For a complex task, training under a mix of low and high anxiety has improved performance better than training under only high anxiety (Lawrence et al., 2014). Introducing anxiety too early in the learning process could disrupt the process and increase time needed to learn the physical skills. Therefore, coaches do not need to wait to conduct PT until they can perfectly replicate competition and may even enhance PT by more gradually increasing pressure.

When introducing PT to athletes, explaining its benefits could help build culture that balances the challenge of pressure with support from coaches and staff members (Fletcher & Sarkar, 2016). PT should take place within a culture that encourages athletes to respond positively to the challenge of pressure, and practitioners can explain that the intervention is an opportunity to practice coping skills that are essential for performance. Doing so can

clarify PT's intent to help prepare athletes and allay fears that added pressure is meant to bully athletes. Whereas improving outcomes under pressure can take time, understanding how PT works can remind athletes that PT is part of a learning process.

5.6.2 Limitations and Future Directions

In light of recent advances in qualitative methods, future studies can enhance data analysis and trustworthiness of findings while preserving themes' depth of meaning. The current study followed Braun and Clarke's (2012) guidelines for thematic analysis, so it relied on the primary analyst's reflexivity to generate deep and nuanced themes. As "critical friends" (Smith & McGannon, 2018), co-authors then reviewed coding and initial themes to ensure that different interpretations of data were considered. This approach prioritised nuance over consensus, but Wiltshire and Ronkainen (2021) have argued that nuance does not have to come at the expense of consensus. They have advocated consensus-building procedures that can increase validity of findings and still yield nuanced themes (Ronkainen & Wiltshire, 2021). Examples include member checking and collaboration of multiple researchers to generate themes. When designing future studies, researchers should consider the wide range of qualitative approaches, such as Wiltshire and Ronkainen's (2021) realist approach, and guidelines for methodological integrity (e.g., Levitt et al., 2017).

There are also limitations to the varied sample of psychologists and athletes from various sports. Varied sampling did allow patterns to be detected between diverse examples of PT, but a more homogenous sample could reveal even greater nuance or other themes that are more relevant to athletes from a specific sport or type of sport (e.g., closed or open-skilled). For instance, within the theme of "extending the reach of consequences," it would be interesting to examine if manipulating judgment creates more pressure in sports in which outcomes are determined by judges. Furthermore, because participants were recruited via snowball sampling and the researchers' contacts, another limitation is that the sample generally had a positive view of PT and discussed effective PT. Future research could be

equally useful if it explores ineffective pressure manipulations or perspectives of individuals who have not found PT effective.

Although a strength of this study is that themes are based on examples of PT that have been feasible and accepted in applied practice, there is insufficient empirical evidence to advocate for using any specific pressure manipulation described by the participants. Intervention studies are needed to empirically test how well specific consequences with extended reach and psychological demands create pressure. Manipulation checks can compare these manipulations to non-pressurised training or other demands and consequences, and studies can also continue to examine properties of manipulations in more detail. For example, the consequences described in the current study tended to involve the potential for athletes to “lose” (e.g., forfeits, negative judgment) rather than win something (e.g., a reward), so there may be even more nuances within the properties described in this study. Increasing pressure successfully does not guarantee the benefits of PT. Similar to other sport psychology interventions, PT’s effectiveness may depend on the practitioner’s delivery of the intervention (cf., Henriksen et al., 2019). Delivery could involve how the practitioner explains PT, selects pressure manipulations, and works with coaches to implement it in training sessions. More research is needed to identify best practices for delivering PT such that athletes are receptive to PT and learn from it.

5.6.3 Conclusion

This study explored the creation of pressure in training and PT’s mechanisms for improving performance. Because themes reflected participants’ experiences in actual training and competition, they demonstrate how applied practice can inform understanding of how an intervention works. Although they do not necessarily represent the only common properties of effective pressure manipulations, the findings illustrate how practitioners can look beyond the severity of consequences or difficulty of a task when considering how to create pressure. Findings on performance benefits suggested that PT enhances performance by providing

athletes a chance to practice coping skills and to realize that pressure does not have to hurt performance. Practitioners can explain these benefits to help athletes and coaches understand the value and purpose of PT.

Chapter 6: Study 3

Effective Delivery of Pressure Training

6.1 Abstract

Pressure training (PT) strategically increases pressure in training to prepare athletes to perform under pressure. Although research has studied how to create pressure during training, PT's effectiveness may depend on more than creating pressure. A practitioner's delivery of sport psychology interventions can moderate their effectiveness, so the current study explored perspectives of sport psychologists and athletes on the characteristics of effective PT delivery in applied settings. As part of the same semi-structured interviews conducted for study 2, eight international-level athletes and eight sport psychologists described their experiences participating in or conducting PT, respectively. Thematic analysis produced four themes relating to effective delivery: a) Collaboration with athletes and coaches: "with," not "to", b) Integration into training, c) Upfront transparency, and d) Promoting learning before and after PT. The themes provide guidance for planning, conducting, and following up on PT sessions in applied settings. The best practices discussed could increase athletes' receptiveness to PT.

6.2 Preamble

This chapter reports a published study (Low, Butt, et al., 2022). The chapter contains three additions to the publication. The first is clarification that data was collected from the same participants during the same interviews as study 2 (p. 104). The second is an added discussion of the role of the researcher's reflexivity in data analysis (p. 113-114). In the chapter's conclusion, the last addition is a summary of the thesis' findings that set up the next study (p. 121).

6.3 Introduction

In sport psychology, practitioners have often urged athletes to focus on “the process” rather than outcomes. This advice is grounded in research on goal setting and goal achievement (Kingston & Hardy, 1997). Practitioners themselves would seem to benefit from focusing on their own process while trying to ultimately improve athletes' performance. In this thesis, an overarching theme has been how to conduct PT. While study 1 evidenced the benefit of pressure in training, study 2 explored how to create that pressure. Findings provided guidance for developing consequences and demands based on Stoker et al.'s (2016) framework. However, creating pressure is likely only part of the process of conducting PT. Pressure manipulations may be necessary but not sufficient for PT to improve performance because effectiveness may also depend on a practitioner or coach's delivery of the intervention.

Previous studies have illustrated the importance of delivery and relationships in sport psychology (e.g., Sharp et al., 2015). In Poczwardowski and Sherman's (2016) heuristic for sport psychology service delivery, delivery consists of many elements of science and “art” beyond the psychological tools or skills that a practitioner teaches. Practitioners have attributed success of interventions to elements such as strong working alliances and active engagement from athletes (Sharp et al., 2015; Tod et al., 2019). Other factors, including

involvement of coaches, can create an environment conducive to athletes' engagement and relationship with practitioners (Henriksen et al., 2019).

The link between effectiveness and delivery is well-established, but sport psychology intervention studies have often neglected to assess or account for delivery (Ivarsson & Andersen, 2016). One reason for this "practitioner-evacuated" research is a preference to control for variables so that only the intervention's content explains results, as in randomised control trials (Ivarsson & Andersen, 2016, p. 13). PT research has reflected this bias. Some studies took place in experimental settings with university students instead of athletes (e.g., Lewis & Linder, 1997), and other studies trained athletes but did not describe the researcher/practitioner's delivery or relationship with the athletes (e.g., Oudejans & Pijpers, 2009). One exception is Bell et al. (2013), who delivered PT with a transformational leadership style in which coaches expressed belief in players and connected PT to an inspirational vision for the team's future performance. However, no subsequent studies have further examined this or any other style of delivery.

Some elements of delivery (e.g., working alliance) may apply universally across sport psychology, but PT has unique challenges that warrant extra attention to its delivery. Because PT generally takes place during training sessions, practitioners must be comfortable working in an environment that may traditionally emphasise physical or tactical skills before psychology. Opportunities to deliver PT may depend on the receptiveness of coaches, who could view PT as infringing on their domain. Added pressure may also make training sessions less enjoyable and more threatening to athletes, so practitioners cannot assume that athletes will automatically recognise PT's value and want to participate. Although PT often creates threatening environments so that athletes learn to view them as a challenge (van Rens et al., 2021), athletes might instead mistake PT for bullying. Some coaches have described how planned disruptions damaged relationships with athletes and fellow staff members, including loss of trust (Kegelaers et al., 2020). A coach or practitioner's attention to delivery

therefore may need to be commensurate with an intervention's level of risk. This delivery could include conveying PT's intent to help, not hurt, athletes (Kegelaers et al., 2020).

Exploring delivery is especially pertinent now because of the recent increase in applied PT intervention studies. With the involvement of coaches, researchers have conducted PT in teams' training sessions for basketball (Kegelaers et al., 2021), cricket (van Rens et al., 2021), and football (Kent et al., 2021). Effective delivery enables accurate evaluation of interventions. If an intervention's effectiveness depends on delivery, then poor delivery could confound results and limit conclusions about the intervention itself. On the other hand, delivery that helps athletes accept and understand PT could increase chances that an intervention does improve performance.

To some extent, authors of interventions have already described aspects of their delivery. Van Rens et al. (2021) let players choose pressure manipulations because autonomy could increase motivation for the intervention. Leading up to PT, multiple researchers have conducted workshops to teach athletes skills for coping with pressure, such as cognitive restructuring (e.g., Kent et al., 2021). Although a workshop itself could be considered part of the intervention's content, providing this support may also develop the facilitative environment that Fletcher and Sarkar (2016) argue is essential when training qualities related to performance under pressure, such as resilience. By describing these aspects of delivery along with content of their intervention, researchers remind readers that translating PT to applied settings entails more than creating pressure.

More research can build on this increased transparency about delivery. There may be no single formula for PT, but there may be aspects of delivery that are especially important for PT. Fletcher and Sarkar (2016) did discuss the hands-on role that practitioners have before, during, and after PT to help ensure that it improves performance. For example, practitioners need to adjust levels of pressure and support according to athletes' responses to pressure, and language used to describe pressure can influence whether athletes view pressure

as a challenge or threat (Fletcher & Sarkar, 2016). Nevertheless, Fletcher and Sarkar (2016) acknowledged that writing about these ideas is easier than applying them and achieving positive results in applied practice. An intervention can be well-planned, but its implementation depends on an organisation's culture and politics, interpersonal dynamics, and key decision-makers' views on psychology (Fletcher & Sarkar, 2016). Examining PT in applied settings could suggest how practitioners navigate these environments and challenges.

In their study of how coaches create pressure in training, Stoker et al. (2016) showed that applied practice can guide theory and future applied practice. Similarly, practitioners could highlight specific challenges and best practices for delivering PT. Whereas intervention studies each describe a single intervention, practitioners may be able to reflect on extensive experience with PT. Their approaches to delivery may reflect lessons learned and strategies developed over time from delivering various PT interventions with different athletes. Their PT can also differ from interventions that are conducted as research. Practitioners have more flexibility when not restricted by research designs, and they may also face more challenges of applied settings when integrating PT into athletes' training over the course of a season rather than three or four weeks of recent interventions (e.g., Kegelaers et al., 2021; van Rens et al., 2021). Practitioners' insights could bridge the gap that Fletcher and Sarkar (2016) acknowledged exists between ideas and implementation.

Although practitioners are often the ones who deliver PT, athletes are the ones who can confirm best practices and identify obstacles that practitioners still need to address. Elite athletes in particular could have valuable insight on the aspects of delivery that improve outcomes and receptiveness to the intervention. PT may simultaneously be especially relevant to elite sport environments yet garner scepticism there. Elite sport values a "ruthless pursuit of performance" (McDougall et al., 2015, p. 270), and PT's purpose of enhancing performance under pressure supports that pursuit. However, practitioners may also encounter elite sport's resistance to change (Eubank et al., 2014). A first step toward reducing this

resistance could be to understand potential misconceptions about PT and how to address them. Effective consulting involves listening to and partnering with athletes (Sharp et al., 2015; Tod et al., 2019), so recommendations from research should also consider athletes' point of view.

Navigating barriers to receptiveness adds complexity to delivering an intervention, and qualitative methods can help to reveal and make sense of such complexities (Smith & Caddick, 2012). In their studies on consulting effectiveness in sport psychology, Henriksen et al. (2019) and Sharp et al. (2015) have also used qualitative methods. "Thick" descriptions allow a reader to reflect on participants' experiences and relate them to the reader's own experience. This "naturalistic generalizability" occurs when a study resonates with, provokes action in or stimulates curiosity among readers" (Smith & Caddick, 2012, p. 69).

Accordingly, the present study was conducted to prompt practitioners to consider delivery and make informed decisions about how they deliver PT. The study's purpose was to explore perspectives of sport psychologists and athletes on the characteristics of effective PT delivery in applied settings.

6.4 Method

6.4.1 Philosophical Approach

Consistent with this thesis and study 2 in particular, the current study adopted a pragmatic approach to research. It reflected Dewey's process of "inquiry" that sought to address a need in applied practice to enhance PT, so exploring delivery of PT was intended to yield findings that practitioners can be apply to work with athletes. The study did not attempt to uncover a universal truth about delivery but instead attempted to find useful ideas or a "practical level of truth" that could contribute to a dialogue on conducting PT in applied practice (Giacobbi et al., 2005, p. 22).

6.4.2 Participants

Inclusion criteria were the same used for study 2, and participants were the same eight international-level athletes and eight sport psychologists who were interviewed in study 2. Each athlete had competed in at least one Olympics, World Championships, or Paralympics and had experience participating in PT. Their sports included boxing, table tennis, shooting, basketball, archery, trampoline, gymnastics, and taekwondo. The psychologists had conducted their PT with international-level athletes and/or podium athletes preparing for future international competitions in various team and individual sports.

6.4.3 Procedure

The study was approved by a university ethics committee. The participants were recruited for this study at the same time they were asked to participate in study 2. Informed consent was obtained for this study as part of the same data collection process for study 2. For each participant, data collection for studies 2 and 3 took place during the same semi-structured interview with the researcher via Skype or Zoom. Separate interview guides were developed for sport psychologists and athletes ([Appendix A](#)). In the interview guide for psychologists, questions related to the process of developing and delivering PT (e.g., “Can you describe your experience conducting pressure training?”). Some questions focused directly on delivery, such as monitoring levels of pressure (e.g., “How do you know when you have put athletes under enough pressure?”). Other questions about creating pressure and impacts of PT elicited responses about delivery because it is intertwined with creating pressure and impacts.

The athlete interview guide included some questions that directly asked about delivery (e.g., “Besides increasing pressure, what else do sport psychologists do that makes pressure training effective?”). As with the psychologists, athletes also discussed aspects of delivery when answering more general questions about their experience participating in PT. Both interview guides used open-ended questions to provide participants with flexibility to discuss the ideas that they felt were most relevant and to encourage participants to provide in-

depth answers (Smith & Caddick, 2012). The semi-structured nature of interviews allowed the researcher to ask follow-up questions for the participants to elaborate on answers. For example, after an athlete described rewards and punishments used to create pressure, a follow-up question was, “How did [sport psychologist] get you to buy into those rewards and punishments?”. Interviews were recorded and lasted 35-55 minutes. The first author then transcribed each interview verbatim. Names of the athletes and sport psychologists were replaced with ID numbers (e.g., A1 or SP1).

6.4.4 Analysis

Analysis followed Braun and Clarke’s (2012) guidelines for reflective thematic analysis. The first author first read and re-read each transcript to gain familiarity with the data. The next step was to code the transcripts. Codes were descriptive labels assigned to segments of text that related to the study’s purpose. Coded segments were then reviewed, and related ones were grouped into themes. Themes were then reviewed to assess how well they represented the data and adjust them when necessary. Related themes were collapsed into one. The names and definitions for the final themes were then determined by the all of the co-authors.

Throughout the analysis, two additional researchers also reviewed the initial analysis as “critical friends” to enhance trustworthiness of the results (Smith & McGannon, 2018). After reading and analysing one of the transcripts, they shared their approach to coding and theming with the first author. They also provided feedback on the themes presented by the primary researcher. Researchers play an active role in constructing themes (Braun & Clarke, 2019), and the different perspectives from critical friends helped the first author see patterns and alternative interpretations of data. The research team met several times and produced multiple iterations of analysis. Instead of reaching total agreement, discussions were intended to enhance the defensibility of findings and their ability to achieve the study’s purpose as best as possible (Smith & McGannon, 2018). Throughout data collection and analysis, the

researcher also wrote memos in a reflexive research journal to note trends in the data, record rationale for analytical decisions, and think about feedback from critical friends (Culver et al., 2012).

6.5 Findings

Participants discussed processes and approaches to PT that helped athletes develop performance under pressure and be open-minded about the intervention. Four themes encapsulated these aspects of delivery: a) Collaboration with athletes and coaches: “with,” not “to”, b) Promoting learning before and after PT, c) Upfront transparency, and d) Integration into training. Each theme is summarised in Table 6.1 and described in more detail below. Raw data quotes are presented to allow readers to interpret data independently.

Table 6.1
Summary of Themes from Thematic Analysis of Interviews

Theme	Examples of raw codes	Summary
Collaboration with athletes and coaches: “with,” not “to”	<ul style="list-style-type: none"> • Planning intent of PT sessions • Discussing pressure manipulations • Identifying sources of pressure 	Sport psychologists worked with athletes and coaches to design and deliver PT. This collaboration increased buy-in.
Promoting learning before and after PT	<ul style="list-style-type: none"> • Learn coping skills first • Debrief • Practice mental skills under pressure 	Mental skills training taught athletes how to cope with pressure in PT and framed PT as a part of a learning process, rather than a punishment.
Upfront transparency	<ul style="list-style-type: none"> • Contracting • Explain reason for PT • Communicate support/safe environment 	Sport psychologists explained that PT’s purpose was to help athletes, despite the potential unpleasantness of pressure. Transparency enhanced athletes’ willingness to collaborate and participate.
Integration into training	<ul style="list-style-type: none"> • Short and frequent PT • Unstructured, coach-led • Timing driven by season/performance cycle 	Rather than a separate event, PT was a part of regularly-scheduled training sessions. Addition of pressure was framed as a natural progression in developing skills.

6.5.1 Collaboration with Athletes and Coaches: “With,” Not “To”

All psychologists and some athletes discussed the importance of collaboration when conducting and designing PT, including development of pressure manipulations. According to SP6, psychologists should do PT “with” athletes rather than “to” them. To choose demands or consequences that would in fact increase pressure, psychologists needed to know and listen to their specific athletes or team. Differences in sport and team cultures could mean that a certain forfeit or form of judgment might increase pressure for some populations but not for others. Therefore, psychologists and athletes needed to work together to identify pressure manipulations that were meaningful to the athletes. SP1 provided an example that fit the personality for one boxer:

So when we’ve done a consequence with her, it was that she had to sing in front of the group afterwards, like to serenade them. So that was the consequence, and she was like “I am not doing that. That’s horrendous.” But she came up with it, and she’s like, “I’m going to do everything in my power not to do that.”

Collaboration did not mean simply letting athletes think of and choose how to create pressure. Sport psychologists facilitated athletes’ involvement in the process. SP2 developed a questionnaire that asked divers to rate the level of pressure they feel in different sport-specific situations, and results suggested what kinds of consequences or demands would increase pressure the most. SP3 would propose ideas for pressure manipulations in a meeting with athletes, who could then consider and alter the ideas if necessary. In team settings, creating the same amount of pressure for every athlete was not possible, so psychologists based pressures on themes from team discussions or allowed the team to agree on the source of pressure. As many athletes as possible would then feel pressure, and frequent PT with various pressure manipulations would allow each athlete to eventually feel pressure.

Knowing and listening to athletes also involved noticing pressure that athletes would already feel in training in addition to the pressure intentionally created for PT. This pressure could come from several sources. Selection commonly raised the importance of training

sessions as teammates competed with each other for spots on a team. The pressure from selection could also increase further at certain times, such as when selection dates were approaching or when performance directors and head coaches watched training. Athletes also felt more pressure as the date of competitions neared. SP1 noted that too much pressure could damage confidence or impede development of mental skills, and psychologists accounted for these existing pressures so that any added consequences or demands would not stress the athletes excessively. The same consequence that was appropriate one day could be too stressful on another occasion, as SP8 observed:

You might actually go, “God, the level of pressure they’re under already, two weeks out from a competition, means actually that we don’t need to add too much in.” We just need to add a little bit...and actually, at a different time of the year, that little bit might not feel like very much, but right now everyone’s up to here in pressure.

Coaches were often key to tailoring PT to athletes appropriately. Coaches contributed expertise on the athletes and the sport, which helped determine the technical or tactical drills to pressurise. SP4 said:

It’s about working with [coaches] and the rest of the team on, “Okay, when do we see some of those examples happening in real life?” and “How can we use the different drills, the different exercises that we might do on the pitch to activate some of those behaviours?”. You’ll find head coaches, assistant coaches, goalkeeper coaches, they particularly will be highly trained in recognizing, “I’ve seen that response. I’ve seen that behaviour response,” so they are incredibly well-equipped and knowledgeable in the kinds of things we can do on the pitch.

PT was not an exercise that was led exclusively by the psychologist. It was integrated into physical or technical training, so coaches were active in the delivery. SP5 worked with coaches to agree to the content and “feeling” of a PT session: “We used to agree a number of principles for the feeling of the session. The session would have to feel competitive. It has to feel serious and have to feel...yeah, it’d have to feel quick-paced.” Coaches could also lead debriefs or explain pressure manipulations to athletes. SP3 would pair each para shooter with a coach or staff member who would conduct a debrief with that shooter after PT. Such involvement could keep coaches open-minded about implementing PT, as SP6 explained:

So I think very early in that that kind of idea-generation stage, if you collaborate from the outset, rather than trying to say, “I’ve got this thing that we should definitely do,” people are a bit more open and bit more curious about it, rather than defensive: “Why are you trying to change my...my practice?”

6.5.2 Promoting Learning Before and After PT

All psychologists actively helped athletes learn to cope with pressure in PT, and several athletes also discussed this training that accompanied PT. Mental skills training (MST) and debriefs not only taught athletes coping skills for pressure but also signalled that PT was an opportunity to develop, not a punishment. MST involved group workshops or one-on-one sessions that psychologists provided in conjunction with PT. Psychologists often started by teaching athletes about the effects of pressure on performance. A next step was to introduce coping skills that athletes could then practice during PT. SP1 described working with one boxer:

So we knew under pressure, he tenses and tries to load up and “kill” people, basically. And...in his head, the way he would debrief that is “I’m trying to win” and it’s that pressure of “I’ve got to win.” So he’ll chase, and it makes him tense and makes him not breathe properly...so we did...we coupled it together: so we did a strategy to develop his ability to breathe and relax anyway.

MST was not unique to PT because the psychologists would already teach many of the same mental skills, but PT provided athletes an opportunity to refine these skills under pressure similar to the conditions when they would need the skills in competition. The progression from MST to PT fit into a team or athlete’s overall goals:

It might be, “Well, okay, in a year’s time I want them to go deliver at an Olympic Games, why are they falling short when they tried to deliver at World Champs or whatever?” And then...I’ll do a skills program and educate first, and then get on the [cycling] track with them and do, like, education not just in the classroom but kind of be giving them opportunities to practice it with me there, and then we’ll expose them to however number of these [PT] sessions... –SP8

After PT sessions, debriefs prompted athletes to reflect on their experiences and performance in the session. The psychologist would ask athletes to consider how they responded to pressure, and this reflection increased athletes’ self-awareness and clarified skills, behaviours, or thinking patterns that they needed to maintain or improve. SP2 said:

So I think the education side that I've mentioned a few times, that has been key and that has come up multiple times with athletes in debriefs: of them understanding either why they're feeling pressure because they know their triggers or, at the very least, understand that their brain's changing and what they needed to do to put themselves in a better situation. Or even seeing their first kind of physical signs—so, loss of fine motor control and stuff—so they know if they see that, that based on past experience, they know that they're going down a path that's actually not going to be great.

The format and delivery of debriefs varied. Some debriefs were structured meetings after training sessions, and others were informal chats between the psychologist and athlete. Coaches often joined the debriefs, or a psychologist might train coaches to lead the debrief themselves.

6.5.3 Upfront Transparency

Driven primarily by psychologists, this theme describes how upfront transparency about the purpose and content of PT was a prerequisite for psychologists to collaborate well with athletes and coaches. Psychologists explained PT to athletes before expecting them to participate in it. The intent to increase pressure was not meant to be a secret. In fact, some psychologists conducted workshops to educate athletes on pressure, its effects on performance, and reasons for PT. This transparency was especially important for PT because feeling pressure would not necessarily be comfortable for athletes. A4 described times when coaches did not explain why they enforced consequences during training, and “everyone hated it so much” because the coaches “just did it because that was who they were. And that's how they trained people, through pressure and through brutal sessions, really.” In contrast, psychologists emphasised to athletes that any discomfort or unpleasantness was intended to help them learn and prepare for competition:

And people need to understand “the why,” so “why are we doing this?”. And it's not to harm you. It's not to make you look silly or to force you to make mistakes. It's “actually, we have a responsibility to you to prepare you for potentially extremely stressful situations.” –SP6

Psychologists did have slight variations in how they used PT. Some used PT to train a specific technical skill that coaches wanted to see from the athlete whereas others pressurised training to let athletes practice coping with pressure in general. Whatever the exact goal of the PT session was, psychologists communicated it to athletes before starting. For SP7, clarifying the goal helped ensure athletes benefited as intended. For example, training the physical execution of a skill under pressure was distinct from training the decision making of that skill under pressure.

Although psychologists often introduced the idea of PT during workshops or conversations, SP1 had each athlete read and sign written “contracts” that explained the intervention. A contract helped ensure that the athlete understood the purpose of PT, and it also allowed coaches and the psychologist to individualize PT for each of their athletes. Each individual could have his or her own consequences, procedure for debriefs, and tactics to work on, and the contract communicated those components to him or her. Psychologists also supported “re-contracting” regularly. They understood that needs of the athlete and circumstances will change over time, so it was necessary not to assume athletes would always be receptive to PT just because they agreed once.

6.5.4 Integration into Training

Some psychologists and some athletes suggested that for PT to be effective and sustainable over time, it needed to be integrated into athletes’ training regimens. Some psychologists initially conducted PT as structured and novel events that required much planning and preparation to develop and implement pressure manipulations. Although transparency about PT’s purpose was important, excessively drawing attention to the added pressure could deter some athletes. A1 eventually recognised the value of PT, but he did not initially:

I hated it at first. I used to just be like, “This is just nonsense” because it was like this whole thing: “Whoo, this afternoon’s pressure training, boys. Remember.” Going into

the hall, they try and make a different feel. You open the door and everybody looks at you, like, “Ooh, you know what’s going on here today.”

Psychologists moved away from singular events and instead included PT as a regular part of training. SP2 described her approach as “little and often” because she would incorporate PT more routinely into training in the form of smaller-scale exercises. SP5 similarly embedded PT into training by adding pressure to warm-up drills or the last exercise of a training session. Big events could, however, lead to such integration because they showed coaches how to create pressure. SP5 said, “by doing a couple of really big ones, the coaches then got a grip of it and they just included it on a more...frequent basis in a less-structured way.” For A5 and A7, coaches already added pressure to their practice competitions without the assistance of a psychologist. As A7 described it, “I kind of always did it from a young age, so at this point I don’t know any different.” That coaches independently integrated pressure into training further demonstrates that PT can be a natural extension of preparation for competition. SP8 recognised that some coaches already pressurise training well, so he would not need to intervene: “Sometimes it’s okay to go, ‘I don’t need to do anything there.’”

Integration was also reflected in the language used (or not used) to talk about PT. To prevent preconceived notions from interfering with PT, SP6 and SP8 both avoided labelling any exercise or drill as “pressure training.” According to SP8, overusing the word “pressure” in a training environment could cause some athletes to “switch off.” Although levels of pressure can vary, psychologists said that athletes often associated the term “pressure” with only the highest levels of pressure. SP8 explained, “Some of them will go, ‘Aww, you can’t replicate what’s going to happen in an Olympic Games, in a World Champs.’” Overemphasizing pressure could prompt athletes to look for or expect pressure, so SP8 advocated directing athletes’ attention to relevant mental skills instead. Psychologists could still teach the skills (e.g., in a workshop) but do so without making practicing them appear to be a novel exercise. SP8 said, “I’ve never sold it as ‘pressure training.’ I’ve always tried to

sell it as ‘We’re going to learn a bunch of skills first...and then we’re going to expose you to situations where you get a chance to practice that.’”

Some psychologists did still distinguish PT from other training sessions, but they did so by mirroring the flow of competition. Building up to PT throughout the day could enhance pressure by signalling to athletes that their performance in training would be scrutinised more than usual:

So we try and make it a little bit more like a bout where you’d be prepping to go in and box someone specific rather than whenever they...might be sparring somebody, they might know 10 minutes before: “Oh, I’m sparring him today but it’s fine.” So we try and create a little bit more of, “This is your opponent, these are your tactics, this is what you need to do”...We get them to properly warm up and make sure they’re as it would be in a bout. –SP1

Despite wanting PT to “feel different” from other training, SP1 did not force the perception of pressure. The physical and tactical preparation implied the importance of the session, which contrasted the explicit reminders about pressure that A1 described experiencing in his first PT. Despite differences in their approaches, psychologists seemed to agree on normalising PT as a part of athletes’ preparation. This psychological component of athletes’ training did not have to be framed as separate. As SP6 explained, PT was “just training.”

6.6 Discussion

This study explored perspectives of sport psychologists and athletes on the characteristics of effective PT delivery in applied settings. Thematic analysis highlighted four themes that described effective delivery: a) Collaboration with athletes and coaches: “with,” not “to”, b) Promoting learning before and after PT, c) Upfront transparency, and d) Integration into training. The researcher’s reflexive process and collaboration with critical friends shaped the name and meaning of these themes. Critical friends led the researcher to contemplate what criteria constitute a theme and then directed the researcher to Braun and Clarke’s (2016) emphasis on the researcher’s role in “constructing” themes. The importance

of interpreting data encouraged the researcher to consider the ideas that data represent (i.e., latent themes) as opposed to semantic themes that are only descriptive (Braun & Clarke, 2016). For example, two initial themes of “debriefs” and “learning coping skills first” were merged into the theme of “promoting learning before and after PT.” Although latent themes are not inherently superior to semantic ones, this final theme better achieved the study’s purpose because it communicated the principle (i.e., “promote learning”) behind what sport psychologists did (e.g., conduct debriefs). Consistent with the purpose to explore participants’ perspectives, such principles represented an exploration of the data’s meaning rather than a mere description of steps for delivering PT.

The findings echoed existing guidelines for PT. For instance, the theme of collaboration supports Fletcher and Arnold’s (2021) guidance that listening to input from athletes can increase their buy-in for PT. However, the current study’s qualitative nature expanded on how practitioners can apply such ideas in competitive sport environments. Each theme included concrete steps that contributed to developing and conducting PT. Just as importantly, these steps also could increase coaches and athletes’ engagement with PT and, therefore, increase their benefit from the intervention.

Collaboration with athletes and coaches helped psychologists to identify pressure manipulations that would successfully create pressure. PT should be tailored as much as possible to each context (Fletcher & Arnold, 2021), and discussing pressure manipulations with athletes allowed psychologists to learn which demands and consequences would be meaningful and relevant to those athletes. Coaches could also generate and vet ideas for creating pressure. Whereas input from athletes depends on their self-awareness, coaches might add another perspective from having seen how and when their athletes feel pressure.

Even if a practitioner could independently develop pressure manipulations, collaboration remained important for keeping athletes and coaches receptive to PT. For athletes, collaboration could reduce a power imbalance that inherently exists between

practitioner and athlete (Sharp et al., 2015; Tod et al., 2019). PT especially might deepen this imbalance if practitioners appear to force demands and consequences on athletes (Kegelaers et al., 2020), but collaboration seems to balance the practitioner-athlete dynamic going into PT. Asking athletes for their input could provide them with autonomy to influence the training, and autonomy helps individuals see a task's relevance to their goals and, in turn, value doing that task (Ryan & Deci, 2000). The resulting commitment is illustrated in the way SP1 described her athlete's motivation to avoid a consequence of singing in front of others: "She was like 'I am not doing that. That's horrendous.' But she came up with it, and she's like, 'I'm going to do everything in my power not to do that.'"

Collaboration gained coaches' support for PT too. Because PT generally took place during training sessions, it could appear to encroach on a coach's territory. Yet psychologists did not feel that they had to lead PT entirely on their own. SP3 had coaches and staff lead debriefs, and coaches have also contributed to PT in intervention studies. In van Rens et al.'s (2021) study, coaches designed sport-specific drills and performance standards that players would have to reach in PT. As SP6 noted, including coaches in the process could encourage them to be "a bit more open and bit more curious about [PT], rather than defensive." This involvement could then impact the culture or environment surrounding PT. For example, in Bell et al.'s (2013) study, the researchers worked with coaches to take a transformational approach to leadership, and coach buy-in could promote other "ingredients" of successful interventions, such as athlete engagement (Tod et al., 2019).

For the theme of promoting learning, the most direct benefit may be the development of coping skills that athletes can then apply during PT. Kent et al. (2021) have found evidence that PT accompanied by MST improves performance better than PT alone. In study 2, participants described how they learn coping skills from engaging in PT, and practitioners might accelerate that learning by introducing skills before PT. After pressurised drills, practitioners in the current study continued the learning process by leading debriefs that

prompted athletes to reflect on their responses to pressure during the training session. Study 2 found that PT helped athletes learn that pressure did not have to hurt performance. As with coping skills, practitioners could facilitate this changed “relationship” with pressure.

Reflection is a skill that practitioners may need to help athletes develop (Neil et al., 2013), so debriefs could be important for maximising learning.

Promoting learning might also develop the facilitative environment that Fletcher and Sarkar (2016) recommend should accompany PT. While pressure manipulations create challenge for athletes, conducting workshops and debriefs may communicate to athletes that a coaching staff is supporting them to overcome that challenge. Just as collaboration promotes autonomy, MST could increase athletes’ sense of competence, which is another psychological need that increases internal motivation for a task (Ryan & Deci, 2000). If athletes feel they have been equipped with skills to cope with pressure, then they may be more willing to experience that pressure.

Like collaboration and promoting learning, the theme of upfront transparency also had multiple dimensions. In some cases, psychologists might need to explain the nuances of PT that targets specific aspects of performance under pressure, such as decision making or a technical skill that tends to decline under pressure. Communicating these targets enables athletes to match their focus and behaviour to the psychologist or coach’s intent for the drill. More generally, upfront transparency clarified that PT was intended to help, not harm, athletes. Although that purpose may seem obvious to a practitioner or coach delivering PT, it may not be so obvious to athletes (Kegelaers et al., 2020). Some participants in the current study suggested that athletes might conflate PT with previous experiences of disciplinary punishments or be accustomed to sport psychology support taking place in “classroom” settings. Transparency could be verbal explanations or take the form of a written “contract” that outlined what PT would involve. Such measures were another way to proactively address any misperceptions of PT.

After psychologists' explained PT to athletes, the intervention's integration into physical training further demonstrated that PT was an extension of, rather than a departure from, existing preparation for competition. PT did not have to be large-scale events that were separate from physical training, and integration into training meant less novelty for athletes to grow accustomed to. Compared to conducting PT as a separate event, pressurising a drill did not disrupt an athletes' typical routine if the athletes already would do that drill in training. During that training, psychologists did not need to overemphasise the presence of added pressure. Terms such as "pressure training" are useful in research for providing a common and concise language to refer to the intervention, but psychologists do not necessarily need to label PT in applied practice. As SP6 said, PT was "just training."

Taken together, this study's findings can advance the trend in the literature toward more holistic PT interventions. Early studies focused on the effect of pressure in controlled experimental conditions (e.g., Oudejans & Pijpers, 2010), but recent studies have incorporated elements such as workshops and debriefs that supplement pressurised drills and better represent how practitioners may conduct PT in applied practice (e.g., Kegelaers et al., 2021; van Rens et al., 2021). Still, research has largely remained "practitioner-evacuated" (Ivarsson & Andersen, 2016). The current study highlighted processes and principles that practitioners can implement and that future studies can evaluate to assess the practitioner's influence on PT's effectiveness.

6.6.1 Applied Implications

Practitioners can increase athletes' engagement with and learning from PT by ensuring that their delivery incorporates the themes found in this study. There are several steps that practitioners can take to do so. One is to help coaches develop skills for leading PT sessions. Skills could include explaining rationale for PT, implementing pressure manipulations, and conducting debriefs. For instance, practitioners can teach debriefing skills by identifying behaviours to observe during PT and demonstrating questions that prompt

athletes to reflect during debriefs. A hands-on role in PT may help coaches buy into PT and fully understand the nuances of delivery. Kegelaers et al. (2020) have similarly argued that debriefs led by a coach are important to help athletes understand and reflect on their responses to pressure. In addition, coaches with these skills can continue PT if practitioners are not always present at each training session. The ability to continue PT is valuable because a second implication is that practitioners should encourage consistent and systematic use of PT. The theme of integration does not mean doing PT once during training or only when practitioners suggest it. Coaches should strive to integrate PT into their training cycle rather than use it on isolated occasions.

Practitioners can normalise sport psychology within training sessions. Because PT requires athletes to simultaneously practice physical and mental skills, it shows that sport psychology does not need to be confined to classrooms or individual consulting sessions. Practitioners can prime athletes to be receptive to PT by regularly providing guidance and support to athletes during training sessions. If practitioners are already present at training to advise coaches and follow up on mental skills taught previously, athletes may more readily accept the practitioner making one more addition to training (i.e., pressure).

6.6.2 Future Directions and Limitations

This study was the first to present perspectives of sport psychologists and athletes on delivery of PT at the international level of sport, but it did have limitations that future research can address. One limitation is that this study did not reflect the impact of each aspect of delivery (e.g., collaboration, upfront transparency) relative to other potential aspects. Empirically testing each aspect of delivery could be unethical if it requires withholding them from a control group, but future qualitative research can add more perspectives to the ones discussed in the current study. Triangulating findings from different studies may uncover patterns that strengthen evidence for including a certain finding into PT delivery. Researchers can also apply the findings when designing and conducting PT intervention studies.

Evaluation of purposeful delivery can then provide the accountability that Ivarsson and Andersen (2016) have argued is needed for the practitioner's role in research.

Furthermore, although several of the current findings centre around avoiding negative misperceptions of PT, additional considerations could serve to enhance the training benefits of planned disruptions even when athletes already understand PT's intent (Kegelaers et al., 2020). Examples included periodization and surprise timing of disruptions (Kegelaers et al., 2020). The strategic use of timing and other aspects of delivery could be important when the nature of a pressure manipulation itself may be restricted by material resources or ethical concerns.

The absence of coaches from the sample is one reason that the study's findings were not the only keys to effective delivery. The theme of integration into training suggested that coaches can and should participate in the delivery of PT. In fact, two athletes in the current study referred to PT that was led by coaches without the help of a sport psychologist, so the absence of coaches' perspectives is a reminder that the findings are only some of the characteristics of effective delivery. Therefore, future research should interview coaches who intentionally pressurise training to prepare athletes for pressure. Coaches may have different approaches to leading pressurising training compared to sport psychologists. They may also contribute a valuable third-party perspective on how sport psychologists can work best with athletes to deliver PT.

Another limitation was the purposeful sampling of participants who had extensive experience with PT. These individuals were more likely to view PT favourably, and the risk of this bias increased because several athletes were recruited via recommendations of participating psychologists. Although many participants did discuss lessons from mistakes that they or their psychologists had made previously, researchers still have more to learn from individuals with less favourable views of PT. It may be equally valuable to understand what steps limit the effectiveness of PT or athletes' receptiveness to the intervention, but

participants with positive experiences of PT may not be aware of such pitfalls or feel comfortable discussing them. Studies can instead interview sport psychologists and athletes who acknowledge that they feel PT has been ineffective. Wide cross-sections of a team can also be interviewed after a PT intervention. In recent research with post-intervention focus groups, not all participants found PT helpful (e.g., Kent et al., 2021). Future intervention studies can continue such focus groups and specifically examine aspects of delivery that may have influenced negative or indifferent reactions to PT.

Finally, this study's sample consisted of elite athletes and sport psychologists who worked with elite athletes, so findings may not generalise to athletes at lower levels of sport. Research has found that youth and adolescent athletes may feel pressure to perform (Dunn et al., 2022; Harwood & Knight, 2009), and Kent et al.'s (2021) study at a football academy found preliminary evidence that PT can benefit youth and adolescent athletes across several age groups. More research is therefore needed to support practitioners and coaches in delivering PT at these levels of competition. Because the current study's sample of athletes also came primarily from individual sports, future studies can explore any differences when delivering PT with team sports.

6.6.3 Conclusion

Practitioners have already espoused the importance of delivery in applied practice (Tod et al., 2019), so it makes sense for research on a specific intervention to examine delivery in addition to content. The current study provided such balance to the literature on PT by giving attention to delivery. According to both psychologists and athletes, psychologists increased the effectiveness of PT through: a) Collaboration with athletes and coaches, b) Promoting learning before and after PT, c) Upfront transparency, and d) Integration into training. Each theme included direct benefits to the design of PT and athletes' experience of PT. For example, collaboration led to selecting pressure manipulations, and integration fit PT into training schedules. In addition, each theme may contribute equally as

much to the environment surrounding the intervention. PT that embodied these themes generated buy-in from athletes and coaches, and it distinguished PT as a form of training rather than punishment. To include these themes in applied practice, a practitioner can work closely with coaches to ensure they understand their roles in PT and the role that delivery plays in the intervention's outcome.

So far in this thesis, the studies have progressed toward informing the design and delivery of an applied PT intervention. On their own, each of the first three studies offer insights applicable to conducting PT. Study 1 evaluated the strength of PT's effect, which supported the use and further study of PT. Study 2 illustrated properties of pressure manipulations, and the depth of its qualitative data allow for naturalistic generalisability that stimulate practitioners to consider how a given theme can inform their own applied practice (Smith & Caddick, 2012). Although it is already common for content of interventions to be "evidence-based," study 3 attempted to examine delivery with attention commensurate with delivery's potential impact on an intervention's effectiveness. However, synthesis of these findings would better reflect applied practice, in which creating pressure and delivery interact to produce effects. Accordingly, the next chapter reports a PT intervention that applied the findings to assess their impact on creating pressure and improving performance in an applied sport setting.

Chapter 7: Study 4

Integrating Pressure Training into Professional Basketball: A Mixed-Method Study of
Pressure Manipulation and Intervention Delivery

7.1 Abstract

In this study, mixed methods were used to evaluate a four-week PT intervention for a professional women's basketball team. Participants were nine players and three coaches. In addition to creating pressure, the study's purpose was to examine the intervention's effect on behaviours important for performance and to evaluate the delivery of the intervention. Behaviours were measured via players and coaches' ratings of the frequency of behaviours in training. The current study applied this thesis' previous findings on creating pressure and delivering PT effectively. In line with study 2, the intervention attempted to create pressure through peer judgment intended as a consequence with extended "reach." Study 3 supported the integration of PT into physical training sessions, so PT was integrated into the team's training during a competitive season. An A-B-A design compared behaviours and pressure during the intervention with a baseline condition that took place before and after the intervention. Repeated measures ANOVAs indicated that pressure was not increased effectively. However, in post-intervention interviews, participants suggested reasons that the pressure manipulation did not increase pressure, and these reflections extended findings of studies 2 and 3. Results had applied implications for increasing pressure more effectively in applied settings.

7.2 Introduction

Building on Stoker et al.'s (2016) framework, study 2 offered guidance for creating pressure in PT. Practitioners and athletes in study 2 described pressure manipulations that they had found effective, and many examples shared common properties. One property was the extended “reach” of consequences. Extended reach could mean athletes’ perception of judgment lasted beyond a brief moment during training, such as the length of one drill. Tracking or displaying performance scores in training served as a public reminder of one’s performance in a training session. It increased the importance of the performance by, for example, having the potential to influence a coach’s judgment, which might eventually inform selection. Extended reach also referred to expanding the sources of judgment to more than just teammates and coaches (e.g., via social media). Athletes might already feel some level of judgment from coaches and teammates at every training session, but extending the reach to a wider audience could increase pressure by magnifying the sense of judgment.

Consequences with extended reach still need to be tested to determine if they do in fact create pressure. Although use at the international-level of sport provides some support for such consequences, empirical studies can more precisely indicate the intensity of pressure created. Another dimension of pressure manipulations is the breadth of their effect (i.e., whether it affects only certain individuals or the majority of a team). There may be no set formula for determining optimal pressure manipulations, but examining these dimensions can identify factors for practitioners to consider when selecting pressure manipulations. For instance, if a pressure manipulation creates pressure for only half of a team, then a practitioner would know to combine it with another pressure manipulation or rotate between different ones over time so that every player eventually feels pressure.

Although recent PT research has used various pressure manipulations, their intensity and breadth are unclear because studies did not measure levels of pressure (e.g., Kegelaers et al., 2021; van Rens et al., 2021). Early PT studies did conduct manipulation checks by

measuring and comparing anxiety levels in low- and high-pressure conditions (Oudejans & Pijpers, 2009). Manipulation checks help to evaluate not just the manipulation itself but also PT's overall effect on performance. It is difficult to attribute changes in performance to PT without evidence that athletes did feel pressure in that training.

Even when manipulation checks are conducted and confirm increased pressure, applied settings present additional challenges for measuring PT's effects on performance. PT is intended to improve performance under pressure in competition, but competitive performance is subject to many variables that cannot be controlled as they would in experimental settings (e.g., opponents, weather, officiating). Bell et al. (2013) did measure and compare cricket performance of a control group and PT group. However, the researchers acknowledged that measuring overall performance in matches did not necessarily reflect performance under pressure, which is the target of PT.

Evidence from competition may be lacking because pressure situations can be relatively rare or difficult to identify. An athlete may only face a small number of "classic" high-pressure situations throughout a season (e.g., a game-winning shot or championship match), and many interventions have not lasted long enough to capture any or all such situations in a season (e.g., Kegelaers et al., 2021; van Rens et al., 2021). Athletes may feel pressure in other situations, such as a bench player trying to impress coaches when he gets playing time, but measuring performance in these situations is still difficult because they may differ for each individual. Because applied settings rarely offer the time, control groups, and sample sizes to assess competitive performance under pressure, researchers need alternatives for measuring effects of PT.

Psychological constructs are one solution for assessing PT's effects but also have limitations. Using psychometric instruments, Kegelaers et al. (2021) measured resilience, and van Rens et al. (2021) measured challenge and threat states before and after PT. These constructs are related to performance under pressure, but their measurement has limited value

for predicting performance and, therefore, assessing effectiveness of an intervention (Ivarsson & Andersen, 2016; Martin et al., 2005). Even if an intervention results in a statistically significant change of scores on an instrument, that change does not clearly indicate if and how it translates to performance.

Instead of constructs, Ivarsson and Andersen (2016) encouraged researchers to “measure variables that will have either some direct impact on, or are at least highly correlated with, behaviours in the real world” (pp. 17-18). An intervention that lasts only three or four weeks might not immediately change results of competition, but behaviours in PT could reveal habits that could eventually impact results. Research on mental toughness has shifted from measuring cognitions, emotions, and characteristics to measuring behaviours in training. In swimming, Beattie et al. (2019) measured achieving “prescribed pace times,” completing “prescribed swim volume,” and other sport-specific behaviours considered to illustrate mental toughness. In volleyball, mentally tough behaviours can include “demanding [the] ball” and positive body language after a missed point (Madrigal, 2020). PT studies could similarly identify and measure behaviours associated with performance under pressure.

To accurately assess an intervention’s nature and effect, studies also need to account for the practitioner’s delivery of the intervention (Ivarsson & Andersen, 2016). Evaluating delivery can enhance understanding results. If performance does not improve, the intervention might not be effective. If, however, the intervention also was not delivered well, then it could be premature to dismiss the intervention’s content, such as the pressure manipulation and drills in PT. Nonetheless, intervention research has tended to ignore the practitioner’s role in interventions (Ivarsson & Andersen, 2016).

Study 3 facilitated the evaluation of delivery in PT by describing processes that sport psychologists and athletes associated with effective PT. Although they do not necessarily constitute the only aspects of PT delivery, these processes included collaboration, integration into training, and transparency about PT’s purpose. Transparency established that PT was

intended to help athletes, and collaboration with athletes and coaches provided them with autonomy and engaged them throughout the process. Integrating PT into existing training facilitated logistics of the intervention and also framed PT as part of athletes' training, rather than a separate event.

Although studies 2 and 3 advanced knowledge of how to conduct PT, their findings need to be tested in applied interventions. An intervention can quantitatively measure pressure created by pressure manipulations that are based on study 2's qualitative findings, and triangulating methods can corroborate findings (Moran et al., 2011). In addition to providing evidence of effectiveness, intervention studies can broaden understanding of how to conduct the intervention in the future. For example, focus groups after van Rens et al.'s (2021) PT indicated potential improvements, such as rotating consequences to maintain their effect.

The current study conducted PT for a professional women's basketball team to apply previous findings on creating pressure and delivering PT effectively. The purpose was to a) increase perceptions of pressure during training, b) examine the intervention's effect on behaviours important for performance, and c) evaluate the delivery of the intervention. There were two main hypotheses. The first hypothesis was that pressure would increase during the intervention compared to baseline conditions. The second hypothesis was that desired behaviours would decrease initially but increase or return to baseline levels by the end of the intervention.

7.3 Method

Similar to recent PT research (Kent et al., 2021; van Rens et al., 2021), the current study mixed methods to evaluate the intervention. Quantitative methods assessed behaviours and perceptions of pressure during PT. Qualitative methods were used because they can help to understand how behaviours under pressure are related to cognitive processes that are difficult to identify and measure quantitatively (Mesagno et al., 2009; Mesagno & Marchant,

2013). For example, cricketers have described how PT increased awareness that helps them know when to utilise coping skills (van Rens et al., 2021). Mixed methods can also allow researchers to triangulate sources of data. Multiple sources of evidence can increase the validity of findings (Patton, 2015), which is especially important in applied research that may lack the experimental control of lab-based studies.

7.3.1 Participants

Participants were nine female basketball players, the head coach, and two assistant coaches from one professional team in the UK's top women's professional basketball league. The sample size of players was smaller than expected because the study took place during the COVID-19 pandemic in 2021. Some players originally on the team opted not to play due to the pandemic; therefore, the team had fewer players during the intervention than is typical for a basketball team. The researcher had worked with the team as a trainee mental performance consultant since the previous season. To recruit the team's participation, he first proposed the intervention to the coaches and then to the players. All players and coaches agreed to participate; however, participation in each intervention session and completion of measures varied each week because of injuries and scheduling conflicts that prevented players from training on occasion. After the intervention, six players and all three coaches participated in either individual or group interviews.

7.3.2 Design

This study used a within-subjects A-B-A design. Players first trained for one week in a baseline phase with no added pressure. Next, they completed a four-week PT phase that took place during regularly-scheduled team training. The last phase was another week of training with no added pressure, identical to the initial baseline phase. This A-B-A design was chosen to illustrate if and how PT changed levels of perceived pressure and impacted performance in training. A between-subjects design was not considered appropriate because of the small sample size and challenge of splitting players on the same team into control and

treatment groups. A pre-test-post-test design would have limitations for testing PT's effect on performance. Previous studies (Oudejans & Pijpers, 2009) have tested participants under high pressure before and after PT. However, without a control group, a pre-test under high pressure would be problematic for a PT intervention because that pre-test itself would be the same as the intervention procedures (i.e., training under pressure).

The A-B-A design compared players' behaviours and perception of pressure during the intervention to two different timepoints under low pressure. The two separate baselines mitigated the influence of possible confounding variables in applied settings. For example, levels of pressure in training could fluctuate depending on the point in the season (e.g., approaching playoffs) or an especially difficult upcoming opponent.

7.3.3 Measures

7.3.3.1 Perceived Pressure Scale

A one-item scale evaluated baseline levels of pressure during training (See [Appendix B](#)). The item asked, "Compared to most practices, how important did you feel it was to perform well today?" Players answered on a 7-point Likert scale, ranging from 1 (much less important) to 7 (much more important). A midpoint of 4 indicated same level of pressure as usual in training. Kinrade et al. (2015) and Stoker et al. (2017) have used a different one-item scale that asks participants to rate how much "pressure" they felt, but that scale has not been validated. Because individuals could have different understandings of the term "pressure," the current study's scale was based on Baumeister's (1984) definition of pressure as "any factor or combination of factors that increases the importance of performing well on a particular occasion" (p. 610). The scale asked players to rate that day's practice relative to "most practices" because Baumeister (1984) refers to increases in importance, not absolute importance. This distinction is necessary because players may believe (or claim to believe) that every training is important to some extent, so a manipulation check needs to measure how much PT increased perceived importance, if at all, compared to previous occasions.

7.3.3.2 Mental Readiness Form-2md

The anxiety scales of the Mental Readiness Form-2md (MRF-2md; Butt et al., 2003) were used to measure changes in anxiety due to the addition of pressure manipulations (See [Appendix C](#)). The MRF-2md measures intensity of self-reported state cognitive anxiety, somatic anxiety, and confidence on an 11-point Likert scale. It also measures direction of each construct on a scale that ranges from -3 (very debilitating) to +3 (very facilitative). Reliability of the MRF-2md was demonstrated by Butt et al. (2003). In addition to the perceived pressure scale, the MRF-2md served as a pressure manipulation check. Both measures were used to strengthen confidence in the effectiveness of the manipulations and to account for individual differences in experiences of pressure (e.g., an individual might perceive an increase in importance without feeling more anxious).

7.3.3.3 Self-Rated Target Behaviours

As a team, players were asked to choose three behaviours that they considered important for their performance, and they were given one week to discuss among themselves and decide. Players were asked to choose because study 3 suggested that collaborating with athletes to design the intervention provides autonomy that could increase motivation for the intervention. The target behaviours chosen were: on-court communication, hustle plays (e.g., diving for loose balls), and boxing out opponents to secure rebounds. On a 7-point Likert scale, each player rated herself on how well she performed each behaviour during training (1 = “hardly ever”; 7 = “almost always”).

7.3.3.4 Coach-Rated Target Behaviours

On the same 7-point Likert scale, coaches rated each player on the same target behaviours on which the players rated themselves. Coaches’ ratings were included to make findings more robust if they converged with players’ self-ratings.

7.3.3.5 Social Validation Questionnaire

A questionnaire asked participants to reflect on three key areas of the intervention: significance of the intervention's goals, appropriateness of the intervention's procedures, and effectiveness of the intervention (Page & Thelwell, 2013). Participants rated each key area on a 7-point Likert scale. An open-ended question then asked participants to provide suggestions for how to improve the intervention (See [Appendix D](#)).

7.3.3.6 Semi-Structured Interviews

Post-intervention interviews allowed participants to share their experiences of the PT and elaborate on the three areas that are addressed quantitatively by the social validation questionnaire. An interview guide was divided into four sections for interviews with players (See [Appendix E](#)). The first section included questions about the intervention's goals. The second section asked about the intervention's procedures, including the effectiveness of pressure manipulations. Next, questions asked about the effects of the intervention and the importance of these effects. The last section asked players to share perspectives on how the intervention or its delivery could be improved. Themes from study 3, such as upfront transparency, guided the development of questions in this last section. Separate interviews were also conducted with the coaches, and an interview guide had questions similar to the player interviews (See [Appendix F](#)).

7.3.4 Intervention

The four-week intervention attempted to create pressure during the team's two training sessions each week. The primary method for creating pressure was peer judgment. After each week's second practice, players anonymously voted for the three teammates who best demonstrated the target behaviours during the week. For each behaviour, they voted for the teammates who demonstrated it the best, second-best, and third-best. A rank-choice voting system gave players three points for every "best" vote received, two points for every "second-best" vote, and one point for every "third-best" vote. Each week's voting results were added to the results of the previous week(s), and highest-ranking players for each

behaviour were recognised the following week before a training session. At the start of the intervention, the researcher announced that the top-ranking player for each behaviour at the end of the intervention would receive a store voucher worth £20. Halfway through the intervention, visual inspection of manipulation checks and social validation data suggested that increases in pressure were limited, so the pressure manipulation was changed so that coaches, not players, voted for the best performers during the last week of the PT.

This peer/coach voting system aimed to prompt players to feel a sense of judgment from their teammates/coaches. Whereas previous interventions have pressurised specific drills within a training session (e.g., Kent et al., 2021; van Rens et al., 2021), the current study's system attempted to make players feel this sense of judgment throughout entire training session. By tracking votes, regularly announcing highest-ranking players, and connecting the voting to the reward, it attempted to extend the reach of judgment. These steps were intended to remind players that their performance was being watched and evaluated by their teammates, so mistakes or failure to execute the target behaviours could "cost" players beyond a given drill by potentially impacting their chance to earn votes. Regularly announcing leaders was intended to reinforce the sense of judgment and remind players that each drill and each training session fit into a longer-term competition to be the leading vote-getter and win the voucher.

7.3.5 Procedure

Table 7.1 outlines the flow of the study. The initial baseline phase was one regularly-scheduled training session in which no pressure manipulation was applied. After the session, players completed the perceived pressure scale, MRF-2md, and self-ratings of the target behaviours. Coaches also rated each individual player on the target behaviours. The next phase was the PT. The peer voting system was explained to players, who cast their votes after the second of their two training sessions each week. They also completed the manipulation checks (MRF-2md and perceived pressure scale) once per week immediately after training.

Manipulation checks were conducted weekly, rather than twice per week, to limit the time commitment for participating in the study.

After the first week of PT, the three names of the highest-ranking players for each behaviour were announced or posted in the team's changing room weekly (scores were cumulative over the course of the intervention). After two weeks of the intervention, players also completed the social validation questionnaire. Social validation measures are commonly used at the end of interventions, but Page and Thelwell (2013) encouraged that social validation during an intervention. This additional time point helped the researcher adjust the intervention based on participant responses while there was still time to do so. For example, responses informed the decision to switch to coaches voting for the best performers in the final week of PT.

A second baseline phase took place after the four weeks of PT to increase the accuracy of the measure of typical pressure during training. This phase took place at the end of the intervention to account for potential influence of the time in the season (e.g., pressure could be lower in the middle of the season compared to the end when a playoff berth could be at stake). The second baseline phase was conducted identically to the initial one, including completion of the quantitative measures. After this final week, six players and all three coaches participated in interviews or group interviews. Two group interviews were conducted with players ($n = 2$ and $n = 3$), and one player participated separately in a one-on-one interview to accommodate schedules. The two assistant coaches participated in a group interview, and the head coach was interviewed separately in a one-on-one interview to accommodate schedules.

7.3.6 Data Analysis

7.3.6.1 Quantitative Analysis

7.3.6.1.1 Pressure Manipulation Check. To check whether pressure was created, baseline intensities of perceived pressure and anxiety were compared with intensities during

the intervention. Values of baseline measures (weeks 1 and 6) were averaged to produce a mean baseline value for each variable. Three one-way repeated measures ANOVAs were conducted separately in SPSS 27 for perceived pressure, cognitive anxiety intensity, and somatic anxiety intensity. Fisher's LSD post-hoc tests compared means of each intervention week with the mean baseline value for each variable. These tests were conducted to detect any patterns among the different measures. If multiple measures increased in any of the same weeks of the intervention, this consistency would support the conclusion that players felt pressure during that week's PT. Means and standard deviations were also calculated for direction of somatic and cognitive anxieties.

7.3.6.1.2 Impact on Performance in Training. For each self-rated target behaviour, a one-way repeated measures ANOVA compared baseline self-ratings with self-ratings during week 3 (beginning of PT) and week 5 (end of PT). As with the pressure manipulations, values of baseline ratings were averaged to produce a mean baseline value. Fisher's LSD post-hoc tests compared means in week 3 and week 5 individually to mean baseline measures. For coach ratings, a mean was calculated for the three coaches' ratings of each behaviour for each week. Identical to the analysis for self-ratings, a one-way repeated measures ANOVA compared baseline coach ratings with those during week 3 and week 5.

7.3.6.2 Qualitative Analysis

Interviews were analysed using thematic analysis (Braun & Clarke, 2012). Transcripts were read and re-read to gain familiarity with their content. Next, codes were assigned to segments of text that helped to answer the research questions. Codes described the meaning of each segment, and related ones were grouped into themes. Finally, themes were reviewed and refined to ensure they contributed to understanding of PT.

7.4 Results & Discussion

Results are divided into three sections that address the intervention's creation of pressure and effect on performance of the target behaviours. Qualitative and quantitative

results complemented and reinforced each other, so they are presented together to provide a coherent narrative of the findings.

The number of participating players varied each week. Players did not complete the quantitative measures after training sessions that they missed due to injury, and some players trained but neglected or chose not to complete the measures after some sessions. The regression method was used to impute missing values (Blankers et al., 2010), and this process enabled data analysis with the pre-planned ANOVAs. Only two players completed each measure throughout the entire study. To provide a more thorough picture of individual experiences of the intervention, those players' datasets are presented as case studies along with the analysis of group means.

7.4.1 Pressure Manipulation Check

Group means and standard deviations for scores on the perceived pressure scale and MRF-2md are presented in Table 7.2. Values that were missing and imputed made up 26% of the data. Even when main effects were not significant, post-hoc tests were conducted and are reported because the purpose of the manipulation check was to determine if perceived pressure in any intervention week differed significantly from baseline.

7.4.1.1 Perceived Pressure

The one-way ANOVA for perceived pressure showed that the main effect of intervention week on perceived pressure was not significant, $F(4,32) = 2.13, p = 0.100, \eta^2 = 0.53$. Fisher's LSD showed that perceived pressure was not significantly different in any intervention week compared to baseline. For the two players with complete datasets (pseudonyms Samantha and Laura), none of their perceived pressure scores during the intervention were higher than their scores in the baseline or second baseline phases (Figure 7.1).

Table 7.1
Flow of PT Intervention

	Week 1 Baseline	Week 2 PT	Week 3 PT	Week 4 PT	Week 5 PT	Week 6 Baseline
Pressure manipulations	None	Peer judgment	<ul style="list-style-type: none"> Peer judgment Leaders announced 	<ul style="list-style-type: none"> Peer judgment Leaders announced 	<ul style="list-style-type: none"> Coach judgment Leaders announced Rewards distributed 	None
Measures	<ul style="list-style-type: none"> Perceived pressure scale MRF-2md Coach-rated behaviours Self-rated behaviours 	<ul style="list-style-type: none"> Perceived pressure scale MRF-2md 	<ul style="list-style-type: none"> Perceived pressure scale MRF-2md Coach-rated behaviours Self-rated behaviours Social validation questionnaire 	<ul style="list-style-type: none"> Perceived pressure scale MRF-2md 	<ul style="list-style-type: none"> Perceived pressure scale MRF-2md Coach-rated behaviours Self-rated behaviours 	<ul style="list-style-type: none"> Perceived pressure scale MRF-2md Coach-rated behaviours Self-rated behaviours Social validation questionnaire

Table 7.2
Group Means (SD) of Perceived Pressure and Anxiety

	Mean baseline (weeks 1 & 6)	Week 2	Week 3	Week 4	Week 5
Perceived pressure ¹	5.11 (1.02)	5.33 (0.71)	4.67 (1.00)	4.56 (1.13)	4.22 (1.13)
Cognitive anxiety intensity ²	4.33 (1.20)	3.56 (0.73)	6.33 (2.24)	5.56 (2.30)	4.11 (2.03)
direction ³	0.87 (0.77)	1.88 (0.62)	-0.21 (1.07)	0.37 (1.81)	0.62 (1.65)
Somatic anxiety intensity ⁴	5.17 (2.05)	4.44 (1.81)	5.11 (2.62)	5.44 (2.35)	5.56 (2.70)
direction ³	-0.18 (0.93)	0.78 (1.20)	-0.09 (1.26)	-0.40 (1.13)	0.44 (1.51)

Note. Means and SDs reflect calculations after missing values were imputed.

¹ 7-point Likert scale (1 = “much less important”; 7 = “much more important”)

² 11-point Likert scale (1 = “calm”; 11 = “worried”)

³ 7-point Likert scale (-3 = “very negative for performance”; +3 = very positive for performance”)

⁴ 11-point Likert scale (1 = “relaxed”; 11 = “tense”)

7.4.1.2 Cognitive Anxiety Intensity

For cognitive anxiety intensity, Mauchly’s test indicated that the assumption of sphericity had been violated, $\chi^2(9) = 17.85$, $p = .043$. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .47$). There was a significant main effect of intervention week on cognitive anxiety intensity, $F(1.88, 15.00) = 4.60$, $p = 0.029$, $\eta^2 = 0.37$. Fisher’s LSD post-hoc tests indicated that cognitive anxiety intensity was significantly higher in week 3 compared to baseline (2.00, 95% CI = [.63, 3.37], $p = .010$). In the other weeks of the intervention, mean anxiety did not differ significantly from baseline. For Laura, cognitive anxiety intensity did increase in weeks 3 and 4, but they remained at baseline levels in the other two weeks of the intervention (Figure 7.2). For Samantha, cognitive anxiety intensities approximated baseline levels throughout the intervention.

7.4.1.3 Somatic Anxiety Intensity

The main effect of intervention week on somatic anxiety intensity was not significant, $F(4,32) = 0.43$, $p = 0.788$, $\eta^2 = 0.05$. Fisher’s LSD showed that somatic anxiety intensity was not significantly different in any intervention week compared to baseline. Laura’s somatic

anxiety intensity did increase in weeks 3 and 4 but remained at baseline levels in the other two weeks (Figure 7.3). These levels mirrored the increases in her cognitive anxiety intensities during the same weeks. For Samantha, somatic anxiety intensities remained approximately at baseline levels throughout the intervention.

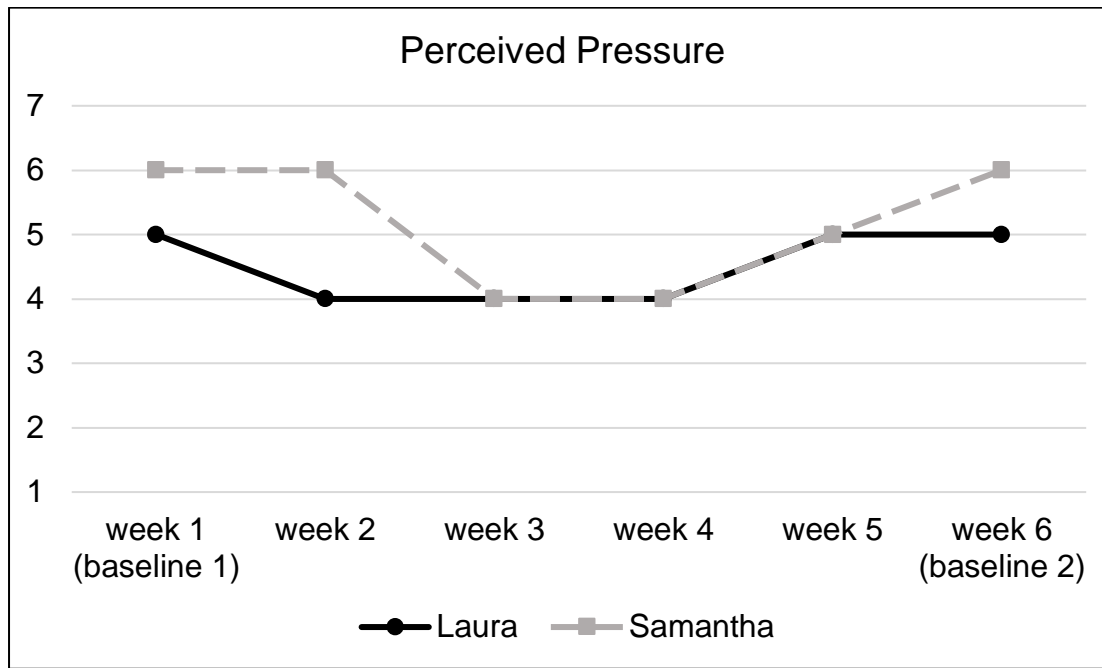


Figure 7.1
Perceived Pressure for Individual Players

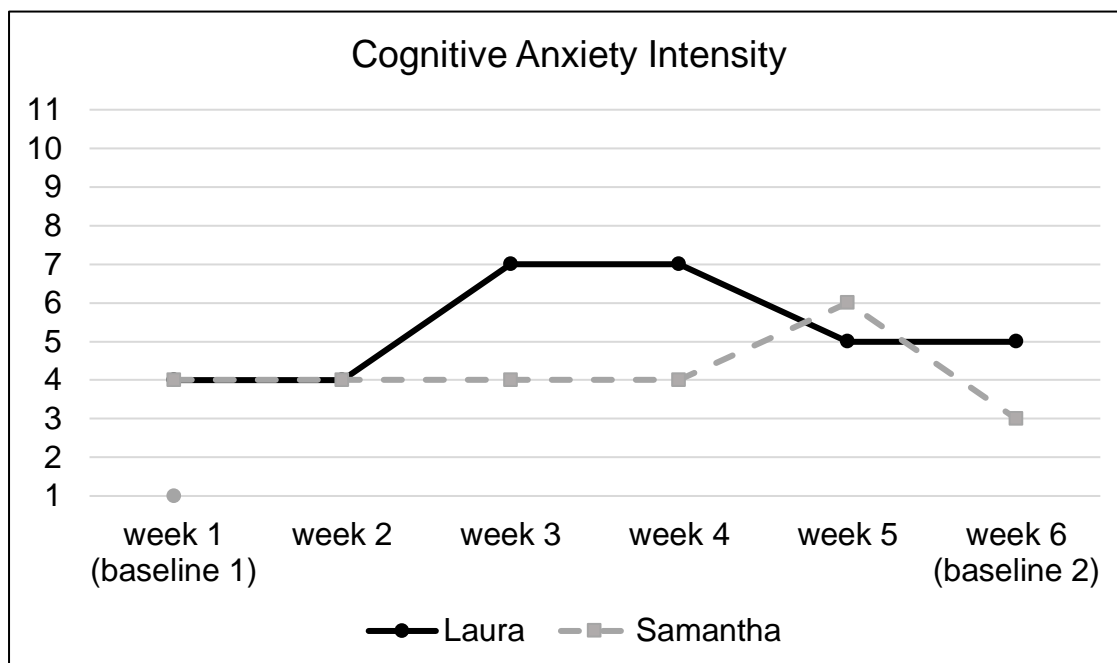


Figure 7.2
Perceived Cognitive Anxiety Intensity for Individual Players

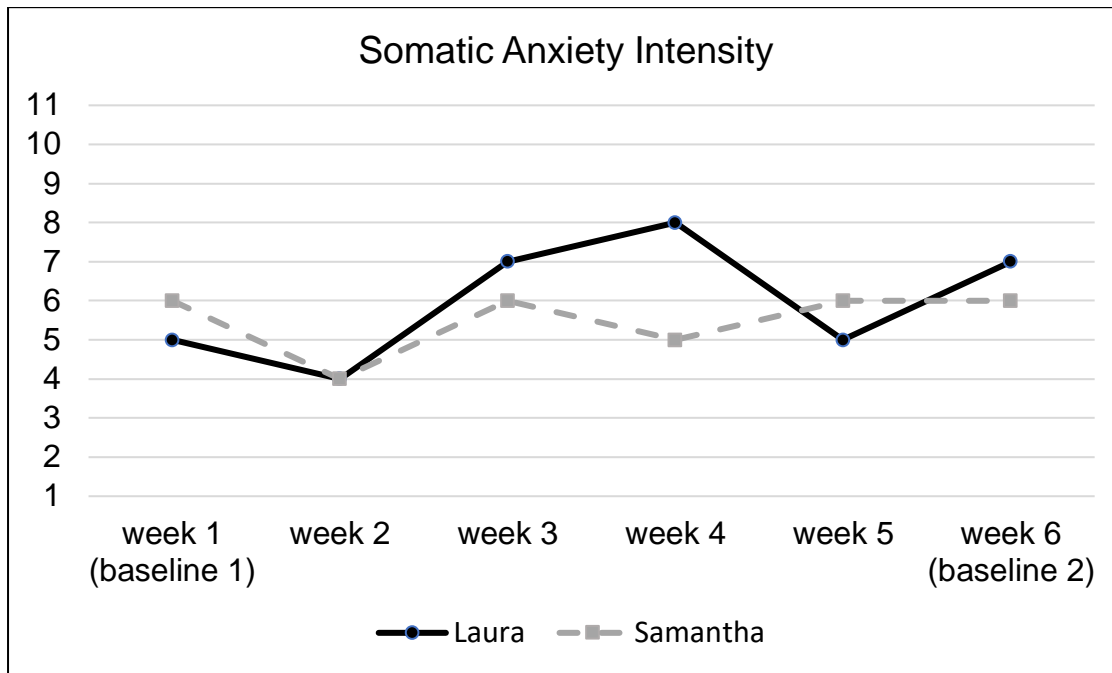


Figure 7.3
Somatic Anxiety Intensity for Individual Players

In summary, manipulation checks indicated that pressure and anxiety did not increase throughout the intervention. An increase in cognitive anxiety intensity in week 3 was statistically significant, but measures of perceived pressure and somatic anxiety did not similarly increase during that week. Furthermore, mean values of each variable indicated that absolute levels of pressure and anxiety were low to moderate on each variable's respective scale during the intervention. Qualitative themes presented in the next subsections explore potential reasons why the pressure manipulations did not increase pressure.

7.4.1.4 No Perceived Judgment

The primary pressure manipulation was the peer voting system that was intended to create pressure by increasing judgment, but players did not seem to feel concerned about judgment from each other. Player 2 said, "So me personally, I don't think it affected [me], at least consciously, because I wasn't thinking about like, 'Oh, I have to rebound because it's going to count'". Player 6 said she was aware that teammates would be voting, but she did not perceive judgment strong enough to increase pressure: "I didn't feel pressure. Like, I

didn't get nervous or anything like that. But I just was more aware that...I was looking at the people and that potentially they were looking at me".

7.4.1.5 Inauthentic Voting

The peer voting may not have created pressure also because players may not have always voted honestly. After seeing which players received the most votes, coaches suspected that some players voted for teammates who needed a boost of confidence instead of teammates who truly demonstrated the target behaviours best. Players then would not have had reason to feel judged if they knew results did not represent teammates' true opinions. Voting also may have been biased by players' preconceived notions of which teammates were already good at the target behaviours. Player 3 said:

I sometimes caught myself not realising if a person did something better today because I knew who was the consistent kind of people, you know? So there's maybe kind of like a trap that you could be falling into like just, like, [voting for] the same kind of people.

7.4.1.6 Reward Not Important

Although the chance to win a voucher was intended to add further importance to the voting, the reward may have distracted players from perceiving judgment. Player 2 said, "I don't think I play basketball to get something. It's just fun for me". This sentiment suggested a perception that the reward was the main reason for earning votes, so it may have diminished the sense of judgment or embarrassment from not being voted as one of the best performers of the target behaviours. The reward itself did not create the same competitiveness described in study 2, in which a reward became valuable because it represented beating teammates in training. Assistant Coach 1 also observed that players who had fallen out of contention for the reward may have lacked reason to earn votes:

I do just wonder if it [the intervention] needed just something a little bit extra to maybe keep the players who knew they probably weren't going to be rated high engaged, or, to put a little bit more pressure on them. Like, you know, again you're thinking, "Well, [player 3] is gonna win most of them".

7.4.2 Impact on Performance in Training

Analysis of performance in training is presented below; however, the lack of pressure limits the conclusions that can be drawn from performance by the end of the intervention. For player self-ratings, 22% of values were missing and imputed. For coach ratings, 5% of values were imputed. Means and standard deviations for player and coach ratings are presented in Table 7.3.

Table 7.3
Group Means (SD) of Coach and Player Ratings of Target Behaviours

	Mean baseline (weeks 1 & 6)	Week 3	Week 5
Player self-ratings ¹			
Hustle plays	4.40 (0.70)	4.96 (1.10)	5.14 (0.78)
Communication	5.39 (0.59)	4.73 (1.08)	5.53 (0.75)
Boxing out	4.95 (0.27)	5.27 (0.42)	4.73 (0.73)
Coach ratings ¹			
Hustle plays	4.70 (0.88)	4.51 (0.69)	4.78 (1.09)
Communication	4.41 (0.83)	4.55 (1.02)	4.63 (0.84)
Boxing out	4.59 (0.60)	4.75 (0.71)	4.96 (0.45)

Note. Means and SDs reflect calculations after missing values were imputed.

¹ 7-point Likert scale (1 = performed “hardly ever”; 7 = performed “almost always”)

7.4.2.1 Hustle plays

The main effect of intervention week on players’ self-ratings on performance of hustle plays was not significant, $F(2,16) = 2.00$, $p = 0.168$, $\eta^2 = 0.20$. Fisher’s LSD indicated that performance of this behaviour did not change compared to baseline during the intervention, according to players. Coaches’ ratings of hustle plays paralleled the self-ratings. There was no significant effect of intervention week on the behaviour, $F(2, 16) = 0.71$, $p = 0.212$, $\eta^2 = 0.19$. Post-hoc tests indicated that performance of hustle plays did not differ from baseline during the intervention.

7.4.2.2 On-Court Communication

The main effect of intervention week on self-ratings of on-court communication was not significant, $F(2,16) = 2.68$, $p = .100$, $\eta^2 = 0.25$. Fisher’s LSD indicated that ratings of

communication in week 3 were lower than baseline (-0.66, 95% CI [-1.29, -.017], $p = .045$) and that ratings did not differ significantly from baseline in week 5. This initial decrease and eventual return to baseline supported the hypothesis that performance would decline at the start of PT until players acclimated to pressure. However, coach ratings did not support this pattern. Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2(2) = 10.12$, $p = .006$. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .57$). The main effect of intervention week on communicating was not significant, $F(1.13, 9.07) = 0.41$, $p = 0.563$, $\eta^2 = 0.05$. Fisher's LSD indicated that ratings of communication did not differ from baseline during any week of the intervention.

7.4.2.3 Boxing Out for Rebounds

The main effect of intervention week on self-ratings of boxing out was not significant, $F(2,16) = 2.57$, $p = 0.108$, $\eta^2 = 0.23$. Fisher's LSD indicated that self-ratings for this behaviour in week 3 were greater than baseline (.33, 95% CI [.01, .65], $p = 0.047$). This increase contradicted the hypothesis that target behaviours would decrease early in the intervention. Although the increase could be interpreted as improved performance, the self-ratings of this behaviour returned to baseline during week 5. For coaches' ratings, Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2(2) = 8.62$, $p = .013$. Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon = .59$). The main effect of intervention week on boxing out was not significant, $F(1.17, 9.37) = 4.60$, $p = 0.212$, $\eta^2 = 0.19$. Fisher's LSD test did find that boxing out was significantly higher in week 5 compared to baseline (0.37, 95% CI [0.13, 0.61], $p = 0.007$).

Given that the intervention did not appear to increase pressure, it is not surprising that ratings of performance generally remained at baseline levels throughout the intervention. However, qualitative data revealed that the intervention may still have had benefits for training the target behaviours. In two themes from interviews, players described how the intervention may have still improved their performance of these behaviours:

7.4.2.4 Focus on Target Behaviours

Evaluating each other did help players focus on the target behaviours during training. Players were already familiar with the target behaviours before the study, but the intervention reinforced the importance of doing them. Player 4 said:

So I think it definitely helped just to put a focus on boxing out, on talking, on hustle plays and stuff like that, you know? We said we want to like do all this before the study and everything, but I think it just really highlighted...at least it helped me focus on these parts and making sure, like, "Okay, let's box out."

She further explained that focusing on specific behaviours contrasted typical trainings: "And it was also having the categories. Having the three things to focus on instead of, I don't know, 'Defence.' It was, like, kind of specific."

7.4.2.5 Increased Self-Awareness

The focus on the target behaviours increased self-awareness of how often or well one performed the target behaviours during training. Player 6 explained how she would be more aware of performance in the moment: "it made me more aware of how I was coming across. 'cause sometimes I would check myself, and I'm like, 'Damn, I'm literally doing nothing at the moment. I need to kind of pick it up.'" Player 1 also became more self-aware:

I think I was more aware when I didn't do [the target behaviour]. Whereas if I was doing it, it was fine. But I think that's what it brought me: More awareness of when I wasn't doing it. I'm like, "Damn, I need to rebound. I need to talk."

Because ratings of the behaviours did not increase over the four-week intervention, more time may have been needed to develop habits of doing the behaviours. Self-awareness, however, may be an initial step to develop these habits (Ravizza et al., 2021). When athletes can recognise the sources of stress or pressure that affect performance, they can recognise what to do to regroup and refocus (Ravizza et al., 2021). In line with the purpose of PT, Ravizza et al. (2021) argue that this self-awareness should be developed in training so that athletes can trust their ability to respond positively when uncomfortable in competition.

7.4.3 Social Validation

Results of the social validation questionnaire supported the findings that the intervention did not create pressure and had limited effects on performance of the target behaviours. Table 7.4 displays means for responses to the social validation questions. Qualitative data from post-intervention interviews elaborated on the questionnaire responses.

7.4.3.1 Significance of Intervention

The purpose of this intervention was to increase pressure in training, and players strongly agreed that feeling pressure in training was significant to their performance. Furthermore, players in the post-intervention interviews attested to their team's need for pressure in training:

7.4.3.1.1 Inconsistent Training Quality. When players reflected on the quality of their training throughout the season, they implied a need for added pressure. They described inconsistent focus and effort in training. Player 1 explained:

I think the best thing is to try to get it [training] as close as possible to a game, and I feel like we have as a team...we haven't had that consistently at all, which it shows in our games. But I do believe that when we're very competitive and we're really competing...I think that's when we're at our best, and I think that's when, like, tensions are high, the pressure is high, the aggressiveness is high.

Player 4 also observed that competitiveness of training had been inconsistent: "I think part of it is also, like, that we as a team sometimes...kind of went through the motions...So it's just like a matter of like staying like focused and not going through the motions." These views echo study 2's finding that PT may enhance the quality of training, such as by increasing athletes' effort and motivation to perform well.

7.4.3.1.2 Appropriate Target Behaviours. In addition to creation of pressure, the targeted behaviours were a second main component of the intervention, and players and coaches confirmed that the target behaviours were appropriate ones to emphasise. Communication, boxing out, and hustle plays were important for basketball in general and for this team in particular. Player 1 said the behaviours were "exactly what we struggle with day in and day out." Assistant Coach 1 observed that they were "three areas that definitely

decreased in terms of performance when we were getting under pressure in games, or when our backs were against the wall.” The target behaviours were also appropriate because they were not biased against any player’s position or level of ability. The head coach explained, “I thought [the players] chose [the behaviours] appropriately without a doubt, without a doubt. Because those are things that require very little talent, that everyone—if they’re focused and playing with energy and effort—are capable of doing.”

Table 7.4
Group Means (SD) for Social Validation Questionnaire

	Week 3	Week 5
<i>n</i>	3	5
Significance of the intervention ¹	6.00 (1.00)	6.00 (1.00)
Appropriateness of procedures ¹	4.67 (1.53)	3.60 (1.14)
Effectiveness of intervention ¹	2.33 (0.58)	4.40 (1.52)

¹ 7-point Likert scale (1 = “strongly disagree”; 7 = “strongly agree”)

7.4.3.2 Appropriateness and Effectiveness of Procedures

Despite the need for added pressure, players only moderately agreed that the procedures (i.e., pressure manipulations) were appropriate for increasing pressure. It therefore followed that in week 3, players disagreed that the PT had improved their performance of the target behaviours. Although agreement increased by the end of the intervention, it was moderate at best. In the post-intervention interviews, players and coaches felt that the intervention could have been more effective if certain conditions were present:

7.4.3.2.1 Negative Judgment. The names of the top three leaders for each target behaviour were announced or displayed each week, but players may have felt more pressure if they saw the entire standings. Player 1 said, “I feel like just voting for the top three, you’re like ‘Okay, these three people did this very well, but where does that leave everyone else?’” A desire to avoid being at the bottom could have created more pressure than the desire to be

at the top. The threat of negative judgment also could have engaged players who fell out of contention to win the rewards. Assistant Coach 1 felt that players might feel more pressure if they knew they were one of the lowest-rated players on the team, and that pressure could accelerate development of the target behaviour:

Say it was my communication that was really bad, and in the first month, I'm in the bottom four and I've got some punishment run. You better be sure that next month, I am doing everything in my power to be talking more and making sure my teammates know I'm talking more so that I can get out of the bottom four.

7.4.3.2.2 Greater Frequency and Duration. The target behaviours may have become more habitual if the intervention was implemented from the start of the season and more frequently throughout it. Four weeks may not have been long enough for players to develop the target behaviours into habits. Starting the intervention at the beginning of the season also may have integrated the target behaviours more thoroughly into the team's culture, which could allow for more impactful consequences (e.g., informing coaches' decisions about playing time). The head coach said:

Easier to do [the intervention] if we set out from the start and this is the expectation from the start of the year. Then you're coming in at the beginning of a practice, say "This is what we're doing." Like you almost don't need to mention it because we know. And there's a routine on Thursday: They have to vote.

7.4.3.2.3 Coach Reinforcement. In addition to becoming routine and familiar for players, a more integrated intervention could involve an active role for coaches. Coaches' reinforcement of the target behaviours might have improved how well players developed the behaviours into habits, but coaches acknowledged that they did not reinforce the behaviours as much as possible. Player 6 explained how coaches could verbally remind players of the target behaviours throughout training:

We could have been reminded throughout the practice. Like, if someone says to me, "We're watching you and we're watching what you do on defence." Then I'm so switched on, but I feel like we mention it at the beginning of practice, and then we don't mention it at all throughout the rest of it. I think if it was constantly dropped in and constantly, like, even from the coaches like, "That's a good hustle play," or using

the three [target behaviours]. Them almost being like the key words of practice, so that we constantly hear it.

This sentiment implies that a boundary existed between the intervention and the team's actual priorities or focus. According to Player 6, the target behaviours were also not emphasised during competition "because it was almost like, 'that's a practice thing.'" Although players chose the target behaviours, coach reinforcement may have been needed for players to internalise the value of those behaviours. PT attempts to increase the importance of performance in training, but the intervention may require performance (of the target behaviours) to have at least a baseline level of importance to players already.

7.5 General Discussion

In an intervention for a professional women's basketball team, this study attempted to build on previous findings in this thesis to test PT's effectiveness in applied settings. To create pressure, peer judgment was introduced. In line with study 2's findings, the judgment's "reach" was extended by counting vote totals toward an ongoing competition for a reward. However, results indicated that players did not perceive increases in pressure compared to non-pressurised training. Cognitive anxiety intensity did increase in week 3, but this finding was an exception instead of a pattern that distinguished the intervention weeks from baseline. The increase in week 3 should be interpreted with caution also because of a high number of missing values that needed to be imputed. Overall, the pressure manipulation checks did not illustrate a consistent pattern of increased pressure that would suggest manipulations were effective.

Although previous studies have created pressure effectively (e.g., Oudejans & Pijpers, 2009), re-using their manipulations would not necessarily represent an intervention that could be practical for consistent use in applied settings. However, previous studies would be more instructive for comparing and contrasting the properties of their effective manipulations with the current study's intervention. The shortcomings of this study could then extend study 2's findings on creating pressure. For example, this study's judgment manipulation may have

lacked key characteristics that are present in effective ones from previous studies. Evaluation by national team coaches and performance directors has increased pressure in previous studies (Alder et al., 2016; Stoker et al., 2019), and athletes are likely to associate judgment of these authority figures with concrete consequences (e.g., selection). In contrast, consequences associated with peer judgment were likely abstract (e.g., mild embarrassment) and subject to individual differences.

The evaluation by authority figures may also have been more apparent to participants in previous studies. Alder et al. (2016) directly informed participants that the coach would review and evaluate video of performance, and the performance director was positioned six feet in front of the athletes during the task in Stoker et al.'s (2019) study. Because the presence of teammates was a usual part of training for players in the current study, players could more easily forget that they were being judged. As Player 6 and coaches described, target behaviours and voting were not reinforced enough during training to maintain pressure to perform the behaviours. To create perceptions of increased importance to perform well during PT, judgment itself likely needs to be perceived by athletes and perceived as important.

The current study did attempt to make peer judgment more important by offering rewards, but the rewards may have made that judgment less important instead. Indifference to winning a store voucher resulted in indifference to earning votes, so practitioners may need to consider how various pressure manipulations will interact with each other. The combined effect of judgment and rewards was not additive. That is, increasing the number of consequences does not necessarily increase the intensity of pressure, and this finding underscores the need to use meaningful consequences. Rather than increase the number of pressure manipulations, practitioners may be more effective if they ensure that the few manipulations used are meaningful and apparent to athletes.

This study's lack of pressure also suggests that "negative" consequences would more effectively create pressure. The use of rewards and announcement of only the top performers framed the intervention as an opportunity to gain something (i.e., a voucher and positive recognition). However, the threat of losing something (e.g., a chance to be selected) or having a negative experience could create more pressure. Stoker et al. (2019) also found that rewards were ineffective whereas judgment and forfeits each created pressure separately. Creating perceptions of threat is consistent with proposed mechanisms that suggest PT improves performance by training appraisals of high-pressure situations. For example, PT may train athletes to view pressure as a challenge rather than a threat (van Rens et al., 2021), so athletes may need to first perceive threat in order to practice changing their appraisals.

Consequences may also need to be meaningful or valued for extending its "reach" to further increase levels of pressure. To extend the reach of peer judgment in this study, voting scores were totalled over the 4-week intervention and top performers were announced regularly to remind players that each practice counted toward their standing in the competition. Extended reach may help to amplify already meaningful consequences, but it was not necessarily enough to convert any possible consequence to a source of pressure. This finding may limit the applicability of extending reach, but the property may still be useful when novel and obvious sources of pressure are not available. Practitioners may have to rely on amplifying judgment from coaches, who are already typically present in training, rather than relying on the mere presence of performance directors who may not be available every time. Nevertheless, findings of study 2 are not shortcuts to creating pressure and cannot replace the need for consequences to be meaningful.

For consequences to be meaningful, athletes may need to already face at least a certain amount of pressure in training even without PT. Scores of somatic and cognitive anxiety intensities suggested that players in this study felt relatively low pressure when they trained without PT. This low baseline pressure could partially be attributed to the conditions

of the COVID-19 pandemic. Because the team had fewer players than usual, the players who did play may have felt less competition for playing time than in usual seasons. Coaches also may have been less demanding on the court in consideration of the stress that players experienced off the court due to the pandemic. A low-pressure environment may at first seem to be one that would benefit most from PT. However, a training environment may need some level of existing pressure that PT can then elevate. For example, judgment in this study may not have been meaningful to players if they knew they would keep their starting position regardless of their performance in training. PT may serve to accentuate existing pressures (e.g., the need to impress coaches), but it is not necessarily a “magic bullet” to compensate for a lack of competitiveness or intensity in training.

Despite the limitations of the study’s pressure manipulations, players did report that the intervention increased their focus on performing the target behaviours and increased their self-awareness in times when they needed to communicate, box out, or hustle more during training. There are possible explanations for these observations that seem to contradict the quantitative findings. The length of the intervention may have been too short to lead to changes in behaviour, but the increased focus and self-awareness may have been the first steps in building habits of increasing the behaviours. The use of ratings to measure performance may have lacked the sensitivity needed to detect incremental changes in behaviour, so objective measures of behaviours could enhance future studies.

7.5.1 Applied Implications

Because this study conducted an intervention in an applied setting, it has implications for practitioners and coaches conducting PT. Minimal pressure could be solved by using different pressure manipulations; however, results also suggested the conditions that practitioners can establish to increase PT’s effectiveness regardless of the pressure manipulations.

Study 3 supported upfront transparency about the role and purpose of PT, and the current study suggested that transparency involves more than explaining that added pressure is meant to be helpful. Practitioners should explain that PT is intended specifically to improve performance under pressure. Although understanding the purpose of PT does not guarantee that athletes will feel pressure, clearer communication from the researcher may have increased buy-in needed for players to engage fully in the current intervention. For example, instead of viewing the intervention as motivating them to play “to get something” (i.e., a reward), players might see more value in preparing for a specific condition that they may face in competition (i.e., pressure). Valuing this purpose could have then led to more sincere voting, which may then have increased perceptions of judgment and subsequent pressure to be judged positively. More generally, practitioners can discuss sport-specific pressure situations to clarify how and when PT is intended to help.

Another implication is for practitioners to facilitate the integration of PT into a team’s culture. Study 3 found that PT should be integrated into existing training. Although the current intervention did take place in the team’s scheduled training, it was not necessarily integrated into the team’s culture. As P6 said of the target behaviours and voting, “we mention it at the beginning of practice, and then we don’t mention it at all throughout the rest of it.” Coaches’ reinforcement of the intervention may establish expectations for displaying target behaviours and add importance to training. This increase in importance would, by definition, increase pressure, and an environment of high expectations can help establish accountability that may have been missing in this study (Fletcher & Sarkar, 2016). Practitioners therefore should train coaches to adopt an active role in PT. Reinforcement could include praising performance under pressure, reminding players about the pressure manipulations before training starts, or setting expectations for players to manage anxiety during training. Rather than assume that coaches will embrace this role, practitioners should

communicate it as a condition for PT's success and continue to encourage it throughout the intervention.

7.5.2 Limitations and Future Directions

This study had limitations in the intervention and the evaluation of the intervention. Although target behaviours were meaningful measures of performance, linking them to pressure manipulations may have detracted from the purpose of PT. Players voted for the best performers of those behaviours, but this process may have served as positive reinforcement of those behaviours instead of PT. By bringing attention to the behaviours, the intervention helped remind players what to do (e.g., box out defenders). However, PT can teach athletes to decide on their own where and how to focus their attention. For example, pressure may initially prompt athletes to worry about outcomes, but PT provides them chances to practice coping skills for re-focusing on the task. Future studies can continue to use behaviours to assess performance under pressure but implement separate pressure manipulations that do not reveal desired behaviours.

Another limitation was the attempt to pressurise entire training sessions, rather than specific drills within the training session. Van Rens et al. (2021) found that pressure from a given consequence can decline over multiple days of PT, and a similar decline may occur within a single session as it progresses and players forget about the consequence. Pressurising single drills or practice games could provide more acute bouts of pressure. However, designing individual PT drills underscores the importance of collaboration. Practitioners and coaches would need to identify the drills, how to apply the pressure manipulation, and explaining them to players. During a team's competitive season, such collaboration would necessarily be only one of a coach's multiple priorities.

Finally, analysis of group means can provide only limited insight into individual experiences of a team-sport intervention. The design of the intervention did not necessarily account for individual differences in responses to pressure manipulations, and group means

did not reflect differences in individual perceptions of pressure. Future studies would benefit from single-subjects designs, which can illustrate individual experiences throughout an intervention. Mace et al. (1986) and Mace and Carroll (1986) conducted case studies on gymnasts and squash players, respectively, but no single-subject studies have examined PT in team sports. The current study did present complete data of two players, but more case studies from a team could show the uniformity or variety of responses to the intervention.

7.5.3 Conclusion

This study sought to apply findings from studies 2 and 3 and address limitations of previous research. Specifically, it developed pressure manipulations to be feasible and sustainable in applied settings over time, and it measured PT's effect on behaviours that participants considered meaningful for performance. Although the intervention did not increase pressure as intended, results offered insight into how to increase pressure. In contrast to the rewards used in this study, negative implications of that judgment could create more pressure. Qualitative feedback from participants suggested a bi-directional relationship between pressure manipulations and the training environment. While pressure manipulations are the tools intended to create pressure, the environment may also moderate the effectiveness of the manipulations. In particular, coaches can reinforce the importance attached to manipulations and the value of performing well during PT. Practitioners can actively work with coaches to create this environment. This finding echoes this thesis' theme in which pressure manipulations and delivery interact to impact the effectiveness of PT interventions.

Chapter 8: General Discussion

8.1 Introduction

This general discussion synthesises the findings of this thesis. After a summary of the results, their significance and contributions to the literature are discussed. The next sections suggest applied implications and discuss the strengths and limitations of the research. To conclude, the last section outlines directions for future research.

8.2 Summary of Results

This thesis examined the implementation of pressure training (PT) in applied sport settings. The aims of the research were to: a) assess the strength of PT's effect on performance, b) extend Stoker et al.'s (2016) framework for creating pressure, and c) identify aspects of effective delivery of PT. Four studies were conducted, and results identified guidelines and considerations for practitioners and coaches conducting PT with athletes.

To assess PT's effect on performance, study 1 conducted a systematic review and meta-analysis of PT interventions. Twelve out of the 14 included interventions improved performance, and their moderate effect size was similar to that of other performance enhancement interventions (Brown & Fletcher, 2017). Subgroup analysis investigated whether PT was more or less effective depending on any of four factors (performance level, domain, length, or type of skill), but no factor did moderate effectiveness. Subgroup analysis was limited to examining factors that were reported in studies and could be divided into distinct categories (e.g., novices versus experts). Pressure manipulations are a factor that might influence effectiveness, but they could not be used to divide studies into subgroups because many studies combined several manipulations in the same intervention (e.g., both forfeits and rewards). This limitation of study 1 prompted study 2 to adopt alternative methods to investigate creating pressure.

Through interviews with sport psychologists and athletes who had experience with PT, study 2 explored how sport psychologists create pressure. Thematic analysis identified

common properties of the pressure manipulations that participants described as effective. These properties were: a) extending the reach of consequences, b) simulating psychological demands of competition, and c) approximating, but not replicating, intensity of competition pressure. Extending the reach of consequences could refer to increasing the impact of judgment beyond a brief moment during training. Reach could also be extended by applying forfeits to teammates in addition to the individual who failed to perform up to standards in PT, thus increasing the individual's responsibility.

Demands that created pressure presented athletes with challenges that were psychological in nature rather than physical or tactical. Psychological challenges included performing on demand, coping with uncontrollable factors, or facing unfairness. Although psychological demands and consequences with extended reach do not necessarily encompass every possible pressure manipulation, they distinguished some effective ones among the many potential ones that a practitioner might consider. The theme of approximating competition pressure meant that these manipulations could be effective even if they did not perfectly replicate the intensity of pressure in competition. In fact, increasing pressure gradually could facilitate individuals' learning.

Study 2 also explored PT's mechanisms for improving performance. Participants did not necessarily find that PT reduced perceptions of pressure in training. Instead, it provided an opportunity to learn and practice skills for coping with pressure. Athletes tried and refined coping skills, such as refocus routines, that they had learned in other mental skills training. PT also changed athletes' relationship with pressure because they could observe that pressure would not necessarily hurt performance. Furthermore, pressure improved the overall quality of training because athletes had more reason to focus, in contrast to typical training that could sometimes become monotonous to them.

Pressure manipulations do not, on their own, guarantee the benefits described in study 2, so study 3 examined characteristics of practitioners' delivery that enhanced PT's effectiveness. Interviews were conducted with the same sample of sport psychologists and athletes who participated in study 2, and four themes detailed how practitioners developed and conducted PT. The theme of collaboration with athletes and coaches described how practitioners tailor PT to specific contexts and provide athletes and coaches with autonomy to influence the training. In the theme of promoting learning before and after PT, practitioners conducted workshops to teach coping skills and conducted debriefs to encourage athletes to reflect on performance in PT. In the theme of upfront transparency, practitioners made clear to athletes that PT was intended to help them, despite potential discomfort from feeling pressure. Finally, PT was integrated into training sessions. Rather than a separate event, PT was a part of preparing for competition along with physical or tactical training.

The purpose of study 4 was to apply findings from studies 2 and 3 in a PT intervention for a professional female basketball team. In line with study 2, the intervention attempted to create pressure by applying a consequence with extended reach. Players voted for their teammates who performed best on each of three target behaviours in training, and the "reach" of this peer judgment was extended by tracking voting results and announcing them over the course of the intervention. Pressure was measured via a perceived pressure scale, which was a one-item questionnaire, and via the MRF-2md, which measured cognitive and somatic anxiety. To measure performance, this study had each player rate her own performance of target behaviours in PT. Coaches also rated each player on the same behaviours. In line with study 3, players collaborated with the researcher to determine the target behaviours, and the PT was integrated into the team's training sessions.

Study 4's intervention failed to increase pressure and therefore did not improve performance as intended. Mean perceived pressure and anxiety intensity were not higher in

the intervention phase compared to two baseline measurements. However, post-intervention interviews identified possible explanations for the ineffectiveness. In terms of creating pressure, a negative consequence (e.g., forfeit, judgment of poor performance) may matter more to players and create more pressure compared to this study's rewards and recognition of top performers. The positive consequences in this study may have framed PT as an attempt to motivate players rather than test abilities under pressure. Extended reach might help to amplify a consequence's pressure, but that consequence may need to be meaningful to athletes in the first place. In terms of delivery, integration of PT should involve more than taking place within a training session. Integrating PT into the team's culture could make consequences more important to athletes, and coaches can foster this integration by verbally reinforcing the consequences, performance standards, or target behaviours during training sessions.

8.3 Significance and Contribution to Knowledge

This section synthesises key findings from the four studies and discusses their significance and contribution to knowledge.

8.3.1 PT Effectiveness: Improving Performance Under Pressure

This thesis clarified what constitutes effectiveness when evaluating PT. The studies considered the end goal of the intervention as well as incremental measures of progress. Study 1's meta-analysis operationalised effectiveness as improvements in performance in post-tests under pressure compared to pre-tests. Importantly, this definition emphasised that PT is designed specifically to target performance under pressure—not simply overall performance in any situation. Study 1's findings indicated that PT could in fact improve performance. Out of 14 interventions, twelve demonstrated that intervention groups improved performance under pressure after receiving PT. The magnitude of the moderate effect matched that of other performance-enhancement interventions in Brown and Fletcher's

(2017) meta-analysis. Furthermore, recent PT interventions have demonstrated that PT and these other interventions can complement, rather than compete with, each other (Kegelaers et al., 2021; van Rens et al., 2021). For example, practitioners can teach athletes a coping skill in a workshop so that athletes can practice it in PT. Among the individual effects of included studies, low heterogeneity indicated that the effect was consistent across different studies with various populations.

When considering to test or implement PT, the intervention's magnitude and consistency are important in light of the risk (or perceived risk) to athletes' wellbeing. That is, to invest time in developing and conducting PT, practitioners may want to know that PT can make an impact that is worth that time and effort. Study 1's results supported the potential value of PT to performance. Despite this initial evidence, there remained a need to further advance understanding of effectiveness. Study 1's findings reflected results in experimental and training settings, but improvements in competitive or "real-world" performance would strengthen practitioner's confidence in an intervention (Martin et al., 2005). Measuring competitive performance under pressure is challenging. The occurrence of pressure in competition can be unpredictable and subjective, and performance can be subject to confounding variables (e.g., opponents or weather). Therefore, subsequent studies in this thesis investigated processes and incremental measures that might indicate whether athletes are learning and improving from PT.

In study 2, mechanisms for improving performance highlighted the unique benefits that PT provides. Athletes gained personalised experience that helped them learn specifically about themselves under pressure. Often facilitated by reflection in debriefs, athletes could learn how they tend to think, feel, and behave under pressure. During PT itself, they could practice and refine coping skills in conditions that resemble situations in which they would need those skills. In fact, it seems necessary for training to prompt certain thoughts and

feelings (e.g., anxiety) if athletes are to ever practice mental skills for coping with those thoughts and feelings. PT's influence on "relationships" with pressure also demonstrated benefits of hands-on experience of performing under pressure. Although practitioners can teach related skills outside of PT (e.g., cognitive restructuring; Kent et al., 2018), PT provided athletes evidence from their own experience that pressure did not have to hurt performance. Competition might also serve as an opportunity to learn, but "constructed challenges," such as PT, could accelerate learning more systematically than waiting for each athlete to encounter pressure in competition (Collins et al., 2016).

Study 4 tested if these learning processes would translate to on-court behaviours that are important for performance in basketball. Coaches and players assessed the frequency of behaviours such as "boxing out" for rebounds and communication. Behaviours are a more meaningful measure of PT's effect than psychological constructs, such as resilience, have provided in previous PT intervention studies (Kegelaers et al., 2021). If PT is intended to ultimately improve performance outcomes, it needs to change what athletes do to achieve those outcomes. Although study 4 still only measured behaviours in training, future research can work to refine and translate similar measures to competition. For example, longer interventions may allow for more opportunities to measure key behaviours in high-pressure situations in matches.

8.3.2 Increase Importance to Increase Pressure

Creating pressure is an essential yet understudied aspect of implementing PT (Stoker et al., 2016), so this thesis examined the process of creating pressure in applied settings. Research has focused more on PT's effects and less on how to create the pressure that produces those effects. In some interventions, levels of pressure were not measured (Kegelaers et al., 2021; van Rens et al., 2021). Other interventions have measured anxiety due to a combination of pressure manipulations but did not examine how or why their

pressure manipulations were or were not effective (e.g., Alder et al., 2016; Oudejans & Pijpers, 2009). Studies 2 and 4 of this thesis, however, offered conceptual clarity for understanding pressure. Findings highlighted the difference between pressure and other forms of challenge, and specific recommendations illustrate how applied practice can reflect the findings. This thesis therefore added balance to the literature by considering what practitioners can, or need, to do and consider to achieve the desired effects of PT.

Study 2 reinforced that pressure, by definition, involves an increased sense of importance to perform well. When practitioners extended the reach of judgment, performance results would be exposed to a wider audience for a longer time. This exposure increased importance because the potential for negative emotions (e.g., embarrassment) or ramifications (e.g., influence on selection) could increase when results would be widely available instead of forgotten after one repetition or drill. For forfeits, extending reach increased importance because an athlete would have more responsibility if poor performance would result in forfeits for teammates instead of only for that individual. When psychological demands were applied, they signalled the importance to perform (i.e., execute skills successfully). For example, asking an athlete to perform on demand required him or her to execute skills without the luxury of taking several chances and adjusting after mistakes. As one athlete described it, PT trained her “skill at competing.”

Given Baumeister’s (1984) definition of pressure, increasing importance may seem an obvious requirement for creating pressure; however, some common attempts to increase pressure may be ineffective because they do not target the importance of performing well. In Stoker et al.’s (2016) study, coaches reported relying on demands that may have increased difficulty of a task, but increasing difficulty does not necessarily increase pressure if athletes do not have added reason to value the outcome of that task. In fact, higher demands could potentially lower perceived expectations to perform as well as expected for an easier task

(Stoker et al., 2017). The difference between difficulty and importance reflects a broader distinction between PT and other training that also simulates aspects of competition. Study 2's participants described competition "run throughs" that familiarise athletes with the surroundings and flow of events of competition, and constraints-led approaches train technical skills (Renshaw et al., 2019). Such training could benefit athletes but not necessarily train coping with pressure. Because these forms of training each have distinct aims, practitioners should be sure to increase perceptions of importance if the intent is to improve coping with pressure.

Although study 4 did not increase pressure or improve performance, the lack of pressure suggested factors that may have limited the effectiveness of pressure manipulations. For judgment in particular, one factor may be the implications that the judgment has for the athletes. Study 4's peer judgment may have lacked the implications of judgment by authority figures that has been effective in previous studies (e.g., Alder et al., 2016; Stoker et al., 2017). When a performance director or coach judges performance, implications are likely to be concrete and apparent (e.g., selection) whereas implications of peer judgment were, at most, abstract (e.g., mild embarrassment) and subjective. Judgment therefore may increase pressure when it has future impact on something that the athletes value.

The potential for negative implications (e.g., deselection or loss of playing time) could make performing well especially important. Whereas study 4's procedures recognised the best performers after each round of peer judgment, announcing results for all players might have raised pressure more for two reasons. First, it can keep athletes engaged even if they are not likely to be the very best in a group. Second, athletes have been shown to be susceptible to loss aversion bias, which is the motivation to avoid losses more than to gain something of similar magnitude (Elmore & Urbaczewski, 2021; Riedl et al., 2015). Negative

consequences in PT could present athletes with a potential loss, such as the loss of a coach's confidence and subsequent loss of playing time.

Furthermore, individuals may be more motivated to avoid negative judgment than to earn positive recognition, even without a concrete implication. Baumeister et al. (2001) observed that for many psychological phenomena, "bad is stronger than good." In the example of self-concept, people strive harder to protect themselves from becoming an undesired self than they do to become their ideal self (Baumeister et al., 2001). In PT, a pressure manipulation that poses a threat to athletes' self-concept (e.g., of being a good player) might prompt athletes to strive to avoid that threat. In contrast, study 4's results indicated that the opportunity for positive recognition and rewards did not create pressure on players to enhance their self-concept.

A distinction exists between the environment that PT attempts to create (i.e., pressure) and the responses that PT attempts to train. At first glance, negative consequences may appear to encourage performance-avoidance goals (i.e., focus on avoiding demonstrating incompetence) even though research suggests that performance-approach goals (i.e., focus on demonstrating competence) lead to better performance (Elliot et al., 2006; Lochbaum & Gottardy, 2015). However, PT's purpose is to train athletes to respond adaptively to challenging conditions. PT parallels exposure therapy in this way. Exposure therapy seeks to activate a patient's fears so that they can be modified (Foa & Kozak, 1986; Rauch & Foa, 2006). Similarly, PT creates pressure under which athletes may initially respond maladaptively (e.g., choke) so that athletes can better understand and modify that response.

8.3.3 Consider Properties of Pressure Manipulations

In addition to being positive or negative, pressure manipulations can have other properties that might elevate the level of pressure that they create. Previously, Stoker et al. (2016) categorised pressure manipulations into consequences and demands. Each category

was also divided into sub-categories (e.g., rewards, forfeits, and judgment). The current thesis extended this framework by identifying common properties of some effective pressure manipulations. One example is the “extended reach” of consequences. These properties suggest that even manipulations within a category are not necessarily equally effective. Although Stoker et al. (2017, 2019) found that some categories (e.g., forfeits, judgment) create more pressure than others, how practitioners frame and reinforce a consequence could be just as important as its category. For example, athletes may feel a sense of judgment if their performance director watches training, but this feeling could be amplified if their performance is tracked and displayed publicly for the director to see throughout the training.

One might argue that understanding categories is sufficient because a practitioner would then tailor them to the athletes participating in PT, but properties can be useful in this tailoring process. Targeting certain properties could help practitioners facilitate discussions with athletes and coaches about designing PT. For instance, if athletes and coaches suggest several ideas that would be categorised as “demands,” findings from this thesis would guide the practitioner to support using the demands that are psychological in nature rather than technical or tactical. Thus, while athletes contribute knowledge of themselves, knowledge of properties can be practitioners’ distinct contribution that helps ensure that PT is not only autonomy-supportive but also effective.

8.3.4 Collaborate with Stakeholders and Integrate PT into Training

Delivery of PT can distinguish PT in applied settings from lab experiments that have tested training under pressure. In study 3, themes described processes that addressed practical or logistical challenges when working with athletes and teams. For example, collaboration with athletes and coaches helped identify pressure manipulations appropriate for each specific context. Even if practitioners followed Stoker et al.’s (2016) framework, they may not know the exact pressure manipulations to select for a particular group without asking

athletes or coaches for input. In the theme of integrating PT into training, participants described how PT could occur more frequently and require less preparation when it took place during training sessions instead of as a separate event.

In addition to the practical value of collaboration and integration, the same processes more importantly promoted working alliances and receptiveness to the interventions. When athletes and coaches collaborated with a practitioner, the opportunity to influence the intervention showed athletes that practitioners were doing PT “with” them, rather than “to” them as if it were a punishment. Collaboration with coaches showed them that practitioners were not trying to infringe on coaches’ territory. Similarly, integration of PT into training could communicate that PT was a part of training or way to enhance training. Whereas separate events could deter athletes by drawing excessive attention to attempts to increase pressure, routinely pressurised drills could keep athletes focused on performing in the drill instead.

Study 4’s qualitative results added depth to the theme of integration. PT was integrated into the team’s training in that the intervention took place within training sessions. However, PT was not necessarily integrated into the team’s culture. Players may have valued peer judgment and the target behaviours more if coaches’ praise and criticism reinforced the behaviours throughout training. Even though players chose the target behaviours, choice was not sufficient to keep players focused on performing the behaviours. Without thorough integration, the overall goals of training (e.g., preparing for the next competition) did not necessarily align with the target behaviours. This finding supports an active role for the practitioner in PT. Collaboration may need to be an ongoing process in which practitioners work with coaches to emphasise sources of pressure and the need to perform.

8.4 Applied Implications

This thesis supported the use of PT to improve performance under pressure, and it also suggested that performance improvements depend on how practitioners create and deliver the intervention. Study 1 found that training athletes under pressure led to better performance under pressure compared to non-pressurised training. Practitioners may already conduct interventions that target performance under pressure, but PT could complement those interventions. In study 2, participants explained that PT provides opportunities to practice coping skills and learn to view pressure productively. Although mental skills training may help prepare athletes for PT (Driskell et al., 2014), the benefits described in study 2 may require first-hand experience of pressure. Despite these benefits, creating pressure can be challenging and raise ethical concerns for athletes' wellbeing. The rest of this thesis addressed these barriers to PT and has several applied implications.

When planning PT, practitioners should distinguish PT from other forms of simulation training (e.g., competition "run-throughs"). The distinction between these forms of training is significant because PT's purpose should inform the design of the intervention. Study 2 found that effective pressure manipulations include psychological demands and consequences with extended reach, and these categories describe pressure manipulations that increase importance to perform well during training. Even though PT did not perfectly replicate competition's intensity of pressure, athletes in study 2 learned from the chance to cope with the same nature of thoughts and feelings that they would have in competition. Furthermore, study 4 demonstrated the need to clarify PT's purpose to athletes. Some players viewed PT as an attempt to motivate them, so they may have engaged less with the intervention because they did not feel that they needed motivation to play their sport. An initial step to generate buy-in may be to specify how and when PT may help athletes in competition.

To achieve the purpose of PT, the threat of negative consequences for athletes may be necessary. In study 4, the opportunity for rewards and recognition for performing well did not create pressure. Participants explained that they would feel more pressure if all results, including the lowest performers, had been announced. Stoker et al. (2017) similarly found that judgment and forfeits each increased pressure more than rewards did. In study 2, the theme of consequences with extended reach exclusively discussed forfeits and judgment, and psychological demands introduced adverse circumstances and feelings, such as unfairness and uncertainty.

Negative consequences might seem to pose a risk to athletes' wellbeing, but a supportive and collaborative environment can help to mitigate this risk (Fletcher & Sarkar, 2016). When designing pressure manipulations, practitioners should collaborate with athletes to establish agreement on the pressure manipulations before expecting participation in PT. In study 3, sport psychologists advocated upfront transparency with athletes about the details and purpose of PT. Collaboration may generate a sense of autonomy that increases athletes' willingness to participate too. Before, during, and after PT, practitioners have opportunities to promote learning. For example, practitioners can teach athletes coping skills that prepare them for pressure in PT. By including this collaboration and teaching along with negative consequences, practitioners can communicate that PT is part of athletes' preparation, not a punishment. Given the importance of athletes' engagement in an intervention (Sharp et al., 2015), these aspects of delivery are essential not only for managing risks but also increasing effectiveness.

Another theme throughout this thesis has been the involvement of coaches in PT. Coaches have multiple roles to play in PT. In study 3, sport psychologists explained the value of collaborating with coaches to identify pressure manipulations that are meaningful to a specific team or athlete. Coaches can identify the physical drills or skills to pressurise, and

they can lead debriefs. Study 4 underscored the need for coaches to reinforce pressure manipulations. Some coaches may already pressurise training without the assistance of a sport psychologist, as two athletes in studies 2 and 3 described. Whether they work independently or in collaboration, their involvement may help integrate PT and performing under pressure into a team's culture, which could in turn increase athletes' buy-in. For practitioners, establishing a strong working alliance with coaches may be a critical first step of PT. In particular, practitioners should clarify the need for coaches to participate throughout the process of designing and delivering PT.

8.5 Strengths and Limitations

This thesis had strengths that enhanced its findings and their applicability. One strength was its mixed-methods approach that helped studies to answer their research questions. In studies 2 and 3, qualitative methods provided insight into experiences of PT that study 1's meta-analysis did not capture. Within study 4, mixed methods were used to evaluate the intervention's effectiveness and provided more depth of understanding than either quantitative or qualitative methods alone could provide.

Another strength was the studies' focus on applied practice. This thesis began with a quote from the Olympic gymnast Max Whitlock, describing his training that simulated the high-pressure atmosphere of defending his gold medal. Similarly, studies 2 and 3 aimed to learn from what elite athletes and sport psychologists already do to prepare for pressure, and the findings demonstrated that PT is feasible and relevant when working with athletes in highly competitive environments. Study 4 applied the findings from the first three studies in a PT intervention. By taking place within training sessions during the team's competitive season, this intervention encountered challenges of conducting PT in applied settings. Participants' reflections after the intervention offered solutions for addressing those

challenges. In addition to applied implications, this thesis also extended Stoker et al.'s (2016) framework for creating pressure and contributed explanations for PT's effect on performance.

Despite its strengths, the thesis also has limitations. First, findings may not generalise to lower levels of sport due to the studies' participant samples. Participants in studies 2 and 3 were exclusively international-level athletes and sport psychologists who had worked at the international level. Study 1 did show that novices might benefit from PT, but there may be differences in how practitioners should conduct PT for lower-level athletes compared to elite athletes. Study 4 attempted to apply findings from the first three studies in a setting of competitive but lower-level sport compared to the elite sample in the two qualitative studies. The ineffectiveness of study 4's intervention could support the need for more population-specific research on PT. However, although qualitative studies can lack statistical-probabilistic generalisability, they can generalise in other ways (Smith, 2018). For instance, transferability occurs when individuals from another setting can consider adopting findings from another setting (Smith, 2018). This thesis has presented detailed descriptions of PT and raw data that allow readers to judge if they can apply such findings to the setting in which they work.

Another limitation is the reliance on participants who likely had favourable experiences of PT. For studies 2 and 3, sport psychologists were recruited if they were known to conduct PT, and several athletes were recruited through recommendations from these sport psychologists. Although some findings do reflect learning from mistakes and initial scepticism about PT, understanding of PT could be strengthened by perspectives of individuals who have had negative experiences with the intervention. Such individuals could illuminate issues that the current sample did not discuss. Study 4 illustrated this value as players and coaches explained ways to improve the intervention, and these perspectives expanded on themes from qualitative interviews in the previous studies.

Finally, measurement of PT's effect on performance was limited. Similar to other PT research, this thesis did not measure changes in performance under pressure in competition. Study 1 quantified changes in performance under pressure, but the majority of included studies took place in experimental settings instead of in athletes' competition. Bell et al. (2013) did measure competitive performance, but the researchers acknowledged that even this performance did not necessarily represent performance under pressure. Competitive performance under pressure is challenging to measure because pressure situations do not occur frequently or predictably and because various factors in addition to pressure could influence outcomes. Study 4 proposed that behaviours that are important for performance could be an intermediate measure of PT's effect. Still, study 4's measurements relied on self-report ratings. More measures, such as coaches' observations of key behaviours, are needed to strengthen evidence of PT's impact. Consistent with a key theme of this thesis, improvement of measurement may mean that research, as well as applied practice, requires strong collaboration with coaches.

8.6 Future Directions

Future research can study which populations would most benefit from PT and which settings would be most conducive to it. This thesis examined a variety of populations, such as athletes from different levels of competition and types of sports. As the previous section described, generalisability may be limited. Nonetheless, instead of focusing on labels such as "elite" and "non-elite," future research may be more informative if it examines the environments and characteristics of individuals that are conducive to creating pressure and delivering PT. Based on study 4, one such condition could be the baseline level of pressure in training without PT. Research can consider if a training environment needs to already apply a certain level of pressure that pressure manipulations can then amplify. This baseline pressure could come from internal competition for playing time, selection, or desire to impress

coaches. Rather than try to create a sudden spike in pressure, practitioners and researchers may consider more incrementally increasing pressure. Future studies can also investigate individual characteristics, such as trait anxiety, to see if they predict responses to pressure manipulations.

Another need is to continue examining properties of pressure manipulations and key aspects of delivery. Findings in studies 2 and 3 were not exhaustive. Future studies can explore creating pressure and delivering PT from different perspectives. Although Stoker et al. (2016) did interview coaches about creating pressure, no studies have explored how coaches deliver PT or how they work with sport psychologists to deliver PT. The theme of integration into training encourages coaches to participate in the delivery of PT. In fact, two athletes in studies 2 and 3 referred to PT that was led by coaches without the help of a sport psychologist. In addition, more interventions and experiments are needed to test qualitative findings. For example, future studies can test the level of pressure created by psychological demands compared to environmental or task demands to verify if the psychological nature is the property responsible for their effectiveness.

Conducting PT for a team sport presented several challenges in study 4, but research should continue to investigate PT in team sports. This thesis and other researchers (e.g., Fletcher & Arnold, 2021) have emphasised that pressure manipulations should be tailored to the athletes participating in PT, but a selected pressure manipulation may not create pressure for a whole team. Moreover, little research has examined individuals' perceptions of pressure on team tasks compared to individual tasks. Recent interventions have studied team sports, but the pressurised drills have involved mostly individual or small-sided tasks (Kent et al., 2021; van Rens et al., 2021). Despite the challenges, research should continue to test PT with team sports because many of them primarily involve open skills that require decision making.

Pressure has been shown to impair decision making in team sports (Kinrade et al., 2015), and study 1 showed that PT could improve performance of open skills.

8.7 Conclusion

This thesis addressed three aspects of PT to enhance the intervention's effectiveness in applied practice. First, it evaluated the strength of PT's effect on performance. Evidence of PT's effect and its potential to complement other interventions encourages practitioners to conduct PT. Second, to support practitioners in doing so, studies explored creating pressure. Properties of pressure manipulations can guide creating pressure within the constraints of applied settings, and they also provide conceptual clarity by reminding practitioners that pressure not only poses a challenge but specifically increases the sense of importance to perform. Finally, as much as this thesis examined the content of PT, the research sought to account equally for the role of a practitioner's delivery of an intervention. Processes such as collaboration or integration into training can increase athletes' receptiveness to and understanding of PT, which in turn can lead to a more effective intervention. In summary, this thesis endorsed the use of PT while highlighting its complexity conducted in athletes' training sessions. Although the creation of pressure can alone consume practitioners' careful consideration, findings also illustrated the practitioner's role extends to shaping the processes and environment that enable PT to enhance performance.

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Appendices

Appendix A: Interview Guides (Studies 2 and 3)

Guide for Sport Psychologist Interviews

Creation of Pressure

1. What are some times when you have observed athletes under pressure during training?
2. What situations or factors increase the importance for athletes to perform well in training?
3. Can you describe your experience conducting pressure training?
 - a. How do you choose which physical skills or situations to pressure train?
4. What methods have you used to intentionally increase pressure during training?
5. How do you know when you have put athletes under enough pressure?
6. Can you tell me what factors a coach could consider to ensure athletes feel the right amount of pressure in training?
7. How do you determine how frequently to conduct pressure training?

Role of Pressure Training

8. How does pressure training affect the way athletes think, feel, and perform in training?
 - a. How does the effect change over time?
9. How has pressure training impacted the way athletes perform in competition?

Guide for Athlete Interviews

Participating in Pressure Training

1. How have coaches/sport psychologists intentionally increased pressure during training?
 - a. What methods work best? Why?
2. Can you take me through a pressure training session?
3. How did you respond to the pressure when first doing pressure training? (E.g., thoughts, performance, feelings)
 - a. How has that response changed over time?

Role of Pressure Training

4. How did you respond to the pressure when first doing pressure training? (e.g., thoughts, performance, feelings)
 - a. How has that response changed over time?
5. How has pressure training helped you cope with pressure, if at all?
 - a. Do different methods of creating pressure help you in different ways?

Delivery of Pressure Training

6. How was PT introduced to you?
7. Besides increasing pressure, what else do sport psychologists do that makes pressure training effective?
 - a. What else would you want in PT to make it helpful or effective?

Appendix B: Perceived Pressure Scale (Study 4)

Compared to most practices, how important did you feel it was to perform well today?

Much less important 1 2 3 4 5 6 7 Much more important

Same as usual

Appendix C: Mental Readiness Form-2md (Anxiety Scales Only; Study 4)

My thoughts were:

Calm 1 2 3 4 5 6 7 8 9 10 11 Worried

These thoughts were:

Very negative for performance -3 -2 -1 0 +1 +2 +3 Very positive for performance

My body felt:

Relaxed 1 2 3 4 5 6 7 8 9 10 11 Tense

This feeling in my body was:

Very negative for performance -3 -2 -1 0 +1 +2 +3 Very positive for performance

Appendix E: Post-Intervention Guide for Player Interviews (Study 4)

1. This training tried to increase urgency or importance to perform well in practices. Can you describe your thoughts about the training? Did it work?
2. What was good or bad? Why?
 - a. Specifically, about the way we tried to increase urgency?

Social significance of intervention goals

3. Can you describe the level of urgency/pressure that you want in practice for the team to perform well? Why?
 - a. How well do typical trainings reach that level?
4. How important to you are the behaviours that we focused on (vocal on defence, boxing out, hustle plays)?
 - a. How/why are they important or not important?
 - b. Were there other behaviours we should have focused on?

Social appropriateness of procedures

5. What was it like training while knowing teammates/coaches would be voting for who performed best?
 - a. What did you like or not like about it?
6. How did the training affect how you performed in training or competition?
 - a. Thoughts, feelings, behaviours
7. How could the training be improved?
 - a. Relevance to you and this team?
 - b. Help learning coping skills?
 - c. Collaboration with players/coaches?

Social importance of intervention effects

8. How satisfied are you with the effects of this training? Why?

Appendix F: Post-Intervention Guide for Coach Interviews (Study 4)

1. This training tried to increase urgency or importance to perform well in practices. Can you describe your thoughts about the training? Did it work?
2. What was good or bad? Why?
 - a. Specifically, about the way we tried to increase urgency?

Social significance of intervention goals

3. Can you describe the level of urgency/pressure that you want in practice for the team to perform well? Why?
 - a. How well do typical trainings reach that level?
4. How important to you are the behaviours that we focused on (vocal on defence, boxing out, hustle plays)?
 - c. How/why are they important or not important?
 - d. Were there other behaviours we should have focused on?

Social appropriateness of procedures

5. What do you think about the use of peer judgment (i.e., voting) to create pressure?
 - a. What did you like or not like about it?
 - b. What effects, if any, did voting on these three behaviours have on players in practices?
6. What do you think about coaches voting instead of players?
7. Trainings like this depend on setting up and delivering it well (explaining to the team, reinforcing, clear instructions). How do you feel about the set-up and delivery of the training?

Social importance of intervention effects

8. How satisfied are you with the effects of this training? Why?