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ELITE ATHLETES' PERCEPTIONS OF PSYCHOLOGICAL PRESSURE DURING THE LASER RUN ELEMENT OF MODERN PENTATHLON: A QUALITATIVE ANALYSIS

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ABSTRACT

This exploratory qualitative study examined elite modern pentathletes' experiences of psychological pressure during the laser run, a decisive endurance-precision event combining high-intensity running with laser shooting under cumulative fatigue. Six elite modern pentathletes (five male, one female) with extensive age-group and/or senior international competition experience participated in semi-structured interviews exploring their perceptions of pressure sources, temporal experiences, and regulation strategies during the laser run. Data were analyzed using thematic analysis, generating four themes: performance pressure comes from self, pressure build-up, physical changes, and performance pressure strategies during races.

Athletes described pressure as predominantly self-generated, arising from internal expectations and interpretations of performance significance rather than external demands. Pressure was experienced as a cumulative temporal process, developing over the days before the competition, intensifying on race morning, and peaking during critical moments of the laser run. Notably, pressure manifested as an embodied experience, expressed through altered running pace, disrupted shooting rhythm, and heightened bodily sensations during performance. In response, athletes reported using flexible psychological strategies, including attentional control, self-talk, and arousal regulation, to manage pressure as it emerged during competition.

These findings extend existing performance-focused research in modern pentathlon by foregrounding athletes' lived experiences and highlighting the dynamic interplay between psychological demands, physical responses, and self-regulation during endurance-precision tasks. The study provides applied insight relevant to coaches and practitioners supporting athletes performing under conditions of fatigue and competitive consequence, emphasizing the value of athlete-centered approaches that address internal evaluative processes, recognize pressure as temporally dynamic, and integrate cognitive and physiological regulation strategies.

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***Keywords*:** *Psychological Pressure, Modern Pentathlon, Laser Run, Qualitative Research, Elite Athletes*

INTRODUCTION

Modern Pentathlon is a multi-disciplinary Olympic sport requiring athletes to perform across fencing, swimming, obstacle course racing, and a combined run and laser shooting event (UIPM, 2021). Since the introduction of the combined running and shooting event, and its subsequent standardization as the laser run following the introduction of laser pistols in the early 2010's, the discipline has become a decisive component of modern pentathlon. The laser run requires athletes to repeatedly transition between high-intensity running and precision shooting under time constraints and cumulative fatigue, creating a performance environment in which psychological pressure is

likely to play a critical role.

The laser run is commonly conceptualized as an endurance-precision task, comparable with other sports such as biathlon, in which athletes must regulate physiological arousal while maintaining technical accuracy (Vickers & Williams, 2007). Research on performance in the laser run has primarily examined physiological, biomechanical, and technical determinants of success. Studies have highlighted the importance of aerobic capacity, pacing strategies, shooting time, and shooting accuracy, with running performance often identified as the primary contributor to overall outcomes (Le Meur et al., 2010; Lim et al., 2018; Hoffmann, 2024). Collectively, this work has advanced the understanding of what predicts performance in the laser run but offers limited insight into how the athletes experience the demands of performing under pressure during competition.

Psychological pressure has been examined in depth across sport psychology literature. Research has demonstrated that pressure can influence performance through changes in arousal, attentional focus, and motor control, with excessive pressure associated with performance breakdowns, commonly referred to as "choking" (Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992). Other work has conceptualized pressure as a temporal process, with anxiety and demands fluctuating before and during competition (Hanton et al., 2008). While these frameworks have contributed substantially to understanding performance under pressure, much of this research has relied on experimental tasks, laboratory-based designs, or outcome-focused measures, which may not fully capture the complexity of pressure in elite sport competitive settings.

From an applied perspective, athletes' subjective experiences of pressure are central to understanding how pressure is perceived and regulated during performance. Qualitative research in elite sport suggests that pressure is often experienced as self-generated, shaped by personal expectations, performance standards, and interpretations of competitive significance rather than external demands alone (Gould et al., 2002). Athletes have also described pressure as embodied and context-dependent, manifesting through changes in thoughts, emotions, bodily sensations, and behavior throughout the competition. These findings highlight the value of athlete-centered approaches to understanding pressure in real-world performance environments.

Despite this growing body of research, little is known about how elite modern pentathletes experience psychological pressure during the laser run. Existing studies have focused on observable performance indicators without exploring the subjective accounts of pressure, from the athlete's perspective, during the repeated run-and-shoot event. Moreover, the laser run typically occurs at the end of the modern pentathlon competition, meaning athletes enter the discipline having accumulated physical fatigue and psychological load from previous events, often within a competitive context where start positions reflect prior performance. Understanding how athletes experience pressure within this context may provide important applied insight for coaches and practitioners seeking to support performance under fatigue and competitive uncertainty.

Qualitative inquiry is well-suited to addressing this gap. By prioritizing athletes' perspectives, qualitative approaches enable exploration of how pressure is interpreted, experienced, and regulated over time, rather than assuming uniform responses or imposing predefined categories. Such approaches are particularly valuable in applied sports settings, where effective coaching interventions depend on understanding individual athletes' experiences and meanings. Exploring psychological pressure from the

perspective of elite modern pentathletes may therefore complement existing performance-focused research and inform coaching practice in endurance-precision sports.

In the context of this study, psychological pressure is understood as a perceived demand to perform in situations where outcomes are considered important and uncertain, and where there is a perceived risk of negative consequences. This definition reflects the subjective and evaluative nature of pressure, recognizing that it is shaped not only by external conditions but also by how athletes interpret and respond to them (Baumeister, 1984; Hanton et al., 2008).

The purpose of this exploratory qualitative study was to examine elite modern pentathletes' experiences of psychological pressure during the laser run. Rather than focusing on a single competition, the study explored athletes' general experiences of pressure across competitive contexts. Specifically, the study aimed to: (a) explore perceived sources of psychological pressure during the laser run; (b) examine how athletes experience and interpret pressure before and during competition; and (c) identify strategies athletes report using to regulate pressure during performance. By focusing on athletes' lived experience, this study seeks to provide applied insight relevant to coaches and practitioners working in modern pentathlon and related endurance-precision sports.

METHODOLOGY

Research Design

This study adopted an exploratory qualitative research design to examine elite modern pentathletes' experiences of psychological pressure during the laser run. A qualitative approach was considered appropriate given the study's focus on athletes' subjective experiences and meanings, and the aim of developing applied insight into how psychological pressure is perceived and managed in competitive contexts. Rather than testing predefined hypotheses, the study sought to explore patterns in athletes' experiences across competitions.

Participants

Six elite modern pentathletes (five male, one female) participated in the study. Participants ranged in age from 18 to 22 years and had between 6 and 9 years of competitive experience in modern pentathlon. All participants had competed at age-group and/or senior international level, including European Championship and World Championship competitions. Participants were recruited using purposive sampling to ensure all athletes had extensive experience of performing under pressure in competitive modern pentathlon contexts.

Given the elite nature of the sample and the specificity of the research focus, the study prioritized the depth and relevance of experience over representativeness. The sample size was considered appropriate for the exploratory aims of the study and consistent with qualitative research examining elite athletes' experiences.

Data Collection

Data were collected using semi-structured interviews. An interview guide was developed to explore athletes' experiences of psychological pressure during the laser run, including perceived sources of pressure, experiences of pressure before and during competition, and strategies used to manage pressure during performance. Example questions included: "Broadly speaking, what is your understanding of performance pressure?", "What do you think, feel, and how do you behave prior to an event start?", "During a competition, do you notice any changes in yourself when you feel performance pressure?", and "What strategies do you use mid-race to overcome pressure?" Follow-up prompts were used where appropriate to explore perceived changes in pac-

ing, shooting process, bodily sensations, and in-race decision-making in greater depth. The semi-structured format allowed for consistency across interviews while providing the flexibility to explore issues raised by participants in greater depth.

Interviews were conducted individually via online secure video conferencing software to accommodate athletes' training and competition schedules. Interviews lasted between 28 and 42 minutes (M = 34 minutes). All interviews were audio recorded with participants' consent and transcribed verbatim for analysis.

Ethical Considerations

Ethical approval was obtained from the authors' institutional ethics committee. All participants provided informed consent prior to participation and were assured of confidentiality and anonymity. To protect participants' identities, pseudonyms were used and identifying details were removed from transcripts.

Researcher Positioning

The lead researcher had prior experience as a coach within modern pentathlon. This positionality was acknowledged throughout the research process. To minimize potential influence on data collection and interpretation, the researcher adopted a non-judgmental interviewing approach and focused on eliciting participants' experiences rather than evaluating performance. Reflexive notes were maintained during data collection and analysis to support awareness of potential assumptions.

Data Analysis

Data were analyzed using thematic analysis. Analysis followed an iterative process involving familiarization with transcripts, generation of initial codes, and development of broader patterns across the data set. Coding focused on identifying meaningful segments of data related to athletes' experiences of pressure, its perceived sources, temporal characteristics, and strategies for regulation.

Themes were developed through active engagement between the researcher and the data, with an emphasis on patterns relevant to applied sport and coaching contexts. The analysis prioritized clarity and practical relevance over exhaustive theoretical abstraction. Themes were reviewed and refined throughout the analytical process to ensure they captured shared patterns across participants while preserving meaningful variation in individual experiences.

Rigor and Trustworthiness

To support analytical rigor, the researcher engaged in repeated reading of transcripts and reflexive memo writing throughout the analytical process to document emerging interpretations and assumptions. Analytic decisions and emerging interpretations were discussed and critically examined through peer debriefing. Transparency was further supported by verbatim participant quotations that illustrated themes and allowed readers to assess the grounding of the interpretation in the data. These strategies were considered appropriate given the exploratory aims of the study and the applied qualitative approach adopted.

RESULTS

Overview of themes

Analysis generated four themes and ten subthemes describing elite athletes' perceptions of psychological pressure during the laser run event of the modern pentathlon: (a) performance pressure comes from self, (b) pressure build-up, (c) physical changes, and (d) performance pressure strategies during races. Subthemes captured more specific patterns within each broader theme. Table 1 summa-

rizes themes and subthemes with illustrative participant quotations. Although themes are presented as analytically distinct, athletes' accounts often overlapped across time and situations. While shared patterns were identified across participants, there was also variation in how athletes described their experiences and responses to pressure. For example, some athletes described a tendency to rush under pressure, whereas others reported becoming more cautious and slowing down. These differences suggest that responses to pressure were not uniform but shaped by individual interpretations and regulatory tendencies.

Thematic analysis results

Table 1. *Themes and Subthemes Describing Elite Modern Pentathletes' Experiences of Psychological Pressure During the Laser Run*

Theme	Subtheme	Illustrative Quotation
Performance pressure comes from self	Self-imposed expectations	"Usually, it comes because of… it's self-inflicted." (Athlete A)
	Interpretation of performance importance	"You know how important that run is, so you start thinking about what it means if you mess it up." (Athlete C)
Pressure build-up	Before competition	"The week before, I start thinking about all the things that could happen…" (Athlete E)
	Morning of the race	"That's when it really starts to feel real." (Athlete C)
	During the laser run	"Once you're in it, every run and every shoot feels important." (Athlete B)
Physical changes	Running pace	"I just attack the run more than I should." (Athlete A)
	Shooting rhythm	"Sometimes you rush the shots because you just want to get through it." (Athlete B)
	Bodily sensations	"You feel tighter, especially when you're trying to shoot." (Athlete F)
Performance pressure strategies	Attentional control	"I try to just focus on the next thing I need to do." (Athlete A)
	Self-talk	"I tell myself to calm down and stick to the process." (Athlete B)
	Arousal regulation	"I try to slow my breathing before I pick the gun up." (Athlete E)

Note. The table presents illustrative examples of themes, subthemes, and participant quotations. Themes were derived through thematic analysis of semi-structured interview data.

Across themes, athletes described psychological pressure as beginning with self-generated expectations and interpretations of prior performances. Pressure was experienced as building over time, intensifying in the days leading up to competition and peaking at key moments during the laser run. Athletes also described physical and behavioral changes under pressure, particularly in the running pace and shooting rhythm, and reported using psychological strategies to regulate attention and arousal during performance.

Theme 1: Performance Pressure Comes from Self

Athletes consistently described psychological pressure during the laser run as originating primarily from internal sources rather than from external evaluation. Pressure was commonly framed as something athletes imposed on

themselves, shaped by personal expectations, perceived performance standards, and interpretations of competitive significance. Across accounts, pressure was not described as driven by spectators, coaches, or opponents, but rather as emerging from athletes' own appraisals of how they believed they should perform.

Self-imposed expectations

Several athletes described psychological pressure as self-generated, arising from internal expectations regarding performance outcomes and execution. Pressure was often linked to the desire to meet personal standards or avoid perceived failure.

"Usually, it comes because of… it's self-inflicted." (Athlete A)

"We as athletes can put pressure on ourselves more than anyone else." (Athlete B)

For some athletes, these expectations were described as intensifying when they perceived that a strong performance was required to justify prior preparation or competitive position.

"I think it's just upon myself, it is expectation… a desire to achieve outcomes." (Athlete B)

Interpretation of performance importance

Athletes also described pressure as increasing when they interpreted specific moments within the laser run as particularly important or decisive. Pressure was heightened when athletes felt that mistakes would have immediate or irreversible consequences for overall performance.

"You know how important that run is, so you start thinking about what it means if you mess it up." (Athlete C)

"It feels like everything is on that one moment, and that's when the pressure really hits." (Athlete D)

These interpretations were often linked to the athletes' own understanding of the laser run as a defining phase of the competition rather than to explicit external demands.

Analytic summary

This theme indicates that psychological pressure during the laser run was primarily experienced as an internally constructed demand, shaped by athletes' own expectations and interpretations of the significance of performance rather than by direct external sources.

Theme 2: Pressure Build-Up

Athletes described psychological pressure as a process that developed progressively over time rather than emerging suddenly at the start of the laser run. Pressure was experienced as accumulating across the period leading up to the competition and intensifying as the race approached. Rather than being confined to the moment of performance, athletes reported that pressure was present in the days before the competition and continued to increase through the morning of the laser run itself.

Pressure experienced before the competition

Several athletes described experiencing pressure in the days and weeks leading up to competition. During this period, pressure was often associated with anticipatory thoughts about performance, expectations, and possible outcomes.

"The week before, I start thinking about all the things that could happen, what do I need to do, what I don't want to mess up." (Athlete E)

For some athletes, this anticipatory pressure was described as mentally demanding, characterized by increased focus on preparation and heightened awareness of upcoming performance demands.

"It's not just on the day, it's already there before you even get to the competition." (Athlete A)

Pressure on the morning of the race

Athletes reported that pressure often intensified on the morning of the competition. This phase was described as distinct from earlier preparation, marked by increased immediacy and awareness that performance was approaching.

"On the morning of the race, that's when it really starts to feel real." (Athlete C)

During this period, athletes described heightened attentional focus on the upcoming laser run, with more pressure becoming more salient as the time to compete drew closer.

"You're thinking about it more and more because you know it's coming." (Athlete D)

Intensification during the laser run

Athletes described pressure continuing to build as they entered the laser run itself. Pressure was often reported to peak at specific moments within the run-shoot sequence, particularly when athletes perceived that performance outcomes could change rapidly.

"Once you're in it, every run and every shoot feels important." (Athlete B)

This sense of intensification reflected the athlete's awareness of the laser run as a decisive phase of the competition.

Analytic summary

This theme highlights psychological pressure as a cumulative and temporal experience, developing over the lead-up to the competition and intensifying as athletes moved closer to, and into, the laser run, rather than emerging solely at the moment of performance.

Theme 3: Physical Changes

Athletes described experiencing noticeable physical and behavioral changes under psychological pressure during the laser run. These changes were most commonly reported in relation to running pace, shooting rhythm, and bodily sensations during the run-shoot sequence. Rather than describing pressure as purely cognitive or emotional, athletes frequently articulated pressure as something that manifested physically during performance.

Changes in running pace

Several athletes reported altering their running pace under pressure, often describing a tendency to push harder or run faster than planned. These changes were described as occurring in response to perceived performance demands rather than deliberate pacing decisions.

"When the pressure is there, I just attack the run more than I should." (Athlete A)

"You know you need to make up time, so you end up running harder, even if it is not the plan." (Athlete C)

For some athletes, these changes in pace were described as difficult to regulate once pressure increased.

"Once you start pushing because of the pressure, it's hard to pull it back." (Athlete D)

Changes in shooting rhythm

Athletes also described pressure-related changes in shooting behavior, particularly in shooting rhythm and tempo. These changes were described as occurring in different directions, with some athletes reporting rushing shots, while others became cautious and slowed their shooting process.

"Sometimes you rush the shots because you just want to get through it." (Athlete B)

"Other times it's the opposite; you take too long because you're overthinking it." (Athlete E)

These alterations were often described as emerging during pressured moments rather than being part of an intentional technical adjustment.

Bodily sensations under pressure

In addition to changes in pace and shooting rhythm, athletes described heightened bodily sensations when experiencing pressure. These sensations included increased muscle tension, changes in breathing, and heightened physical awareness during shooting.

"You feel tighter, especially when you're trying to shoot." (Athlete F)

"Your breathing feels harder to control when the pressure is high." (Athlete B)

Athletes described these sensations as making execution feel more effortful during key moments of the laser run.

Analytic summary

This theme illustrates that psychological pressure during the laser run was experienced not only cognitively but also through observable physical and behavioral changes, particularly in running pace, shooting rhythm, and bodily sensations during performance.

Theme 4: Performance Pressure Strategies During Races

Athletes described using a range of psychological and behavioral strategies during the laser run to manage perceived pressure and maintain performance. These strategies were typically deployed in response to moments of heightened pressure and were aimed at regulating attention, emotional response, and execution during the run-shoot sequence. Athletes emphasized that strategies were often adjusted dynamically during the race rather than applied in a fixed or pre-planned order.

Attentional control strategies

Several athletes described deliberately narrowing or redirecting their attention during the laser run to manage pressure. This often involved focusing on immediate task-relevant cues rather than broader performance outcomes.

"I try to just focus on the next thing I need to do, not the whole race." (Athlete A)

"When it gets stressful, I bring it back to one shot at a time." (Athlete C)

By focusing attention on controllable elements of performance, athletes described reducing the impact of pressure at critical moments.

Use of self-talk

Athletes also reported using self-talk as a way of regulating pressure during the laser run. Self-talk was described as both instructional and motivational, helping athletes maintain composure and guide execution under pressure.

"I tell myself to calm down and stick to the process." (Athlete B)

"Sometimes it's just reminding myself that I have done this loads of times before." (Athlete D)

Regulation of arousal and emotions

Several athletes described attempting to regulate arousal and emotional responses during the laser run, particularly when they became aware of heightened pressure. Strategies included controlling breathing, slowing movements, or briefly pausing to rest before shooting.

"If I feel rushed, I try to slow my breathing before I pick the gun up." (Athlete E)

"Taking a moment to reset helps stop the pressure getting on top of you." (Athlete F)

Athletes described these strategies as important for maintaining control during demanding phases of the competition.

Analytic summary

This theme highlights that athletes actively engaged in a range of cognitive, behavioral, and physiological regulation strategies during the laser run in response to perceived pressure,

applying these strategies flexibly to manage performance demands as they emerged during the competition.

DISCUSSION

This study sought to explore elite modern pentathletes' perceptions and experiences of psychological pressure during the laser run element of competition. Using an exploratory qualitative approach, the findings provide insight into how pressure is experienced, interpreted, and managed within an endurance-precision context characterized by cumulative fatigue and performance consequences. Athletes described pressure as predominantly self-generated, developing progressively across the lead-up to competition and intensifying during the laser run itself. Pressure was also experienced as embodied, manifesting through changes in running pace, shooting rhythm, and bodily sensations, rather than solely as a cognitive or emotional state. In response, athletes reported using flexible, in-the-moment psychological strategies to regulate attention, arousal, and performance execution. Collectively, these findings extend existing performance-focused research in modern pentathlon by foregrounding athletes' lived experiences of pressure and highlighting the dynamic interplay between psychological demands, physical responses, and self-regulation during the laser run. Because start positions in the laser run are determined by cumulative performance across earlier disciplines, athletes enter the race with clear performance consequences, which may contribute to perceived psychological pressure during execution.

Self-generated pressure

Athletes consistently described pressure as arising from their own expectations, performance standards, and interpretations of what constituted a successful or unsuccessful performance. This aligns with previous qualitative research in elite sport, suggesting that pressure is often internally constructed, shaped by athletes' personal meanings and evaluative frameworks rather than by explicit demands from coaches, spectators, or competitors (Gould et al., 2002). In the context of modern pentathlon, where athletes possess a high degree of performance awareness and accountability, such self-generated pressure may be particularly salient.

The findings also extend existing research on performance under pressure by illustrating how internal expectations become especially influential within the laser run. Athletes described interpreting specific moments within the run-shoot sequence as decisive, with errors perceived as having immediate consequences for overall outcomes. This interpretation appeared to amplify pressure, even in the absence of overt external evaluation. These experiences are consistent with theoretical accounts suggesting that pressure intensifies when individuals place heightened importance on outcomes and perceive limited tolerance for error (Baumeister, 1984). However, rather than conceptualizing pressure solely as a response to situational demands, the present findings highlight the active role athletes play in constructing the meaning and significance of those demands.

From an applied perspective, these findings suggest that interventions aimed at managing pressure in the laser run may benefit from addressing athletes' internal evaluative processes, including how performance expectations are formed and how critical moments are interpreted. Supporting athletes in recognizing and regulating self-imposed standards, particularly during decisive phases of competition, may help reduce maladaptive pressure responses without diminishing competitive motivation. Importantly, this emphasis on self-generated pressure reinforces the value of athlete-cen-

tered approaches that prioritize individual perceptions and interpretations when developing psychological skills for performance.

Pressure as a cumulative and temporal experience

Athletes described pressure as emerging in the days and weeks leading up to the competition, intensifying on the morning of the race, and peaking during key moments of the laser run. This temporal pattern underscores pressure as a dynamic process that develops over time, shaped by anticipation, proximity to performance, and perceived consequence.

These findings align with conceptualizations of competitive anxiety and pressure as fluctuating across different phases of performance rather than remaining stable (Hanton, Fletcher, & Coughlan, 2005; Hanton et al., 2008). Athletes' accounts reflect distinctions between anticipatory pressure during preparation, heightened immediacy on the day of competition, and acute pressure during execution. By capturing athletes' subjective experiences across these phases, the present study extends prior work by illustrating how pressure is experienced longitudinally within a single competitive discipline, rather than measured at isolated points.

Importantly, the cumulative nature of pressure described by the athletes may be especially salient in modern pentathlon, where the laser run typically occurs at the end of the competition following multiple physically and psychologically demanding events. Athletes enter the laser run with accumulated fatigue and heightened awareness of performance consequences, potentially amplifying pressure as the competition unfolds. The present findings, therefore, complement existing research by situating pressure within the broader competitive context, highlighting how temporal build-up and accumulated demands shape athletes' experiences during decisive phases of performance.

In applied settings, recognizing pressure as a process that develops over time has implications for the delivery of psychological support. Interventions that focus solely on in-the-moment regulation during performance may overlook earlier phases where pressure begins to accumulate. Supporting athletes in managing anticipatory pressure in the days leading up to competition, as well as on the morning of the performance, may help mitigate escalation into more disruptive pressure responses during the laser run itself.

Physical manifestations of psychological pressure

A key contribution to the present study is the identification of psychological pressure as an embodied experience during the laser run, expressed through observable physical and behavioral changes rather than solely through cognitive or emotional responses. Athletes described pressure as manifesting in altered running pace, disrupted shooting rhythm, and heightened bodily sensations, suggesting that pressure was experienced through the body as performance demands intensified. This finding extends existing work in modern pentathlon, which has largely focused on physiological and technical determinants of performance by highlighting how psychological pressure may interact with physical execution during competition.

The reported changes in running pace and shooting rhythm align with broader sport psychology literature examining how pressure can disrupt motor execution and self-regulation. Athletes described both rushing and slowing behaviors under pressure, indicating that responses were not uniform but varied depending on how pressure was interpreted and experienced. Such bi-directional changes have been

noted in research on performance breakdown under pressure, where increased self-monitoring or urgency can lead to deviations from habitual movement patterns (Beilock & Carr, 2001; Masters, 1992). Importantly, the present findings suggest that disruptions occur dynamically during endurance-precision tasks, in which athletes must repeatedly transition between physically demanding and technically precise actions.

Athletes also described heightened bodily sensations under pressure, including muscle tension and altered breathing, particularly during shooting. These embodied responses may further complicate performance regulation in the laser run, where effective execution depends on the ability to stabilize psychological arousal following intense running bouts. Rather than framing these sensations as purely detrimental, the findings indicate that athletes were highly attuned to bodily feedback during performance, using these sensations as cues to adjust behavior and strategy in real time.

For coaches and practitioners, recognizing pressure as embodied has important implications for psychological preparation in modern pentathlon. Interventions that focus exclusively on cognitive strategies may overlook the role of bodily awareness and physical regulation in managing pressure during performance. Supporting athletes in recognizing early physical signs of pressure and developing strategies to regulate pace, rhythm, and breathing may enhance adaptability during the laser run and reduce the likelihood of performance disruption under pressure.

These findings reinforce the importance of attending to athletes' lived and embodied experiences of performance, aligning with calls within qualitative sport psychology to prioritize contextually grounded, experience-based accounts when examining complex performance phenomena (Smith & McGannon, 2018).

Regulation of psychological pressure during performance

The findings of this study indicate that elite modern pentathletes actively engaged in a range of psychological and behavioral strategies to regulate pressure during the laser run. Rather than relying on a single fixed approach, athletes described using strategies flexibly and responsively as performance demands emerged. These strategies were primarily aimed at controlling attention, regulating arousal, and maintaining effective execution during transitions between running and shooting. These findings are consistent with self-regulation perspectives in sport, which conceptualize performance as an ongoing process of monitoring and adjusting cognitive, emotional, and behavioral responses in relation to situational demands (Carver & Scheier, 1998; Latinjak, 2025).

Athletes' use of attentional control strategies, such as narrowing focus to immediate task-relevant cues, aligns with applied sport psychology literature emphasizing the importance of attentional regulation under pressure (Wilson, Vine, & Wood, 2009). By directing attention toward controllable elements of performance, athletes appeared to reduce the impact of pressure associated with outcomes or perceived consequences. Importantly, athletes described these strategies as being deployed in response to rising pressure, rather than as rigid routines applied regardless of context, highlighting the adaptive nature of self-regulation during competition.

Self-talk was also identified as a commonly used strategy, serving both instructional and motivational functions. Athletes described using self-talk to guide execution, reinforce confidence, and maintain composure during pressure moments. This is consistent with research demonstrating the role of self-talk in facilitating attentional focus and emotional

regulation during performance (Hardy, 2006). During the laser run, where athletes repeatedly shift between physical exertion and technical precision, such internal cues may help stabilize performance amid fluctuating demands.

In addition to cognitive strategies, athletes described attempts to regulate physiological arousal through breathing control, slowing movements, or briefly pausing before shooting. These strategies suggest an awareness of the close relationship between arousal, bodily sensations, and execution during endurance-precision tasks. The integration of cognitive and physiological regulation strategies reflects a holistic approach to managing pressure, in which athletes respond to both mental and bodily cues during performance.

Practically, these findings underscore the importance of developing adaptable self-regulation skills rather than prescribing uniform strategies. Practitioners working with modern pentathletes may benefit from supporting athletes in identifying which strategies are most effective for them in different phases of the laser run and in practicing switching strategies as pressure fluctuates. Such an approach recognizes pressure management as a dynamic process embedded within performance, rather than as a static skill applied in isolation.

Limitations and Future Research

Several limitations should be considered when interpreting the findings of this study. First, the study involves a small, purposively selected sample of elite modern pentathletes. While this sample size is appropriate for exploratory qualitative research focused on depth of experience, the findings are not intended to be statistically generalizable. Instead, they offer contextually grounded insight into how psychological pressure is experienced within a specific elite performance setting. The adequacy of the sample is supported by the concept of information power, whereby the relevance and richness of participant experience guide sample size in qualitative interview studies (Malterud et al., 2016). Future research may build on these findings by exploring pressure experiences across different competitive levels or cultural contexts within modern pentathlon.

Second, the study relied on retrospective accounts of athletes' experiences. Although retrospective reflection can provide valuable insights into how athletes make sense of pressure over time, such accounts may be influenced by recall processes and post-performance interpretation. Rather than viewing this as a methodological weakness, retrospective accounts can be understood as meaningful constructions of experience shaped by reflection and context. Future studies could extend this work further by incorporating data collected closer to competition, such as immediate post-race interviews or diary-based methods to capture pressure experiences as they unfold.

Third, the findings are grounded in athletes' subjective perceptions of pressure rather than in objective measures of performance or physiological responses. This aligns with the study's qualitative and exploratory aim; however, future research may benefit from integrating qualitative accounts with performance data or physiological measures to further explore how perceived pressure relates to observable changes in execution during the laser run. Combining methods in this way may enhance analytical rigor while retaining sensitivity to athletes' lived experiences (Smith & McGannon, 2018).

Finally, whilst this study focused on athletes' experiences of pressure during the laser run as a distinct discipline, future research could examine how pressure accumulates and transfers across events within the broader modern pentathlon competition. Longitudinal or competition-wide qualitative designs may help clarify how experiences in earlier disci-

plines shape psychological demands during the laser run and how athletes adopt regulation strategies across events. Future research may also examine the conditions under which psychological pressure becomes maladaptive, contributes to performance disruption, or is associated with more adverse psychological outcomes for athletes.

CONCLUSION

This exploratory qualitative study examined elite modern pentathletes' experiences of psychological pressure during the laser run, providing insight into how pressure is perceived, develops over time, and is managed during performance. The findings highlight pressure as a predominantly self-generated, cumulative, and embodied experience shaped by athletes' expectations, interpretations of performance significance, and physical responses to the run-shoot sequence. Athletes described actively engaging in flexible self-regulation strategies to manage pressure as it emerged, underscoring the dynamic and context-dependent nature of performance in modern pentathlon and contributing applied understanding relevant to coaches and practitioners supporting athletes under conditions of fatigue and competitive consequence. Future research may build on these findings by examining pressure experiences across different competitive contexts and integrating qualitative insight with performance and physiological data.

REFERENCES

Baumeister, R. F. (1984). Choking under pressure: self-consciousness and paradoxical effects of incentives on skillful performance. *Journal of Personality and Social Psychology*, *46*(3), 610–620. https://doi.org/10.1037/0022-3514.46.3.610

Beilock, S. L., & Carr, T. H. (2001). On the fragility of skilled performance: What governs choking under pressure? *Journal of Experimental Psychology: General, 130*(4), 701–725. https://doi.org/10.1037/0096-3445.130.4.701

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior.* Cambridge University Press. https://doi.org/10.1017/CBO9781139174794

Gould, D., Dieffenbach, K., & Moffett, A. (2002). Psychological Characteristics and Their Development in Olympic Champions. *Journal of Applied Sport Psychology*, *14*(3), 172–204 https://doi.org/10.1080/10413200290103482

Hanton, S., Fletcher, D., & Coughlan, G. (2005). Stress in elite sport performers: a comparative study of competitive and organizational stressors. *Journal of Sports Sciences, 23*(10), 1129–1141. https://doi.org/10.1080/02640410500131480

Hanton, S., Neil, R., & Mellalieu, S. D. (2008). Recent developments in competitive anxiety direction and competition stress research. *International Review of Sport and Exercise Psychology, 1*(1), 45–57. https://doi.org/10.1080/17509840701827445

Hardy, J. (2006). Speaking clearly: A critical review of the self-talk literature. *Psychology of Sport and Exercise, 7*(1), 81–97. https://doi.org/10.1016/j.psychsport.2005.04.002

Hoffmann, C. (2024). Factors affecting shooting performance in laser run. *Journal of Science in Sport and Exercise*. https://doi.org/10.1007/s42978-024-00286-9

Latinjak, A. T. (2025). Integrative self-regulation model for sport and exercise: Theory and implications for comprehensive training. *Performance Enhancement & Health, 13*(4), 100350. https://doi.org/10.1016/j.peh.2025.100350

Le Meur, Y., Hausswirth, C., Abbiss, C., Baup, Y., & Dorel, S. (2010). Performance factors in the new combined event of modern pentathlon. *Journal of Sports Sciences*, *28*(10), 1111–1116.

https://doi.org/10.1080/02640414.2010.497816

Lim, C. H., Yoon, J. R., Jeong, C. S., & Kim, Y. S. (2018). An analysis of the performance determinants of modern pentathlon athletes in the laser-run. *Exercise Science, 27*(1), 62–70. https://doi.org/10.15857/ksep.2018.27.1.62

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample Size in Qualitative Interview Studies: Guided by Information Power. *Qualitative Health Research*, *26*(13), 1753–1760. https://doi.org/10.1177/1049732315617444

Masters, R. S. W. (1992). Knowledge, knerves and know-how: The role of explicit versus implicit knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology, 83*(3), 343–358. https://doi.org/10.1111/j.2044-8295.1992.tb02446.x

Smith, B., & McGannon, K. R. (2018). Developing rigor in qualitative research: problems and opportunities within sport and exercise psychology. *International Review of Sport and Exercise Psychology, 11*(1), 101–121. https://doi.org/10.1080/1750984X.2017.1317357

Union Internationale de Pentathlon Moderne. (2021). Modern pentathlon competition rules and format. https://www.uipmworld.org

Vickers, J. N., & Williams, A. M. (2007). Performing under pressure: The effects of physiological arousal, cognitive anxiety, and gaze control in biathlon. *Journal of Motor Behavior, 39*(5), 381–394. https://doi.org/10.3200/JMBR.39.5.381-394

Wilson, M. R., Vine, S. J., & Wood, G. (2009). The influence of anxiety on visual attentional control in basketball free throw shooting. *Journal of Sport & Exercise Psychology*, *31*(2), 152–168. https://doi.org/10.1123/jsep.31.2.152

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