An Analysis of Sport-Specificity in Relation to Periodisation by Field-Team Sport Strength and Conditioning Coaches.

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Abstract

Resistance training is fundamental to the physical preparation of athletes. Periodisation models are training planning tools often used by strength and conditioning coaches (SCCs) to inform their manipulation and sequencing of training variables to maximise adaptations, avoid plateaus, and mitigate injury risk. This thesis aimed to examine how field-team sport SCCs manipulate key training variables—intensity, range of motion (ROM), and tempo—across the seasonal phases (pre-season, in-season, transition period, off-season) of the annual training plan (macrocycle). Specifically, it integrates relevant periodisation literature with novel empirical data to provide an evidence-informed understanding of how SCCs design and adjust resistance training prescriptions across the macrocycle, and the extent to which these practices align with periodisation principles. A review of the literature was conducted to outline the background of periodisation and its recommended application to team sports, analyse the quality of existing research, and evaluate the mechanistic influence of intensity, ROM, and tempo manipulation on adaptations and athlete readiness. This review revealed persistent methodological challenges and limitations in experimental design in periodisation studies, informing the cross-sectional, observational study presented in Chapter Three. A global survey was distributed to SCCs (N = 42) with ≥1 year of experience working in field-team sports. Participants reported if and how they manipulated intensity (percentage of one-repetition maximum [%1RM], rating of perceived exertion [RPE], repetitions in reserve [RIR]), ROM (full, shortened partials, lengthened partials, isometric), and tempo (eccentric, concentric, pause) across the four macrocycle phases for squatting and upper body pressing exercises. Cochran's Q tests analysed overall phase differences, with pairwise McNemar comparisons (Bonferroni adjusted) identifying directionality and magnitude of between-phase differences in training variable manipulation. Descriptive statistics were used to quantify manipulation frequencies of training prescriptions. Manipulation varied significantly across phases for intensity, $Q(3) = 31.02$, $p < .001$; ROM, $Q(3) = 22.62$, $p < .001$; and tempo, $Q(3) = 23.66$, $p < .001$. Transition periods showed consistently lower manipulation, while in-season ROM manipulation was significantly higher than off-season ($p = .004$). In-season, 100% of SCCs who manipulated ROM used shortened partials, and 100% of those who manipulated concentric tempo prescribed maximal concentric intent. Off-season prescriptions showed the highest use of lengthened partials (50%) and the lowest use of shortened partials (25%). Tempo manipulation also differed, with slow eccentric and long pauses most common in the off-season, and faster tempos during the in-season. No SCCs manipulated ROM during the transition period. This thesis integrates existing periodisation and training variable literature with observational data. Using an observational design to maximise ecological validity, our findings indicate that SCCs manipulate training variables in a phase-dependent manner, aligning with broader periodisation principles and demonstrating intentional, context-specific practices in applied settings.

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Attestation of authorship

“I hereby declare that this submission is my own work and that, to the best of my knowledge, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of the use), nor material which to a substantial extent has been submitted for the award of any other degree of diploma of a university or other institution of higher learning.”

Rob Willems

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STUDENT AND SUPERVISOR APPROVALS

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Chapter 1 – Introduction

Periodisation can be defined as the systematic and strategic manipulation of training variables across time to maximise rate of adaptation in one or multiple physical outcomes, reduce stagnation, lower the risk of overtraining and injury, and 'peak' athletes for maximal performance at pre-determined times (Kataoka et al., 2021; Plisk & Stone, 2003). Hence, periodisation is considered a primary consideration in long-term athlete development and when designing training around competitive schedules. Field-team sports, with their often long and congested competitive schedules, limit training opportunities to target meaningful stimuli (Gamble, 2006). Periodisation can address this issue if flexibly applied as a training framework– one that can be tailored to diverse sporting contexts while remaining grounded in core principles such as variation, progressive overload, and fatigue management.

There is no shortage of articles and textbooks that outline the theoretical background of periodisation and how it should be integrated generally and in team-sport contexts. (Bompa & Buzzichelli, 2018; de Hoyo Lora & Arrones, 2022; Gamble, 2006; Plisk & Stone, 2003; Turner, 2011; Turner & Stewart, 2014). Experimental studies, from which science derives its conclusions and subsequent recommendations, are often performed in closed (controlled and standardised) environments, which are necessary for reliable investigation. However, real-world settings are less controlled, and their inevitable constraints necessitate pragmatism from strength and conditioning coaches (SCCs).

Research gap

Can field-team sport SCCs practice in a manner that aligns with evidence-based guidelines, despite the many constraints imposed on them? This question has prompted a growing body of observational research examining real-world coaching practices (Drury et al., 2021; Weldon, Duncan, Turner, LaPlaca, et al., 2022; Weldon, Duncan, Turner, Lockie, et al., 2022). Confusion surrounding the concept and integration of periodisation by SCCs may stem from a lack of a formal definition (Anyadike-Danes et al., 2023; Kataoka et al., 2021), reflected in surveys asking them whether they use periodisation. In a systematic review of surveys on SCC practices in professional sports, the majority of respondents said they use periodisation (Weldon, Duncan, Turner, Lockie, et al., 2022). Conversely, other studies report low usage of periodisation by SCCs due to the difficulty of integrating training into congested competitive schedules (Loturco et al., 2022; Zabaloy et al., 2022). This contrast arguably highlights a misunderstanding of periodisation in applied settings. Although some coaches report avoiding periodised approaches due to scheduling constraints, periodisation is designed to manage such challenges by strategically managing training loads based on proximity to competition.

In parallel, some literature supports the notion that systematically integrating variability in training, aligned with the demands of different seasonal phases (pre-season, in-season, transition period, off-season), can enhance performance in team sports (de Hoyo Lora & Arrones, 2022; Gamble, 2006; Mujika et al., 2018). However, research on periodisation often isolates its investigation to a specific phase (Abade et al., 2020; Hoffman et al., 2009) or single variable, typically in pursuit of experimental control, internal validity, and clear causal inference. This isolation to specific phases or variables is also driven by the inherent challenges of conducting long-term studies involving multiple interacting variables (Afonso et al., 2017; Kataoka et al., 2021). For instance, Hoffman et al. (2009), attempted to maximise adaptations during the off-season, while Abade et al. (2019), examined strength-power training strategies during the in-season. However, such isolation fails to reflect the dynamic and context-specific nature of real-world sport settings, where training variables interact continuously across the macrocycle.

There are very few studies that explore how key training variables interact or are manipulated collectively across an entire year (macrocycle). While the literature affirms the role of intensity, range of motion (ROM), and tempo in influencing specific physiological outcomes (Kassiano, Costa, Nunes, et al., 2023; Kraemer et al., 1996; Schoenfeld et al., 2015), no research to date has investigated how these variables are integrated and manipulated across the macrocycle by experienced field-team SCCs in applied settings. Notably, while volume is an important programming variable, it was not included as a training variable due to our study's focus on execution-level specificity (intensity, ROM, tempo), which more directly captures the intended stimulus and specificity of training.

Purpose of this research

This research aims to investigate how field-team sport SCCs manipulate key training variables (intensity, ROM, and tempo) throughout the macrocycle. To address this aim, the following research question was developed: Do field-team sport SCCs manipulate intensity, ROM, and tempo of squatting and upper-body pressing exercises throughout the macrocycle? If so, how? I hypothesise that SCCs alter training variable prescriptions across the macrocycle and that, consequently, we would therefore observe significant differences across macrocycle phases.

Contribution to the field

This thesis contributes to existing literature by providing insight into real-world programming decisions across phases of the macrocycle, as reported by practitioners with various backgrounds and levels of experience. Unlike controlled experimental studies, which typically isolate variables under standardised conditions, this research captures applied strategies to navigate the complexities of team-sport environments, characterised by (but not limited to) congested schedules throughout long competitive seasons, diverse athlete profiles, and organisational constraints. Therefore, a cross-sectional study design was chosen to retain ecological validity and provide an insight into training decisions made by SCCs operating under realistic constraints.

The findings in this thesis offer a benchmark against which practitioners can evaluate their own periodisation strategies, acting as a pragmatic point of reference. Further, it helps coaches integrate theory into practice in two ways. First, this thesis reviews the literature to provide evidence-based recommendations for periodisation. Secondly, it contrasts these recommendations with the decisions of the SCCs who participated in this research. The literature review consolidates a currently fragmented body of research fraught with opinions– drawing together theoretical models, empirical findings, and field-team sport specific considerations into a cohesive narrative. Then, the survey provides examples of periodisation in action, in real-world settings. Together, this expands our understanding of periodisation in applied settings, and highlights gaps between research and practice, helping to inform future research priorities in strength and conditioning (S&C).

Organisation of this thesis

This thesis adheres to the pathway two format (it contains a publishable chapter, in its submitted format and does not follow a traditional thesis format) and is therefore organised into four chapters. Chapter one introduces the research topic, outlines the issues this research seeks to address, the research aims (including the research question), identifies the research gaps, and explains how this research contributes to the field. Chapter two reviews the literature on periodisation theory and how it should be used in team-sport environments in a narrative format. Chapter two also explores the literature on relevant training variables and demonstrates why they largely dictate the specificity of training. Chapter three presents the survey manuscript submitted to the Journal of Sport Sciences, including its methods, results and interpretation. Lastly, Chapter four includes a general discussion, limitations and recommendations for future research, and outlines its practical applications which stem from the integration of the present thesis findings, its literature review, and the extant body of knowledge on the thesis topic.

Chapter 2 – Literature review

Introduction

The purpose of this narrative review is to provide an overview of the current state of knowledge regarding periodisation in resistance training, particularly as it applies to field-based team sports. By synthesising empirical research and foundational texts, this review aims to clarify the extent and quality of our current understanding of periodisation, with a specific focus on the manipulation of three key training variables: intensity, ROM, and tempo. This review identifies key limitations in the literature, including difficulties inherent in studying periodisation that have contributed to conceptual ambiguity and ongoing uncertainty regarding its efficacy. Furthermore, although the literature has yet to explicitly position intensity, ROM, and tempo as central to sport specificity, this review contends that these variables play a primary role in determining the specificity of resistance training and presents evidence to support this claim. Lastly, this review explores contrasting perspectives on periodisation and outlines directions for future research.

How periodisation developed

While periodisation is often formally associated with 20th-century sport science, structured training planning strategies can arguably be traced back millennia. Stone et al. (2021), present a timeline illustrating the application of training planning strategies as far back as 1500 BCE. Periodisation is a training management tool constructed through logical inferences by observation of both successful and unsuccessful training methods throughout history. Indeed, the scientific method has only relatively recently been applied to periodisation to quantitatively assess its efficacy as a model for managing training (Stone et al., 2021).

Leo Matveyev is widely regarded as the 'father' of training periodisation, who formalised the concept in the mid-twentieth century in response to the Soviet Union's difficulties in achieving consistent peak performance at the 1952 and 1956 Olympic Summer Games (Krüger, 2016; Matveyev, 1981). Matveyev introduced a structured, linear model of training–now referred to as linear or classical periodisation. This model aimed to increase the predictability of training adaptations by systematically manipulating training volume, intensity, and specificity, in effort to peak athletes more reliably (Krüger, 2016).

Since its formalisation, numerous variations of periodisation have been developed to accommodate the diverse needs, physical demands, and competitive schedules of athletes. This evolution of periodisation was driven by the limitations of the original linear model, which was primarily designed for individual sports with short, clearly defined seasons and a singular performance peak (Stone et al., 2021). With the increased prominence of team sports, longer competitive schedules, and the need to concurrently develop multiple physical qualities (strength, power, endurance, technical skill) within integrated sport settings, alternative models such as non-linear periodisation, block periodisation, and undulating periodisation emerged (Stone et al., 2021). These adaptations to the original linear model aimed to offer greater flexibility, allow for multiple performance peaks, and manage concurrent sport stressors alongside those encountered in the weight room (Stone et al., 2021).

Underlying ideas and structures

Periodisation is fundamentally rooted in physiological theories regarding adaptation to stress. One of the earliest influences was Selye's General Adaptation Syndrome (GAS) model, initially developed in the medical field to describe the predictability of an organism's responses to stressors, such as injury, infection, or environmental challenges (Selye, 1936, 1956). Selye proposed that organisms respond to a stressor in three stages. In the alarm phase, the body recognises the stressor and initiates an acute physiological response, often characterised by temporary reductions in performance due to fatigue, muscle damage, or neuromuscular inhibition when extrapolated to an athletic context. This is followed by the resistance phase, where adaptation occurs: again, if extrapolated to sport, recovery processes lead to improved fitness, allowing the body to better tolerate similar or greater stress in the future. This phase is typically associated with elevated performance, provided the stressor is appropriately dosed to stimulate adaptation. However, if the stress persists for too long without adequate recovery or the magnitude of the stimulus is too great, the stress exceeds the body's adaptive capacity. In a training context, this is thought to manifest as impaired recovery, reduced physiological function, hormonal disruption, or increased risk of injury and illness (Kataoka et al., 2022). From a performance perspective, this exhaustion phase is conceptually associated with a decline in readiness and training responsiveness, where further exposure to stress no longer drives adaptation and may lead to regression.

As illustrated in Figure 1, the National Strength and Conditioning Association (NSCA) adapted Selye's model to better reflect the physiological responses to training in athletes. Specifically, the exhaustion phase was relabelled as the overtraining phase, and an additional supercompensation phase was added to represent performance improvements that occur following appropriate training and recovery (Haff, 2016). According to the NSCA, if training stress is appropriately structured and of sufficient magnitude, it can elicit adaptations that raise the athlete's physical capacities beyond previous levels—effectively establishing a new performance baseline. These acute enhancements, when consistently achieved, contribute to long-term athletic development (Haff, 2016). This application of GAS to athletic training suggests the body would respond in a similar, predictable manner to the imposed demands of exercise, allowing coaches to systematically plan training loads to promote positive adaptations while avoiding overtraining (Cunanan et al., 2018).

However, the direct application of GAS to resistance training has been questioned. Buckner et al. (2017) argue that Selye's model, based on extreme pharmacological and environmental stressors in rodents, is not entirely analogous to voluntary, structured exercise in humans (Buckner et al., 2017). The original observations of systemic deterioration under toxic conditions differ fundamentally from the controlled and progressive overload typically employed in training contexts. Furthermore, there is a lack of experimental evidence directly supporting GAS as a mechanism governing human adaptation to resistance exercise. While GAS provides a conceptual framework, its scientific validity for guiding modern periodisation strategies, particularly those focused on optimising strength and hypertrophy, appears limited (Buckner et al., 2017).

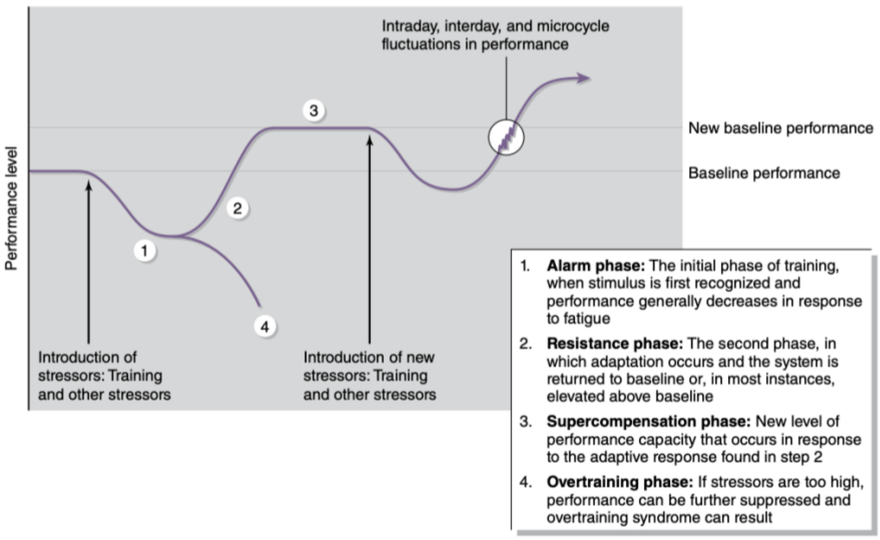

Figure 1. The General Adaptation Syndrome (GAS) and applications to periodisation (Haff, 2016).

Building upon this theoretical foundation, the fitness-fatigue model (FFM; Figure 2) further refines the understanding of how training affects performance. Rather than assuming a singular, linear adaptation, this model proposes training simultaneously induces fitness gains and fatigue, with performance at any given time reflecting the interaction between these processes (Chiu & Barnes, 2003). Fitness effects are more stable and longer-lasting, but smaller in magnitude, whereas fatigue effects are larger in magnitude but more transient (Chiu & Barnes, 2003). The key distinction between GAS and FFM, therefore, is that FFM acknowledges that fitness and fatigue interact in a non-predictable manner, accumulating and dissipating at different rates depending on the type and magnitude of the stimulus and the athlete’s individual adaptive resources. This perspective is shared by Haff and Triplett (2016), who argue that although the FFM organises all stressors and adaptive processes into three generalised categories (fitness, fatigue, and preparedness), different types and magnitudes of stressors are likely to produce idiosyncratic responses regarding recovery duration and adaptive potential and should therefore not be treated equally. For instance, Pareja-Blanco et al. (2020), observed that resistance training to failure, especially with high repetition counts, resulted in greater fatigue, slower recovery, increased muscle damage, and amplified hormonal responses compared to non-failure protocols (Pareja-Blanco et al., 2020). This finding illustrated that, within a single training modality, variations in intensity and volume can substantially influence recovery demands, reinforcing the FFM's emphasis on individualised stress-response relationships.

This conceptual shift from GAS to FFM may be useful in planning short- and long-term training strategies, offering a more dynamic framework for managing training loads, tapering, and recovery strategies (Chiu & Barnes, 2003; Haff & Triplett, 2016). While these models provide useful frameworks for understanding training responses, applying them effectively requires individualisation based on the athlete's capacity to adapt, recover, and their training history.

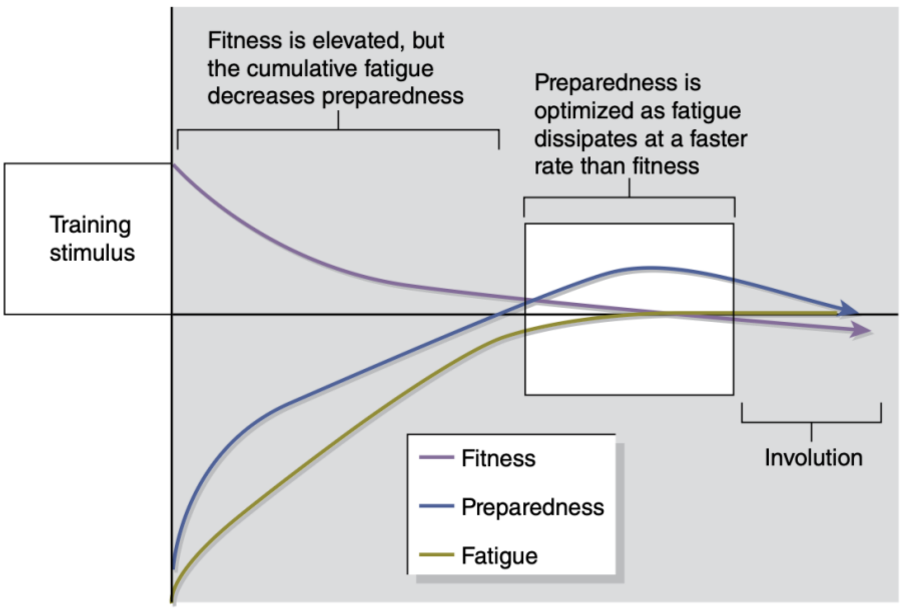

Figure 2. The Fitness-Fatigue Model (FFM) (Haff, 2016).

How proponents suggest its use

Proponents of periodisation provide detailed frameworks for its practical application, grounded in physiological principles, the aforementioned stress response theories, and a long history of coaching practice (anecdotes). In essence, periodisation is long-term training organisation, aligning the physiological principles of adaptation with the demands of the competitive calendar. Practically, periodisation is typically implemented by dividing the annual training plan into hierarchical cycles: the macrocycle (typically one year), mesocycles (several weeks to months), and microcycles (usually one week) (Bompa & Buzzichelli, 2018). Within these cycles, proponents advise systematically varying training variables such as volume, intensity, and frequency. This strategic variation is considered essential to avoid stagnation and ensure ongoing adaptation (Issurin, 2010; Turner, 2011). The frequency and extent of this variation depend on factors such as the athlete's training age, competition frequency, and proximity to key events, and form the primary distinction between different periodisation models.

The linear (or traditional) model is characterised by a steady progression from high-volume, low-intensity training to low-volume, high-intensity training, with a gradual transition from general to specific training across mesocycles. This approach may be most appropriate for novice athletes, who benefit from a broad base of physical development, or for sports with infrequent competition and extended preparatory phases (Haff & Triplett, 2016).

By contrast, undulating and block periodisation models introduce more frequent variation in training stimuli and are often recommended for advanced athletes who train closer to their physiological ceiling, possess narrower adaptation windows, and require greater training stress to stimulate progress (Bompa & Buzzichelli, 2018; Issurin, 2008; Issurin, 2010; Stone et al., 2021). Block periodisation, in particular, structures training into highly concentrated mesocycles, each targeting a specific physical quality (Issurin, 2010; Stone et al., 2021). This structure is thought to enhance adaptations while more effectively managing fatigue. Issurin (2010) proposes a three-part sequence, consisting of accumulation (general physical preparedness), transmutation (conversion to sport-specific capacities), and realisation (peaking through reduced volume and heightened specificity), with each phase designed to build on the last and culminate in peak performance during key competitions. Similarly, Bompa and Buzzichelli (2018), advise athletes to commence the macrocycle with a general preparatory phase, focused on building aerobic capacity, muscular endurance, and hypertrophy, followed by more specific phases that develop maximal strength, power, and sport-specific capacities.

The principle of "phase potentiation" (Bompa & Buzzichelli, 2018; Haff, 2004; Stone et al., 2021; Suchomel et al., 2016) is an approach that strategically sequences training so that the adaptations from one phase directly enhance (potentiates) the next, and that, thereby, the overall training process is made more productive. For instance, a hypertrophy phase increases muscle cross-sectional area, which is intended to support greater force production in a subsequent strength phase, ultimately enabling higher rates of force development during a power-focused phase.

Verkhoshansky and Siff (2009), developed the concept of dynamic correspondence, which they argue is critical for ensuring that strength gains transfer effectively to sport performance. They recommend progressing from general exercises with broad physical benefits to specific movements that replicate the sport's velocity, force vector, and coordination demands. This general-to-specific transition is designed to improve training transfer and ensure that physical qualities developed in earlier phases are expressed in competition-specific tasks (Verkhoshansky & Siff, 2009).

To summarise, periodisation proponents recommend a detailed, cyclical (phasic) approach to training that incorporates progressive variation, strategic sequencing of training goals, and a progression from general to specific exercises. These principles are applied through a variety of models—each with distinct proposed benefits—selected based on the athlete's level, sport demands, and calendar structure.

Critiques

While previous sections outlined the rationales and models typically used for implementing periodisation, there are notable critiques of the basis for certain aspects of periodisation and their subsequent application. This section aims to elucidate what ideas related to periodisation are supported by high-quality evidence, and which are based on tradition and assumption.

Critics question several components of periodisation; some merely question its paradigms and assumptions in pursuit of scientific clarity and improved individualisation (Kiely, 2012), while others go as far as reducing periodisation to the status of a myth rather than a theory (Steele et al., 2023). Indeed, even its very definition (or lack thereof) is a key issue debated in the literature (Kataoka et al., 2021). In their paper discussing periodisation's opaque definitions, Kataoka et al. (2021), provide 87 distinct periodisation definitions in the literature since 1981, with varying degrees of similarity. This ambiguity presents problems beyond just confusion for those seeking to understand periodisation. One such issue, which several authors who critique periodisation agree on, is that without a precise definition, periodisation cannot be precisely studied, nor can its proponents claim to call it a testable theory (Kataoka et al., 2021; Steele et al., 2023). These authors claim a precise definition would allow scientists to more accurately study periodisation, thereby elucidating its efficacy (Kataoka et al., 2021; Steele et al., 2023). If a concept cannot be accurately defined and, therefore, tested, it cannot be deemed a scientific theory, as this violates the conditions of the scientific process. This is not an isolated issue; difficulties in empirically studying periodisation often stem from underlying conceptual ambiguity.

Another issue arising from the imprecise definition of periodisation is confusion in the literature between periodisation and programming (Kataoka et al., 2021). This is not just a semantic problem; it considerably influences how periodisation is studied. Programming is the micro-management of acute training variables (exercise selection, repetitions, sets, rest, intensity, ROM, tempo, among others) (DeWeese et al., 2015). Periodisation is the macro-management tool that exploits programming to apply strategic variation in training stimuli to achieve specific goals at pre-determined times while avoiding non-functional overreaching (Kataoka et al., 2021; Stone et al., 2021). Some periodisation theorists claim a specific order of mesocycles is necessary as these phases "potentiate" one another, resulting in superior adaptations and subsequent performance at the conclusion of a macrocycle (Suchomel et al., 2016). For example, while it is logical to claim that a hypertrophy mesocycle, followed by a strength mesocycle, followed by a power mesocycle, could improve power more than repeating a power mesocycle three times, testing this claim requires training studies lasting the better part of a year. Unfortunately, nearly 90% of "periodisation" studies last only 4-18 weeks, and are arguably better described as programming studies (Kataoka et al., 2021).

Another limitation of the short duration of most periodisation studies is that participants are unlikely to be exposed to stressors long enough to succumb to overtraining (Steele et al., 2023). This inability to analyse the extent to which periodisation can manage stress compared to non-periodised training may be a significant limitation, given that stress management through variation is central to the periodised model (Steele et al., 2023). Notably, proponents of periodisation encourage critics to reconsider their dismissal of long-term observational studies, some of which span several years and are conducted in the athletes' natural environment (Stone et al., 2021). In these environments, athletes are exposed to realistic stressors—including sport-specific training and broader life demands—in addition to resistance training. This contrasts much of the existing empirical research, where participants are typically subjected to isolated resistance training stressors (Stone et al., 2021).

The conflation between periodisation and variation is also common. While periodisation includes variation, variation in and of itself is not necessarily periodisation. Variation merely implies a change in stimuli (Afonso et al., 2017). However, it is the strategic use of variation in the context of a long-term training plan which distinguishes the variation embedded in a periodised plan from variation itself (Afonso et al., 2019). For example, one could randomly vary a training plan or use variation that violated principles of phase potentiation in a plan, embedding variation while also making them non-periodised. Study designs often reflect this conflation; in studies that compare periodised approaches to non-periodised approaches, non-periodised approaches lack any variation (no changes in programming) (Ahmadizad et al., 2014; Hoffman et al., 2009; Kraemer et al., 2003). There have not been any comparisons between non-periodised plans with random variation or variation that violates periodisation principles, compared to periodised plans (Afonso et al., 2019). Arguably, these studies can only claim that periodisation is superior to programs devoid of any variation, not that periodised programs are superior to non-periodised programs. Further noteworthy limitations of periodisation research include the aforementioned lack of realistic stressors alongside resistance training (Kataoka et al., 2021), limited control of confounding variables such as nutrition, supplementation, or medication, and the absence of clear predictions regarding the direction, timing, or magnitude of adaptations – a core claim made by proponents of periodisation (Afonso et al., 2017).

Another, more conceptual criticism comes from Kiely (2012), who challenges the foundational assumptions underlying traditional periodisation models. The first of these assumptions is that adaptations to training are both predictable in magnitude and occur on a fixed timeline. The second is that these adaptations are uniform across athletes—both within and between individuals. Kiely (2012) argues that responses to training are far more variable than traditionally assumed, with factors such as genetics, training age, biological age, sleep, nutrition, and psychological stress influencing the rate and magnitude of adaptation (Kiely, 2012). In reality, Kiely argues, two athletes completing the same training session may experience vastly different outcomes, and even the same individual may respond differently to an identical session depending on their internal and external state (stress levels, sleep quality, novelty of the stimulus) (Kiely, 2012). Due to this unpredictability, Kiely encourages practitioners to move away from a one-size-fits-all model and instead adopt a more individualised, dynamic approach to training that reflects the fluid and non-linear nature of human adaptation. Periodised models typically rely on a rigid structure built upon several assumptions, some of which may be flawed (Kiely, 2012). Kiely's critique represents a deeper, more existential challenge that cannot be resolved through improved study design alone, as it calls into question the core principles underpinning traditional periodisation.

It is important to note that none of these critics claim that training planning systems are inherently fallible or that periodisation itself is ineffective. They instead point out the shortcomings of its assumptions and the way it has been studied.

How strong is the evidence?

As outlined in the section above, a primary critique of periodisation lies in what some consider to be erroneous study design, inadequate at testing the paradigms of periodisation. Empirical research is too short in duration, insufficiently controlled, has not exposed participants to realistic concurrent stressors, and rarely includes clear hypotheses regarding expected outcomes. As a result, there is little empirical evidence to support the claims that periodisation is a superior fatigue management and performance optimisation system (Afonso et al., 2017). Consequently, some authors conclude the empirical support for periodisation remains weak (Afonso et al., 2017; Afonso et al., 2019; Kataoka et al., 2021; Steele et al., 2023).

That said, there are other forms of evidence outside of empirical research, such as long-term observational studies and case studies. These are less controlled, and therefore less scientifically rigorous, but also have respective benefits. Observational data collected over several years within elite environments may better reflect the real-world conditions under which periodisation is typically applied, including the presence of concurrent training loads, psychological stressors, and competition schedules. Moreover, widespread adoption of periodisation principles by coaches and athletes across various sports disciplines suggests a degree of practical utility, even if this evidence lacks the experimental control and statistical power of laboratory-based studies. Indeed, a key reason for the lack of long-term empirical research is the difficulty of executing a long-term, controlled study due to athlete availability and funding (Stone et al., 2021). Observational studies may be the next best thing since empirical research on periodisation is logistically challenging. This challenge is acknowledged by Afonso et al. (2019), who conducted a meta-review of meta-analyses on periodisation. The included meta-analyses examined interventions comparing periodised and non-periodised programs, without restricting the types of adaptations targeted. Importantly, only studies that included predictions about the timing of adaptations (when performance was expected to peak or decline) were included. Only two meta-analyses (with 31 total studies) met these inclusion criteria (Rhea & Alderman, 2004; Williams et al., 2017). The authors concluded that neither the original studies nor the meta-analyses could reliably demonstrate that periodisation can be used to predict or manage training stress, because they lacked the theoretical definitions and methodological controls necessary to distinguish periodisation from general variation or programming (Afonso et al., 2019).

Arguably, the evidence on periodisation, despite a lack of empirical rigour, may not be as weak as critics suggest. Stone et al. (2024), in a paper written directly in response to some critiques outlined in this review, defends periodisation as a theoretical model grounded in practical application. While the authors acknowledge periodisation is built on assumptions–primarily due to a lack of empirical backing–they argue these assumptions are logically derived from careful, detailed and extensive long-term observations across diverse athletic populations (Stone et al., 2024).

To summarise, although high-quality empirical evidence supporting periodisation remains limited, its models are grounded in physiology, logic, and observation and may retain value, particularly when applied flexibly and with attention to individual variability.

How periodisation is used in team-sports

It is important to disclaim that the recommended periodisation strategies mentioned in each seasonal phase are theoretically designed for experienced athletes. There is evidence young and/or novice athletes can concurrently develop multiple physical qualities without excessive fatigue or compromised adaptation (Granacher et al., 2018; McQuilliam et al., 2020). With low relative and absolute strength levels, requisite training volumes may not tax their nervous system or deplete adaptive resources as notably. Novice lifters exhibit rapid neuromuscular adaptations with minimal risk of overtraining, allowing for a broad-spectrum athletic development (McQuilliam et al., 2020). Additionally, early phase resistance training primarily enhances motor coordination and neural efficiency and does not require high mechanical loads that might necessitate strict adherence to a periodisation scheme that focuses on sequencing training phases focused on single physical outcomes (hypertrophy, then strength, then power, then speed) (Granacher et al., 2018).

In contrast, experienced athletes may require higher volumes and loads to drive adaptations. Theoretically, their training should be more sequential, as concurrently training multiple physical attributes may be more likely to lead to overtraining (Haff, 2004; Haff & Triplett, 2016; Plisk & Stone, 2003).

Gamble (2006) outlined the challenges of incorporating periodisation in team-sport environments, and the recommendations for its use in the pre-season, in-season and off-season for team-sport athletes. The author acknowledges the usefulness of non-linear (undulating) periodisation for team sports, as this population requires broad physical competency. Therefore, using an undulating model may allow athletes to be exposed to disparate stimuli within a condensed timeframe. Arguably, however, the primary utility of an undulating model is that these frequent variations in training stimuli may maintain performance adaptations while mitigating excessive fatigue and the risk of overtraining. It is important to acknowledge that these considerations may only be necessary during the competitive phase (in-season). Instead, Gamble (2006), suggests linear or phasic methods (such as block periodisation) in the off-season and pre-season, as these models progress in a structured manner, typically gradually transitioning from general to specific (Figure 3). These models may be more conducive to overload and establishing foundational strength and hypertrophy before advancing to more intensive (and specific), high-velocity power training (Stone et al., 2021; Turner, 2011). This perspective is reflected by Corcoran and Bird (2009), who promote a block model during the off-season and pre-season that shifts from high-volume, low-intensity, to low-volume, high-intensity training and progresses from general to specific for rugby union players (Corcoran & Bird, 2009).

Pre-season

The pre-season (late preparation phase) occurs between the off-season (early preparation phase) and the in-season (competitive phase; Figure 3). During this time, technical and tactical sports training such as match simulations, set-piece practice, and strategy implementation are prioritised. Therefore, training targeting physiological or morphological adaptations (e.g., strength and power development) should arguably be integrated around these priorities, with considerations for athlete fatigue, recovery, and available training time (Gamble, 2006). Doing so requires continuous communication with sports coaches to ensure athletes are exposed to the correct doses of internal (physiological) and external (structural) load. Practically, athletes cannot be exposed to the same magnitude of training stimuli in the pre-season as they could in the off-season, when they are not subject to additional sources of fatigue. The compromises of sports training on S&C training are further exacerbated later in the pre-season, as that is typically a time when competition (often friendly) occurs in the weeks leading into the in-season.

The pre-season is a time to transfer the general training adaptations gained during the off-season into more sport-specific performance (Corcoran & Bird, 2009; Gamble, 2006; Turner, 2011). It is also the last chance before the in-season to impose stimuli of adequate magnitude to elicit meaningful adaptations (unless the athlete is young or inexperienced), as doing so could be too fatiguing during the competitive phase, potentially negatively impacting performance.

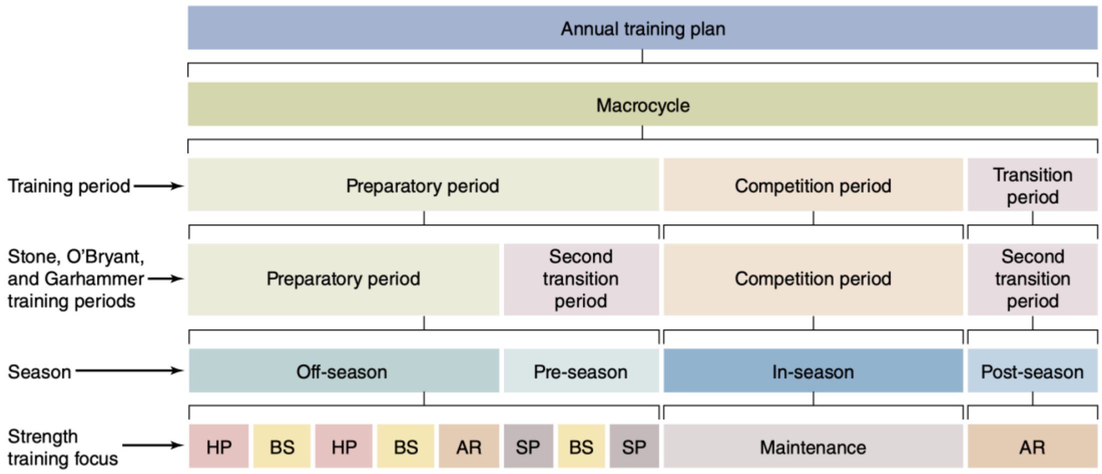

Figure 3. Relationship of periodisation periods to seasons and strength training focus. HP = hypertrophy/strength endurance; BS = basic strength; AR = active rest; SP =strength/power (Haff, 2016).

In-season

The in-season poses some challenges for SCCs. Team sports seasons are often long with dense competitive schedules (some sports compete three times per week). Given the short recovery periods between matches, athletes must balance technical, tactical, and physical preparation. This limited availability leads to a shift in training priorities, necessitating an emphasis on recovery rather than continued physical overload and development (Cuthbert et al., 2021).

Hence, during the in-season, maintaining physical capacities (strength, power, speed) becomes an achievement rather than an expectation (unlike the off-season and pre-season; Figure 3). One resistance training session per week was adequate for maintaining strength and power in football (soccer) athletes (Yu et al., 2021). Additionally, a systematic review with meta-analysis by Cuthbert et al. (2021), sought to determine how manipulating resistance training frequency in volume-matched comparisons across the week would affect trained participants' strength. The authors found no significant differences in maximal strength between different training frequencies over 6–12-week periods, despite frequencies ranging from one to nine sessions per week across the included studies. This lack of difference indicates that athletes could micro-dose strength training, which is less fatiguing and could be more accommodating to in-season constraints without compromising the quality of adaptations (Cuthbert et al., 2021). These findings are useful considering the time constraints typified by the in-season. However, physical development should not be overlooked for those with less strenuous competitive schedules or young athletes (both biological age and training age), who may be capable of attaining training adaptations with lower stimulus magnitudes (Hartmann et al., 2015).

In-season training typically integrates low-volume, high-intensity strength and power sessions, used to maintain sport-specific qualities alongside an emphasis on sport-specific conditioning (such as high-intensity interval training to work on repeat sprint ability), recovery, and sports training (Turner & Stewart, 2014). This focus on strength and power may preserve neuromuscular adaptations developed during the off-season and pre-season, allowing athletes to remain explosive and physically resilient throughout the in-season (Yu et al., 2021).

Non-linear (undulating) periodisation is the most frequently recommended strategy for organising in-season training in team-sports (Bompa & Buzzichelli, 2018; Gamble, 2006). This approach involves frequent manipulation of training variables—typically within a training session, daily, weekly, or fortnightly—to concurrently maintain (or develop) multiple physical qualities (e.g., strength, power, speed, endurance) while managing fatigue (Gamble, 2006; Hartmann et al., 2015; Turner & Stewart, 2014). Its utility lies in its flexibility, given the high frequency and unpredictability of competition during the in-season. Given the variability of match frequency, and individual playing time, training load should arguably be continually adjusted based on athletes' fluctuating internal and external fatigue (Gamble, 2006; Hartmann et al., 2015). Undulating periodisation accommodates this by allowing SCCs to organise the microcycle strategically. For instance, placing fatiguing stimuli (e.g., hypertrophy and maximal strength training) earlier in the week, and potentiating stimuli (e.g., power or speed) closer to competition (Harrison et al., 2019). In this way, physical qualities can be maintained or enhanced without compromising match performance (Turner & Stewart, 2014).

Transition period

The transition period, or the period immediately after the competitive season concludes, is widely regarded as the time for active rest and recovery (Gamble, 2006; Haff & Triplett, 2016). Hence, during this period, athletes are encouraged to take several weeks off training and prioritise active recovery in the form of varied and enjoyable activities to alleviate physical and psychological stress and monotony. Monotony can be defined as a lack of variation in training type or structure, typically caused by repetitive loading patterns, which may contribute to excessive fatigue, increased risk of overtraining, and reduced adaptation when sustained over time (Foster, 1998). Drew and Finch (2016) highlighted that sustained high training loads (or acute spikes in training loads), coupled with insufficient recovery, were associated with higher risk of injury and illness in athletes (Drew & Finch, 2016). It is generally recommended that training periods last between one and four weeks to allow for recovery without incurring detraining effects (Haff & Triplett, 2016). However, performance declines can begin within this short term if training ceases entirely. Short-term detraining (<4 weeks) primarily affects neuromuscular adaptations, including reduced motor unit recruitment and neural drive (Mujika & Padilla, 2000a). If training cessation extends beyond four weeks, more substantial decrements occur, such as muscle atrophy, reduced maximal strength, and significant losses in endurance and power (Mujika & Padilla, 2000a, 2000b). Silva et al. (2016) similarly note that while some performance losses may begin within 2–4 weeks, they tend to accelerate with prolonged inactivity (Silva et al., 2016). Therefore, long-term cessation of training (≥4 weeks) may require extended preparatory periods to regain or improve performance capacities (Haff & Triplett, 2016).

Practically, to reduce risks, the volume and intensity of training should be lowered to alleviate physical and psychological fatigue following the often very long in-seasons (Bompa & Buzzichelli, 2018; Gamble, 2006; Haff & Triplett, 2016). The concept of fatigue accumulation is frequently referenced in the literature (Bompa & Buzzichelli, 2018; Chiu & Barnes, 2003; Israetel et al., 2020; Mujika & Padilla, 2003; Wan et al., 2017) and is embedded within theoretical models such as the FFM (Chiu & Barnes, 2003). This is reflected by periodisation's strategic management of fatigue, usually in the form of the transition period, as well as variation in training stimuli intended to allow continued progress (avoiding plateaus), and tapering for competition (Mujika & Padilla, 2003). Although the term 'accumulated fatigue' lacks a precise definition, it is generally understood as the progressive summation of central and peripheral stressors across successive training bouts, which, if left unresolved, may lead to overtraining (Kataoka et al., 2022). However, as Kataoka et al. (2022) highlight, the concept remains largely ambiguous due to the lack of empirical evidence supporting actual fatigue accumulation in resistance training. Instead, they suggest that observed performance declines are more likely attributable to muscle damage rather than unresolved central or peripheral fatigue. Although the authors themselves could not establish a physiological basis for accumulated fatigue beyond muscle damage resulting from insufficient recovery (Kataoka et al., 2022), it could be argued that if repetitive mechanical stress on contractile and connective tissues contributes to declines in performance, then varying training stimuli may still be beneficial to mitigate localised tissue strain and promote recovery, plausibly indicating that variation may be an important aspect of implementing periodisation.

Notably, monotony is difficult (if not impossible) to avoid in team sports. Athletes are necessarily and frequently exposed to similar physical stressors in training and games. While it may be possible to mitigate training monotony in-season through variation, there is no escaping the physical toll brought on by the sport itself. For instance, football (soccer) players are continuously exposed to the same (or similar) energy system demands, playing surface, muscle contraction, and exercise type. Due to this lack of variation, extended time removed from these repetitive stressors may facilitate recovery. Theoretically, the transition period serves as an opportunity for such recovery.

Off-season

The off-season is widely considered a valuable window for physical development, as athletes are not constrained by sport-specific training or competition demands. This allows SCCs to impose higher stimulus magnitudes with less concern for performance decrements or injury risk (Gamble, 2006; Turner, 2011). These stimuli typically consist of maximal strength or hypertrophy targeted training, as these adaptations require relatively high intensities and volume, which acutely lower sport performance and coordination (Freitas et al., 2016), especially when training to failure (Vieira et al., 2022). Block and linear periodisation are recommended for developing the aforementioned foundational qualities during this extended period, which allows time for progressive overload (Gamble, 2006; Turner, 2011).

Notably, not all athletes experience a structured off-season. In some sports, particularly at lower competitive levels or in poorly resourced organisations, supervised S&C sessions may be absent altogether. Consequently, the off-season may resemble an extended transition period, characterised by unsupervised, unstructured, or insufficient training. This prolonged lack of exposure to training stimuli may lead to detraining if athletes do not self-regulate their training habits (Mujika et al., 2018). Moreover, because the off-season is typically intended to develop foundational qualities like strength and hypertrophy, missing this phase may compromise athletes' ability to tolerate and benefit from higher-velocity, sport-specific stimuli introduced during the pre-season and in-season (Suchomel et al., 2018; Suchomel et al., 2016).

Sport-specificity

Sport-specificity, congruent with the specific adaptations to imposed demands principle, posits that training adaptations are highly specific to the type of stimulus applied. Accordingly, as phases become more specific, exercises should be kinetically (forces), kinematically (movement-velocity, planes of motion, ROM) and physiologically (energy systems, motor unit recruitment, contraction type) similar to realistic sporting actions (Brearley & Bishop, 2019; Kraemer & Ratamess, 2004). Therefore, exercise selection and training variable (intensity, repetition and set targets, ROM, tempo, rest times) prescription may largely influence sport-specificity.

Training transfer, the extent to which training adaptations (strength, power, speed, endurance) enhance sport-specific task performance, according to Issurin (2013), is influenced by several factors: exercise specificity, athlete developmental stage, and sport complexity. Despite being an important consideration in athlete development, training transfer remains an opaque research area with diverse perspectives in the literature and coaching practice (Burnie et al., 2018). Training transfer stems from the theory of dynamic correspondence introduced by Verkhoshansky (Verkhoshansky & Siff, 2009). According to this framework, exercises that share key biomechanical and neuromuscular characteristics with the target sport movement may be more likely to elicit transferable adaptations (Verkhoshansky & Siff, 2009). Specificity, therefore, is considered a key determinant of whether resistance training adaptations transfer to sports performance.

The practical implementation of training transfer varies greatly among coaches (even at the highest levels), as observed by Burnie et al. (2018), who investigated elite coaches' philosophies on transferring strength training to sports performance. Their qualitative study revealed a spectrum of approaches: some coaches emphasised highly specific training methods designed to mimic the exact demands of competition, while others favoured more 'holistic' approaches, incorporating both general and specific exercises to address the multifaceted nature of athletic performance (Burnie et al., 2018). In his paper, Issurin (2013) provides a more nuanced perspective by proposing the transfer effect is dynamic, evolving throughout an athlete's career. In the early stages of development, the author claims, general exercises can yield significant benefits due to the broad adaptative potential of less-experienced athletes (Issurin, 2013). However, he suggests the marginal gains from general training diminish as athletes reach higher performance levels. This perspective suggests that coaches should consider progressively scaling training with the developmental stage and competitive demands of the athlete.

Brearley and Bishop (2019), questioned the extent to which training specificity should be prioritised, cautioning that although specific training can yield improvements in sport-related tasks, there is a risk of over-specialisation, potentially limiting an athlete's overall physical development. Their review emphasised that general strength training plays a foundational role, particularly in the early stages of athletic development, by improving fundamental neuromuscular and morphological qualities (Brearley & Bishop, 2019). However, several gaps remain in the literature regarding the transfer of training. Brearley and Bishop (2019), note that there is a lack of empirical studies directly comparing the long-term effects of general versus specific strength training on sport performance outcomes. As with the general concept of periodisation, a nuanced approach that accounts for individual differences in experience and developmental stage is likely a critical consideration when deciding how specific training should be to maximise transfer.

General and Specific Physical Preparation

The concept of general physical preparation (GPP) has not been directly investigated in empirical research. Therefore, GPP must be identified tangentially, as most studies address its components implicitly or indirectly. Consequently, research on the individual variables that constitute GPP should be synthesised, critically examined, and integrated to form a comprehensive analysis of the concept.

GPP is a term used to describe a training approach aimed at preparing the body for varied physical demands that are not necessarily kinetically, kinematically, or physiologically specific to the sport (Bompa & Buzzichelli, 2018). GPP is typically characterised by developing foundational physical qualities (strength, hypertrophy, movement competency, work capacity [tolerance]) intended to potentiate more specific physical qualities associated with sport performance, like power and speed (Haff & Triplett, 2016; Suchomel et al., 2016). Bompa and Buzzichelli (2018) claim GPP training phases are the most important phases of the macrocycle as they are thought to increase tolerance to the demands of the competitive period. They emphasise this point by outlining potential detriments of not committing extended periods of time to GPP, including increased injuriousness and suboptimal performance during the competitive period.

The physiological rationale for emphasising strength and hypertrophy in a preparation phase is that increased strength may make the body more resilient by increasing bone density and tendon (and other connective tissue) strength (Folland & Williams, 2007). Other possible morphological adaptations to strength training include changes in fibre type (from Type IIx to Type IIa), hypertrophy, and increased myofilament density (Folland & Williams, 2007; Suchomel et al., 2018). Hypertrophy is typically emphasised during GPP as muscle size is correlated with increased force production capacity (Aagaard et al., 2001). Strength development, in turn, may increase the potential for other physical qualities, such as power. Power is calculated as force multiplied by velocity; hence, increasing strength is thought to contribute to power development by enhancing force development. Power, depending on how it is expressed along the force-velocity continuum, is a critical physical characteristic in team sports which involve sprinting, jumping, and forceful, rapid accelerations, decelerations and changes of direction (Cormie et al., 2011a; Haff & Nimphius, 2012).

In contrast, specific physical preparation (SPP) refers to more sport-specific training. An SPP phase aims to maximise training transfer to ensure the physical attributes developed during a GPP phase translate to improved sport performance.

Training variables

The following section describes the training variables explored in this thesis, aims to provide an evidence-based rationale for their influence in achieving the desired physical outcomes, and outlines an evidence-based approach to how these variables could be periodised for team-sports.

Intensity

"Intensity" in resistance training is related to strength, as it describes the load, proximity to failure and/or perceived exertion used in a set and can be prescribed subjectively and/or objectively. Strength is defined as the neuromuscular system's ability to produce force. A common objective measure of intensity is percentage of one repetition maximum (%1RM), which represents the proportion of one's maximal load that can be lifted for a single repetition. %1RM is a valuable metric due to the precision with which coaches can prescribe intensity based on the athlete's strength. Manipulating %1RM can change the type and magnitude of the stimulus from an exercise, allowing SCCs to target specific adaptations. The physiological rationale behind this change in stimulus lies in Henneman's size principle (Henneman & Olson, 1965; Henneman et al., 1965a, 1965b). Essentially, this principle provides a physiological explanation for why manipulating training load impacts the extent of motor unit recruitment and, therefore, force production (Henneman et al., 1965a; Herda, 2022). Motor units are recruited in a predictable manner, dependent on the force demands of a task, beginning with smaller, low-threshold motor neurons (Type 1 muscle fibres) and progressively engaging larger, high-threshold motor neurons (Type 2a and Type 2x muscle fibres) as force production demands increase (Herda, 2022). Type 2 muscle fibres have more growth potential than their Type 1 counterparts and possess a faster shortening velocity, making them more powerful, whereas Type 1 fibres are more fatigue resistant and oxidative, possessing higher endurance capacity (Herda, 2022).

Training intensity can also be described subjectively, including rating of perceived exertion (RPE) and repetitions in reserve (RIR). In the context of resistance training, these metrics assess the difficulty of a given set (or an entire session in the case of session RPE), either subjectively gauging perceived difficulty or perceived proximity to failure, respectively (Helms et al., 2016). RPE can be recorded using various scales that allow individuals to report perceived exertion at various points in training. Initially developed by Borg (1970), for aerobic exercise, the RPE scale has been adopted for resistance training to indicate the difficulty of a set, exercise, workout, and and/or training week (Borg, 1970; Helms et al., 2016). However, RIR estimates how many repetitions are perceived to remain before an athlete can no longer perform an additional repetition in a given resistance training task. For example, if 2 RIR is prescribed for a repetition target of eight, the athlete would select a weight they believed was their 10-repetition maximum at that moment, with the intention of stopping at the eighth repetition, two repetitions from task failure, assuming accurate load selection. However, research suggests that study participants, on average, typically underestimate RIR, although by only a small margin (~1 repetition), but this error increases steeply in sets with ≥12 repetitions (Halperin et al., 2022). Additionally, some data indicate RIR accuracy is higher than was reported by Halperin in well-trained lifters (Refalo et al., 2024), and may improve over time (Hermann et al., 2025). Gauging RIR directly or using the RIR-based RPE scale, in which RPE scores are anchored to RIR (Zourdos et al., 2016), is therefore an effective tool for acute adjustments based on fluctuations in performance and readiness during heavy and moderate load resistance training in experienced athletes (Helms et al., 2016; Zourdos et al., 2016).

Notably, these intensity metrics can be used together. For example, Helms et al. (2016), outline the application of an RIR-based RPE scale and how it can be applied to target different performance outcomes (hypertrophy, maximal strength, muscular endurance, power). %1RM can be used as a precise load prescription tool in conjunction with RIR and/or RPE to facilitate long-term progression by monitoring and adjusting training intensity (load and proximity to failure concurrently) to maximise performance and manage fatigue.

For team-sport athletes, periodising (manipulating) intensity throughout the macrocycle may be useful for managing fatigue and scaling training loads to suit the needs of each respective competitive phase. During the off-season, building foundational strength and hypertrophy is recommended (Gamble, 2006). During the pre-season, intensity may be progressively increased to target maximal strength and power, preparing athletes for competition demands (Turner, 2011). During the in-season, the recommended approach is to fluctuate intensity, with training getting progressively less intensive as a match/game approaches to manage fatigue in an attempt to maintain prior adaptations with lover volume, less intense training due to the constraints of competition (Gamble, 2006; Yu et al., 2021).

Tempo

Tempo, in the context of resistance training, refers to the velocity with which a repetition is executed. Tempo is typically expressed and prescribed as a sequence of four numbers (in seconds) denoting the duration of the eccentric phase (muscle lengthening), the isometric pause at the end of the eccentric, the concentric phase (muscle shortening), and the second isometric pause at the end of the concentric phase (Wilk, Tufano, et al., 2020). Manipulating the tempo of one contraction phase influences the others, thereby altering the mechanical and physiological stimulus, allowing for more targeted training adaptations (Moreno-Villanueva et al., 2022).

To better understand how manipulating tempo influences force production and adaptation, it is helpful to consider the three-component model of muscle contraction, which describes how force is generated and transmitted within the muscle-tendon unit. This model conceptualises the muscle as comprised of a contractile component, responsible for active force production via actin-myosin cross-bridge cycling; a series elastic component, which includes tendons and aponeuroses that store and return elastic energy during stretch-shortening actions; and a parallel elastic component, consisting of passive tissues such as fascia, titin, and intramuscular connective structures that resist stretch and contribute to passive tension (Herzog, 2014, 2018; Hill, 1938; Patel & Lieber, 1997; Schleip & Müller, 2013; Zajac, 1989). While functionally accurate in most cases and fundamentally accurate for practice, this is a conceptual model, as many details regarding its physiological and molecular mechanisms remain inconclusive (Herzog, 2018). Manipulating tempo alters the relative contribution of these components, particularly during the stretch-shortening cycle–a mechanism in which rapid eccentric action is immediately followed by a concentric contraction (Carzoli et al., 2019; Wilk, Gepfert, et al., 2020), causing the series elastic component to store elastic energy during the lengthening phase, contributing to force production in the concentric phase (García-Ramos et al., 2021; Komi, 2000; Turner & Jeffreys, 2010). Tempo prescriptions encouraging fast eccentric tempos and minimal transition time maximise stretch-shortening cycle utilisation, supporting performance in explosive or ballistic tasks such as jumping and sprinting (Amdi & King, 2024).

Historically, slow eccentric tempos were considered a primary mechanism to target hypertrophic adaptations by increasing time under tension and muscle damage (Schoenfeld et al., 2015). Two recent systematic reviews (one with meta-analysis) found no conclusive evidence that intentionally slowing the eccentric beyond controlled lowering provided superior hypertrophic adaptations (Amdi & King, 2024; Moreno-Villanueva et al., 2022). In fact, excessively slow repetitions (>8 seconds) may impair hypertrophic adaptations (Moreno-Villanueva et al., 2022). Similarly, no evidence supports the claim that maximum concentric intent produce more muscle growth than slower concentric tempos, provided sets conclude at an *involuntarily* slow concentric tempo due to reaching or nearing momentary failure (Moreno-Villanueva et al., 2022). It was believed that due to mechanical tension being a primary mechanism for muscle growth, one must produce maximal force (force = mass x acceleration; i.e., the rationale for maximising concentric velocity) to stimulate the necessary motor units (fibre types) appropriately. While this may be true for maximising strength and power, proximity to failure is the intensity variable that seems to influence hypertrophy, as the intent to produce force in the face of muscle fatigue achieves full motor unit recruitment and subsequent hypertrophy (even if it does not maximise velocity or power-specific adaptations). Thus, regardless of eccentric, concentric, or transition tempos, hypertrophy is likely similar if total set durations are not excessively slow and terminate sufficiently near failure (Lopez et al., 2020). Lastly, time under tension was thought to be another mechanism for stimulating hypertrophy (Schoenfeld et al., 2015). However, when adjusting load to facilitate training to failure at disparate repetition ranges (i.e., 6-12 and 25-40), no significant differences in hypertrophy are observed (Jenkins et al., 2016), indicating time under tension *alone* does not produce greater muscle growth. Therefore, tempo (outside of ensuring individual repetitions do not exceed ~8 seconds) may not be as critical for eliciting hypertrophy stimuli as was once believed.

Strength development, however, is maximised when training involves high loads lifted with maximal concentric intent, regardless of the movement tempo (Suchomel et al., 2018; Wilk et al., 2021). However, tempo manipulation—especially slowing the eccentric phase—may play a complementary role in promoting neural and morphological adaptations, particularly when accentuated eccentric loading is used (Suchomel et al., 2018). Performing the concentric phase explosively, regardless of actual bar speed, enhances motor unit recruitment and rate coding, contributing to greater strength gains (Wilk, Tufano, et al., 2020; Wilk et al., 2021). For strength, moderate eccentric tempos (e.g., 2–3 seconds) are generally effective, provided the lifter maintains maximal intent during the concentric phase (Wilk, Tufano, et al., 2020).

For power development, specificity of training velocity is critical. Movements performed with maximal concentric intent, minimal load deceleration, and short ground contact times (in the case of plyometrics) best mimic the demands of field sport and optimise neuromuscular adaptations for high velocity power output (Suchomel et al., 2016; Wilk, Tufano, et al., 2020). While slow tempos reduce power output due to prolonged force application periods and reduced velocity, explosive concentric efforts under both light and moderate loads are necessary for developing high rate-of-force development and mechanical power (Suchomel et al., 2016). Therefore, training aimed at increasing power should prioritise fast eccentric-concentric coupling and avoid unnecessarily prolonged repetition durations.

From a periodisation standpoint, team-sport SCCs should consider these variable stimuli and corresponding adaptations affected by tempo manipulations of the different repetition phases (eccentric, concentric, pauses) and systematically integrate tempo manipulation in the macrocycle to align with the competitive schedule. Practically, ensuring maximal concentric intent and moderate-to-slow eccentric tempos during the pre-and in-season (and arguably throughout the year) to develop strength and power is advisable due to the positive impact of strength and power on sports performance (Moreno-Villanueva et al., 2022; Suchomel et al., 2016; Yu et al., 2021).

Range of motion

ROM, in the context of resistance training, can be defined as the amount of movement a joint achieves during an exercise, from start to finish of a given repetition. To manipulate ROM is to deliberately limit or maximise joint motion and the extent that muscles elongate, which influences force production and adaptation.

The length-tension relationship describes a muscle's changing force production capabilities at various muscle lengths (Gordon et al., 1966; Ottinger et al., 2023), due to changing sarcomere length and subsequent overlap of actin-myosin cross-bridges which influence the contractile potential of a muscle, as well as the force contribution from the "passive", elastic element of the muscle-tendon unit as the tendon and titin change in length (Gordon et al., 1966; Zajac, 1989). The greatest crossover between myosin and actin filaments (and therefore maximal cross-bridge formation) occurs when the muscle in at or near its optimal length for active tension, which often (but not always) corresponds to the middle portion of a joint's ROM. At shorter or longer lengths, fewer possible cross-bridges can typically form. However, the passive, elastic contribution increases as the muscle is lengthened beyond its optimal contractile range, primarily due to the elongation of non-contractile structures such as titin, connective tissue, and the series elastic component of the muscle-tendon unit, which can store and transmit elastic energy (Herzog, 2014; Zajac, 1989). At long muscle lengths, passive tension summates with reduced active tension, preserving (or enhancing) total force production (Herzog, 2014; Proske & Morgan, 2001).

Like the other variables, manipulating ROM has physiological and biomechanical implications that affect adaptation (Ottinger et al., 2023; Rhea et al., 2016). Full ROM resistance training produces greater hypertrophy than partial ROM when partial ROM is performed at shortened muscle lengths (Kubo et al., 2019; Wolf et al., 2023). However, when partial ROM is performed at long muscle lengths, hypertrophic outcomes match or exceed those of full ROM (Kassiano, Costa, Kunevaliki, et al., 2023; Pedrosa et al., 2022; Wolf et al., 2023). In contrast, strength adaptations tend to be specific to the joint angles or muscle lengths trained (Pallarés et al., 2021; Wolf et al., 2023). For example, partial squats performed at shorter muscle lengths (top of the ROM) enhance strength in the specific range utilised during sprinting and jumping (Clark et al., 2011; Rhea et al., 2016). Therefore, due to these diverging responses, ROM can be manipulated to induce a desired training effect and target strength adaptations at specific joint angles.

Regarding team-sport periodisation, ROM could be manipulated throughout the season according to the demands of the seasonal phase. During the preparatory phases (off-season and early pre-season), GPP adaptations may be targeted by training with full ROM or using lengthened partials to stimulate hypertrophy and build strength across joint angles. Notably, training at longer muscle lengths can induce greater muscle damage, particularly during eccentric contractions (Nosaka & Sakamoto, 2001; Proske & Morgan, 2001). Therefore, it may be prudent to reduce ROM, favouring the shortened positions during the competitive phase (late pre-season and in-season), or position long-length training earlier in the week to allow for sufficient recovery prior to competition. During these late-preparatory and competitive phases, plyometric exercises could be utilised to enhance joint and active muscle stiffness. Isometrics at high intensities (load) and long muscle lengths may enhance tendon structure and function (Bojsen-Møller et al., 2005; Kubo et al., 2017; Oranchuk et al., 2019). Isometric training also produces less muscle damage than dynamic exercise (Oranchuk et al., 2019), making it conducive to use in the in-season. There is, however, little conclusive evidence on the application of isometrics in team-sport environments.

Why intensity, ROM, and tempo largely determine specificity

This section is dedicated to presenting a novel, evidence-based rationale for the pivotal role of the three training variables in determining the sport-specificity of training. Most of the physiological grounds are already established in this text, informing the following logical deductions.

Consider the previously mentioned definition of sport-specificity. For training to be sport-specific, it should closely mimic the kinetic (force-production) and kinematic (movement) actions that athletes are likely to encounter in sport. Specificity of training is, therefore, often pursued through exercise selection, expressed through movement pattern similarities between exercises and sports actions (Brearley & Bishop, 2019; Sheppard, 2003). However, solely relying on manipulating exercise type overlooks a critical component: exercise execution. This section emphasises that intensity, ROM, and tempo are the primary determinants of specificity, rather than exercise selection alone. Understanding and effectively manipulating these variables can significantly enhance specificity of training, as they determine the intention with which an exercise is executed, which, as delineated earlier in this text, has adaptive implications.

Exercise selection, however, remains an important consideration. Exercises should align with the intended loading strategies and planes of motion. However, kinematic resemblance to sport-specific movements, in isolation, may not maximise the likelihood of transfer unless accompanied by purposeful execution. Conversely, a 'general' exercise can be made highly specific if intensity, ROM, and tempo are correctly prescribed. Rather than treating specificity as an inherent property of a given exercise, it is arguably more appropriate to analyse specificity by its execution and the intent behind its implementation.

Intensity (%1RM, RPE, RIR) dictates the neuromuscular and force production demands of an exercise (Henneman et al., 1965a; Herda, 2022). ROM influences the joint angles and muscle lengths at which force is produced and the extent to which force can be produced (Gordon et al., 1966; Ottinger et al., 2023; Wolf et al., 2023). Tempo affects the duration of muscle tension, the emphasis on different contractile phases (eccentric, isometric, concentric), and the resultant mechanical and metabolic demands (Schoenfeld et al., 2015; Wilk, Tufano, et al., 2020). These training variables can produce distinct stimuli when manipulated in conjunction, allowing SCCs to target specific adaptations.

For instance, sled-resisted sprinting is widely used to develop sprint-specific force production capacities. Generally, this exercise is considered sport-specific due to its kinetic and kinematic similarities to sprinting, particularly the forward, horizontal force vector, and extension through the hip, knee, and ankle (Alcaraz et al., 2018). Indeed, when appropriately loaded, it can target horizontal force application in early acceleration phases without compromising sprint mechanics (Cross et al., 2017; Morin et al., 2017; Petrakos et al., 2016). In this context, heavy sled-resisted running is not necessarily less specific but serves as a force-dominant adjunct to sprinting to be used in a phase, dose and/or individual-need specific manner. The effectiveness of resisted sprinting depends on its careful integration within a periodised training plan, where adjustments to load (intensity), movement velocity (tempo), and ROM shape the specificity of the resulting adaptations (Cross et al., 2017; Petrakos et al., 2016).

Similarly, the trap-bar deadlift is typically considered a general exercise due to its vertical force orientation and lack of direct resemblance to sprinting. However, when performed at high intensities (e.g., 80–90% 1RM), with a ROM targeting sprint-relevant joint angles (e.g., quarter or half pulls), and executed with maximal concentric intent, it can elicit neuromuscular adaptations relevant to sprint performance (Hagerupsen et al., 2024). These modifications demonstrate how adjustments in training variables to the same exercise can target sport-relevant adaptations differentially (Issurin, 2008; Morin & Samozino, 2016).

This concept is illustrated further by a single-joint exercise such as the calf raise, which may initially appear non-specific due to being an isolation (single-joint) exercise that lacks resemblance to sporting movements like sprinting or jumping. However, when loaded appropriately, performed with maximal concentric intent, and integrated strategically, it can target plantar flexor strength and tendon stiffness—qualities relevant to jump and sprint performance (Kubo et al., 2017; Kubo et al., 2007). Therefore, even seemingly general or simple exercises can contribute meaningfully to sport-specific adaptation when execution parameters are strategically manipulated.

These training variables can also be reconceptualised as task constraints, enabling SCCs to adopt a constraints-led approach to resistance training prescription (Renshaw et al., 2010). By understanding how intensity, ROM, and tempo can be manipulated (constrained) to drive specific adaptations, SCCs can systematically shape athlete development with greater precision. This approach mirrors more conventional approaches to task constraints in sport, such as modifying pitch size, rules, or player numbers to influence athlete behaviour or physical demands (Renshaw et al., 2010). For example, from a S&C perspective, decreasing pitch size increases acceleration, deceleration and change of direction demands, while increasing pitch size allows athletes to accumulate more speed. Similarly, adjusting ROM, tempo, or intensity (load and/or proximity to failure) can shift the emphasis of an exercise. In this way, the careful manipulation of training variables functions as a practical extension of the constraints-led approach. Explicitly framing training variables as manipulatable constraints may shift coaching practice from a fixed, exercise-focused mindset to a more adaptive, outcome-oriented one. Rather than categorising exercises as inherently 'general' or 'specific', SCCs may be more attuned to how movement execution shapes adaptation and transfer. Failure to facilitate the correct execution of an exercise through these variables, in alignment with the needs of the training phase, may compromise intended stimulus. Conversely, clearly prescribing how an exercise should be performed can enhance intent and make the training process more productive.

In practice, manipulating training variables in a sport-specific manner may unintentionally result in exercises that resemble sporting actions. For instance, power development typically requires the use of submaximal loads lifted with maximal concentric intent, and strength gains are specific to the joint angles trained (Cormie et al., 2011b; Pallarés et al., 2021; Turner et al., 2021; Wolf et al., 2023). When such prescriptions are applied deliberately to enhance performance capacities like rate of force development, joint-angle-specific strength, or tendon stiffness, the resulting movement patterns may begin to mirror sport-specific actions. This resemblance, however, is a byproduct of purposeful programming rather than an attempt to visually mimic the sport.

Individual variability further supports this need for precise and informed prescription. Athletes have varying physical strength and weaknesses, which should be considered when designing an individualised training program. For example, assessments like the reactive strength index can help identify whether an athlete is strength, or velocity dominant, or whether they rely primarily on their active contractile tissue or elastic and passive components during sport-specific tests (e.g. counter-movement jump). This information can then be used to inform SCCs about whether they need to get the athlete stronger or faster, allowing them to correctly program the execution of the exercises using these variables to achieve the desired adaptations. This can arguably be considered sport-specific training, as addressing an athlete's weaknesses can arguably disproportionally enhance their sport performance.

Ultimately, training variables should be prescribed to match the intended stimulus, with exercises selected for their capacity to facilitate that outcome. The most visually similar exercise is not always the most effective, as it may lack the stability and loading potential required for meaningful progression. In contrast, general compound movements often provide greater capacity for overload and progression across broader ROMs. Thus, exercise selection should be reconciled with execution. It is the programming and subsequent execution of an exercise, not just its appearance, that determines its specificity.

While this section has presented a strong rationale for intensity, ROM, and tempo as the primary determinants of sport-specific adaptations in resistance training, their implementation in applied settings remains underexplored. Experimental studies typically isolate individual variables under tightly controlled conditions, which, although valuable for understanding mechanisms, cannot capture the complexity of decision-making in real-world environments. SCCs manipulate training variables simultaneously, in context-specific, time-constrained, athlete-specific ways. Given these constraints, it may not be practicable, or even desirable for controlled research to attempt replicating the dynamic, integrated programming decisions made by SCCs across the macrocycle, especially due to the idiosyncratic nature of organisation, sport, and competition-based constraints. However, observational research can offer useful insights into current coaching practices, providing a necessary bridge between theoretical models and practical application. By investigating how SCCs manipulate intensity, ROM, and tempo across seasonal phases, the survey presented in Chapter Three aims to contribute to a more ecologically valid understanding of periodisation in team-sport settings, and to inform future research—controlled and observational—grounded in real-world practices.

Conclusion

Periodisation remains a valuable framework for planning and organisation of long-term training. Various models attempt to accommodate the diverse demands of competitive sports. In team-sport settings, the choice of periodisation model often reflects the structure and frequency of competition, with different approaches suited to continuous versus intermittent schedules. By aligning the training strategy with these constraints, SCCs may manage fatigue more effectively, prioritise key adaptations, and prepare athletes for performance at appropriate times. While empirical support for these models remains limited, strategic manipulation of training variables–including intensity, ROM, and tempo–may allow practitioners to control training load and target adaptations with contextual specificity. As such, periodisation should be viewed as a flexible framework, shaped by the needs of sport and capacities of the athlete, rather than a rigid set of training protocols.

Chapter 3 – Practices of field-team sport strength and conditioning coaches regarding training intensity, range of motion, and tempo throughout the year.

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Abstract

This study examined how strength and conditioning coaches (SCCs) in field-team sports manipulate training variables—intensity, range of motion (ROM), and tempo—throughout the year (macrocycle). Despite the widespread use of periodisation, limited research has explored how SCCs manipulate these variables across macrocycle phases. A global cross-sectional survey was distributed to experienced SCCs working with field-team sport athletes ($N = 42$). In-season, 100% of SCCs who manipulated ROM used shortened partials, and 100% of those who manipulated concentric tempo prescribed maximal concentric intent. Off-season prescriptions showed the highest use of lengthened partials (50%) and the lowest use of shortened partials (25%). Tempo manipulation also differed, with slow eccentric and long pauses most common in the off-season, and faster tempos during the in-season. No SCCs manipulated ROM during the transition period. Manipulation varied significantly across phases for intensity, $Q(3) = 31.02$, $p < .001$; ROM, $Q(3) = 22.62$, $p < .001$; and tempo, $Q(3) = 23.66$, $p < .001$. Transition periods showed consistently lower manipulation, while in-season ROM manipulation was significantly higher than off-season ($p = .004$). Our findings indicate that SCCs adjust training variables in a phase-dependent manner, aligning with periodisation principles and demonstrating structured, context-specific practices in applied settings.

Introduction

Periodisation is a training planning tool that strategically manages training variables over time to maximise performance at predetermined times and mitigate injury risk and performance plateaus. Periodising resistance training in team-sport environments is challenging due to the disparate demands of each seasonal phase (pre-season, in-season, transition period, off-season), potentially necessitating phase-specific training approaches throughout the year (Gamble, 2006).

Recommendations for the application of periodisation to team-sport settings are well documented (Bompa & Buzzichelli, 2018; de Hoyo Lora & Arrones, 2022; Gamble, 2006; Plisk & Stone, 2003; Turner, 2011; Turner & Stewart, 2014). Authors recommend that during the preparatory period (off-season, early pre-season), resistance training can be prioritised, as there is no competitive schedule that may be compromised by arduous training loads (Gamble, 2006; Turner & Stewart, 2014). Hence, recommendations during the preparatory period are to target adaptations and address individual weaknesses. Conversely, during the competitive period (late pre-season, in-season), it is recommended that performance takes precedence, and resistance training stimuli are typically deprioritised to minimise detriments in match performance (Gamble, 2006).

Controlled experimental periodisation research has been conducted to test the effectiveness of periodisation. However, the standardisation and control of potential confounding variables for experimental reliability can remove important real-world factors, such as travel, games, concurrent training, position-specific demands which produce unequal stresses across participants, and more, that periodisation is intended to address (Afonso et al., 2017; Afonso et al., 2019; Kataoka et al., 2021; Steele et al., 2023). Given that real-world training environments are inherently dynamic and complex, with numerous interacting variables at play, the validity of even long-term experimental studies of periodisation is questionable, on top of the fact that such research is often logistically impracticable (Afonso et al., 2017; Kataoka et al., 2021; Steele et al., 2023). Observational research therefore offers a less controlled, albeit more ecologically valid means of determining whether practitioners who use periodisation do so in the traditionally recommended manner or other ways, and how they navigate the real-world complexities of sport whilst manipulating training variables.

Indeed, a growing body of observational research examines whether team-sport strength and conditioning coaches (SCCs) practice in an evidence-based manner despite these numerous practical and contextual constraints (Drury et al., 2021; Loturco et al., 2022; Weldon, Duncan, Turner, LaPlaca, et al., 2022). Confusion about how SCCs conceptualise and apply periodisation likely stems from the lack of a formal definition (Anyadike-Danes et al., 2023; Kataoka et al., 2021). Although many SCCs report applying a periodised approach (Weldon, Duncan, Turner, LaPlaca, et al., 2022), some note low adoption due to the challenges of managing congested schedules (Loturco et al., 2022; Zabaloy et al., 2022). This contradiction bespeaks a broader potential disconnect between theory and application, given that periodisation is designed specifically to address such scheduling constraints by strategically managing load.

Evidence suggests systematically varying training to align with the demands of different seasonal phases can enhance team-sport performance (de Hoyo Lora & Arrones, 2022; Gamble, 2006; Mujika et al., 2018). However, much of the existing periodisation research has examined individual phases in isolation (Abade et al., 2020; Hoffman et al., 2009) or focused on single training variables, via experimental designs with high internal validity, potentially at the expense of ecological validity. For instance, Hoffman et al. (2009) focused on optimising off-season adaptations, while Abade et al. (2019) investigated strength-power training during the in-season. Consequently, few studies explore how key training variables, such as intensity, range of motion (ROM), and tempo which drive specific physiological adaptations (Kassiano, Costa, Nunes, et al., 2023; Kraemer et al., 1996; Wolf et al., 2023), are manipulated throughout the full macrocycle by experienced field-team sport SCCs in real-world settings. Therefore, this study examines if and how field-team sport SCCs prescribe intensity, ROM, and tempo of the squat and upper-body pressing exercises throughout the macrocycle via an anonymous online survey. We hypothesised that SCCs would alter training variable prescriptions across the macrocycle, and that consequently we would observe significant differences across macrocycle phases.

This study extends the existing literature by providing new insight into real-world programming decisions across the phases of the macrocycle, as reported by SCCs with varied backgrounds and experience levels. Furthermore, it provides the first overview of applied periodisation in field-team sports by delineating how training variables are manipulated across the full macrocycle.

Methods

Participants

A cross-sectional, observational study was conducted using an anonymous online survey. The study was designed to gather insights into periodisation and programming practices of SCCs working with field-team sport athletes. A convenience sampling method was used for this survey to target experienced team sport SCCs. The survey was advertised on social media platforms (Instagram and relevant LinkedIn groups) and using the authors' professional network. A total of 84 responses were received. Due to our convenience recruitment strategy, representativeness may be limited. Respondents are more likely to be English-speaking coaches actively engaging with social media. Furthermore, self-selection may favour those with a stronger interest in periodisation. The eligibility criteria required that participants have at least one year of experience working with team-sport athletes in a strength and conditioning (S&C) capacity. 42 were eligible for inclusion in the analysis ($N = 42$). These SCCs were from nine countries, worked with 10 field-team sport types, most held a master's degree (55%) or higher (12%). Only 10% of participants reported experience of less than 4 years. The AUTEC ethics committee granted ethical approval for this study on 31 October 2024 (reference number 24/292). No formal power analysis was conducted for this study due to the limited availability of validated methods for Cochran's Q test in standard software such as G*Power. However, our sample of 42 qualified and experienced SCCs represents a relatively large and diverse cohort within the niche field of field-team sport strength and conditioning. Given the small and specialised target population, the exploratory nature of the study, and recruitment constraints inherent to convenience sampling within professional networks, we considered the final sample size sufficient to provide meaningful insight into field-team sport SCC practice patterns (Lakens, 2022).

Survey

The survey was developed and distributed using the Qualtrics platform. Participants were recruited via the authors' social media channels, relevant LinkedIn groups hosted by the National Strength and Conditioning Association, and targeted outreach within the authors' professional networks. Before distribution, four professionals reviewed a pilot survey; all were experienced coaches, and three were experienced sports science and periodisation researchers. Pilot feedback emphasised clear wording, standardised terminology, removal of non-essential items, refined survey logic, and alignment of outputs with the planned statistical analyses. Beyond usability, these revisions strengthened content validity by clarifying key variables (seasonal phases and training variables), and standardising terminology. Revisions also improved measurement validity by yielding data congruent with the intended analyses and refining routing and response options so participants only viewed relevant items, ultimately ensuring the survey would extract a comprehensive insight into their S&C practices.

The final survey was opened to responses on September 1st, 2024, and closed on March 5th, 2025. No questions obtained identifiable information, so participation was anonymous. Informed consent was obtained via an embedded information sheet, and agreement was required to proceed.

The survey consisted of six sections: (1) a background section, collected information on participants' coaching experience, relevant qualifications, primary source of knowledge on periodisation and training variables, and self-rated confidence in their understanding of periodisation. Screening logic excluded ineligible participants or those who did not complete the relevant sections. (2) a section on exercise use and perceptions assessed whether participants prescribed squatting and/or upper body pressing exercises at any point in the year and their views on the importance of varying training stimuli for maximising performance and minimising injury risk. Furthermore, this section enquired about the frequency with which participants typically varied training stimuli, indicating the type of periodisation they prescribe. (3-6), the final four sections addressed how participants manipulated intensity, ROM, and tempo for squatting and/or upper body pressing exercises throughout the different seasonal phases in the macrocycle. First, participants were asked which of the intensity metrics (percentage of one-repetition maximum [%1RM], rating of perceived exertion [RPE], repetitions in reserve [RIR]) they used for each respective seasonal phase they selected. They could choose multiple, which many did (e.g., %1RM and RPE in the same phase). For ROM, participants were asked if they manipulated ROM for each phase. If they chose "Yes", they were asked how (shortened partials, lengthened partials, or isometrics). Alternatively, they could choose "No, I primarily prescribe full ROM". Lastly, participants were asked whether they manipulated tempo. If they indicated doing so, they were asked how–first by asking which lifting phase they manipulated (eccentric, concentric and/or isometric), then by asking to what degree (the specific tempo).

Survey logic skipped phases participants did not indicate using to target adaptations. Questions were consistent across all phases. Questions were multiple choice, with optional "Other" responses allowing participants to provide open-text answers if the listed options did not reflect their practice. In this case, these "Other" responses are presented as frequencies (percentages) and presented in figures alongside the other responses.

Data analysis

Following the closure of the survey, data were exported to IBM SPSS Statistics (Version 30.0; IBM Corp., Armonk, NY, USA) for analysis. The dataset was screened for missing or incomplete responses. The dataset was screened for eligibility and completeness. Cases that failed eligibility or provided no data for any seasonal-phase section were excluded. All other partial completions were retained. For inferential tests, we used pairwise complete-case inclusion; only coaches with complete data for the phases being compared were included. Outcome variables were the training variables (intensity, ROM, tempo) and whether their prescriptions changed according to each respective seasonal phase (pre-season, in-season, transition, off-season), addressing the research question, whether SCCs make phase-specific training variable decisions.

Descriptive statistics (frequencies and percentages) were calculated to summarise participant characteristics, including location, education, experience (level, type, and length), and views on relevant periodisation topics. Additionally, how participants manipulated each variable for each respective seasonal phase are shown via response frequencies. Not all participants responded to every phase, as they were only shown the questions for the seasonal phases in which they indicated they manipulated variables. Therefore, the number of valid responses (valid percent) is reported for each analysis to account for masked or missing data.

To assess whether the frequency of training variable manipulation differed significantly across the four seasonal phases of the macrocycle, Cochran's Q tests were conducted for each outcome variable (intensity, ROM, and tempo). This non-parametric test is suitable for repeated measures designs with binary data across multiple conditions. All assumptions for Cochran's Q were evaluated and met; data were paired (repeated measures from the same participant), variables were dichotomised (1 = Yes, 0 = No), and each participant contributed only one response per condition. The alpha level for the initial Cochran's Q test was set at the conventional threshold of $p \leq .05$. When a significant overall difference was detected across seasonal phases, post-hoc pairwise comparisons were conducted using McNemar tests to determine which specific phases differed significantly. To account for the increased risk of Type 1 error associated with multiple comparisons, a Bonferroni correction was applied. The original alpha was divided by the number of comparisons ($k = 6$), resulting in a Bonferroni-adjusted significance threshold of $p \leq .0083$ (.05 ÷ 6) for the McNemar tests. To support interpretation of the post-hoc results, direction and magnitude were described by reporting the proportion of "Yes" responses across seasonal phases. This descriptive approach enabled comparisons between phases in practical terms, allowing for more precise identification of patterns in training variable manipulation.

Results

Demographic data from the 42 included respondents are presented in Table 1. Football (soccer) ($n = 10$, 24%), American football ($n = 9$, 21%), baseball/softball ($n = 6$, 15%), Gaelic football ($n = 5$, 12%), and rugby ($n = 4$, 10%) were the most common sports participants had experience working with. Other sports included cricket, Australian football, hurling, lacrosse, and field hockey. Some respondents also indicated working across multiple sports or in unspecified "other" contexts.

Average resistance and sport-specific experience of the athletes that the participants coach is also presented (Table 2).

Table 1. *Demographic data for survey respondents.*

Demographics	No. of responses (*n*)	% of respondents
Final Sample (*N*)	42	100%
Location(s)	44*	105%
United States	16	38%

United Kingdom	3	7%
Ireland	6	14%
Australia	2	5%
New Zealand	10	24%
France	1	2%
India	1	2%
Italy	1	2%
South Africa	1	2%
Other	3	7%
Education	42	100%
No formal education	1	2%
Certification	3	7%
Bachelor's degree	10	24%
Master's degree	23	55%
Doctorate	5	12%
Job Title	42	100%
Head S&C Coach	19	45%
Assist. S&C Coach	8	19%
Head Sport Coach	1	2%
Assist. Sport Coach	1	2%
S&C Practitioner	4	10%
S&C Contractor	1	2%
Other	8	19%
Experience Type	42	100%
Field-team sports	42	100%
Individual sports	32	76%
Non-field team sports	24	57%
Track and field	25	60%
Other	6	14%
Experience Level	41	100%
Club	5	12%
Provincial / regional	7	17%
College	7	17%
National	7	17%
International	4	10%
Olympic	1	2%
Professional	4	10%

Other	6	15%
Experience Length	42	100%
<1 year	0	0%
1 – 3 years	4	10%
4 – 7 years	18	43%
8 – 10 years	4	10%
10+ years	16	38%

*Data that exceeds *N* is due to participants being able to choose multiple answers.

Table 2. *Experience of athletes trained by participants.*

Experience Length	**No. of responses (*n*)**	**% of respondents**
Resistance Training	42	100%
<1 year	5	12%
1 – 3 years	23	55%
4 – 7 years	8	19%
8 – 10 years	4	10%
10+ years	2	5%
Do not know	0	0%
Sport Training	42	100%
<1 year	0	0%
1 – 3 years	2	5%
4 – 7 years	15	37%
8 – 10 years	10	24%
10+ years	14	33%
Do not know	1	2%

Perceptions of periodisation and training variable manipulation

Participants were asked about the source of their knowledge on periodisation and programming. Participants indicated the most common source was science-based sources (45%), such as peer-reviewed research and textbooks, followed by educational sources (36%), such as university, verified clinics and conferences, and workshops. The least frequent sources of information were anecdotal (10%) and personal experience (7%). Participants were also asked to rate their confidence in their knowledge of periodisation (rating out of ten, zero being not confident at all, ten being extremely confident; Figure 4).

Regarding sources of programming (acute training variable manipulation) information, a similar trend occurred. Science-based evidence (52%) and educational sources (31%) were the most common sources of information. Anecdotal evidence (7%) and personal experience (7%), and an unspecified source (‘other’; 2%) were reported by some participants.

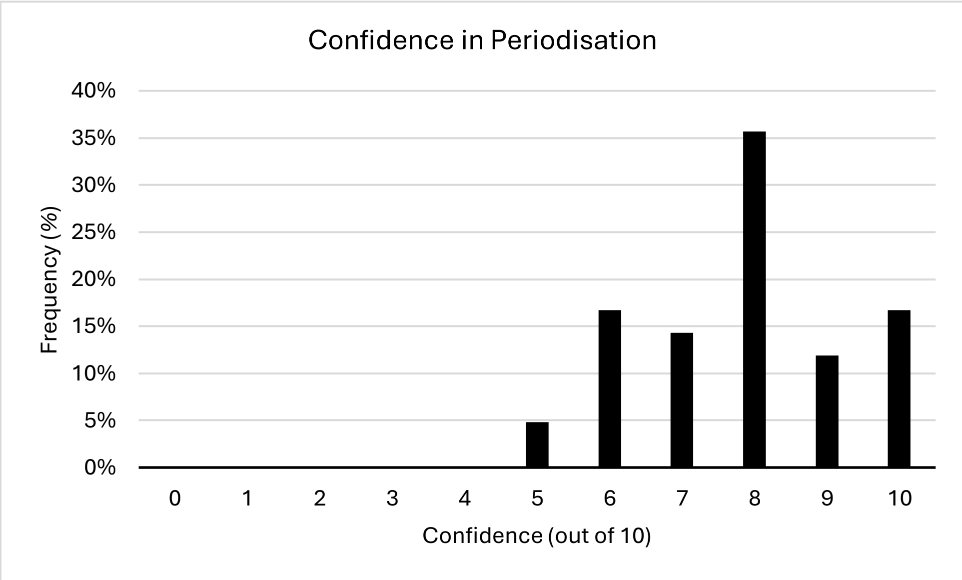

Figure 4. Respondent’s perceived confidence in their knowledge of periodisation.

Furthermore, participants were asked about the importance they placed on training variable manipulation for optimising performance and minimising injury risk (Figure 5).

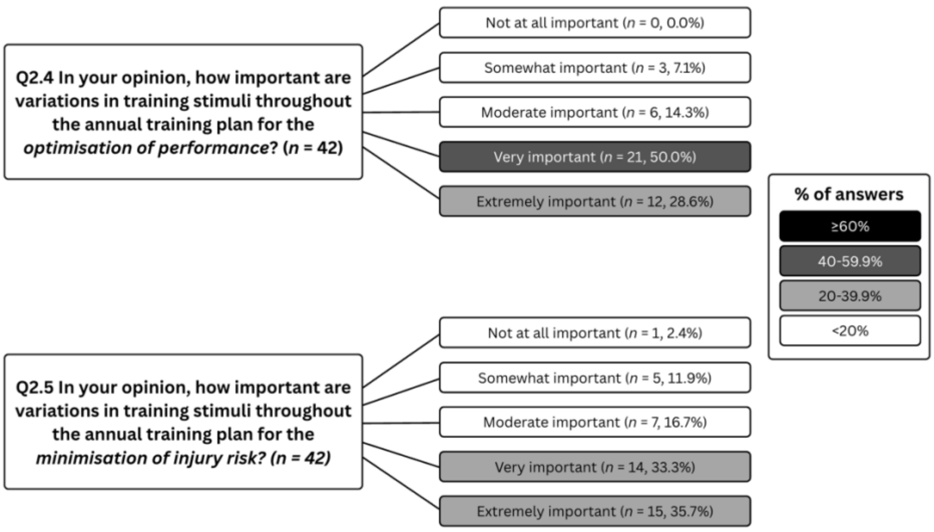

Figure 5. Respondent’s perceived importance of training variable manipulation for optimising performance and minimising injury risk.

When asked how often they manipulate training variables (intensity, ROM, tempo), participants reported a large variety of results, with no distinct most popular timeframe. The frequencies of the timeframes used to manipulate training variables were within session (n = 13), daily (n = 22), weekly (n = 22), monthly (n = 24), yearly (n = 12), and on a seasonal phase basis (n = 25).

Training Variable Manipulation Throughout the Seasonal Phases

The frequency of variable manipulation by seasonal phase (pre-season, in-season, transition period, off-season) is displayed in Figure 6. The survey logic was set-up to only provide the questions corresponding with the participants' chosen seasonal phases.

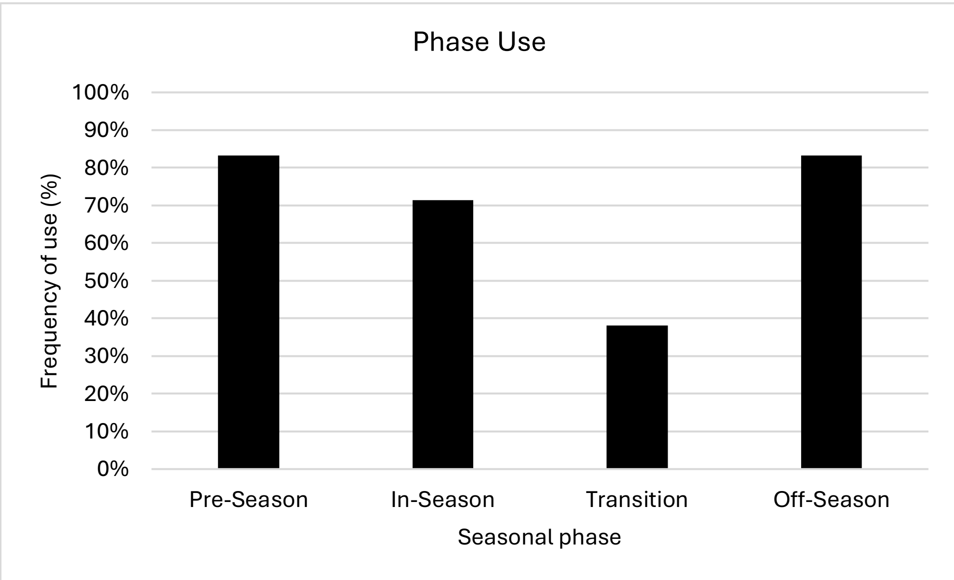

Figure 6. Frequency of seasonal phase use by field-team sport SCCs to target training adaptations.

Not all participants completed questions for every seasonal phase, indicating they do not use some phases to target certain training adaptations. As a result, the following percentages are calculated based on the number of respondents who viewed each phase-specific question (valid percent).

Intensity

Figure 7 represents the frequency of intensity manipulation, and which prescription types were used; %1RM, RPE, and RIR.

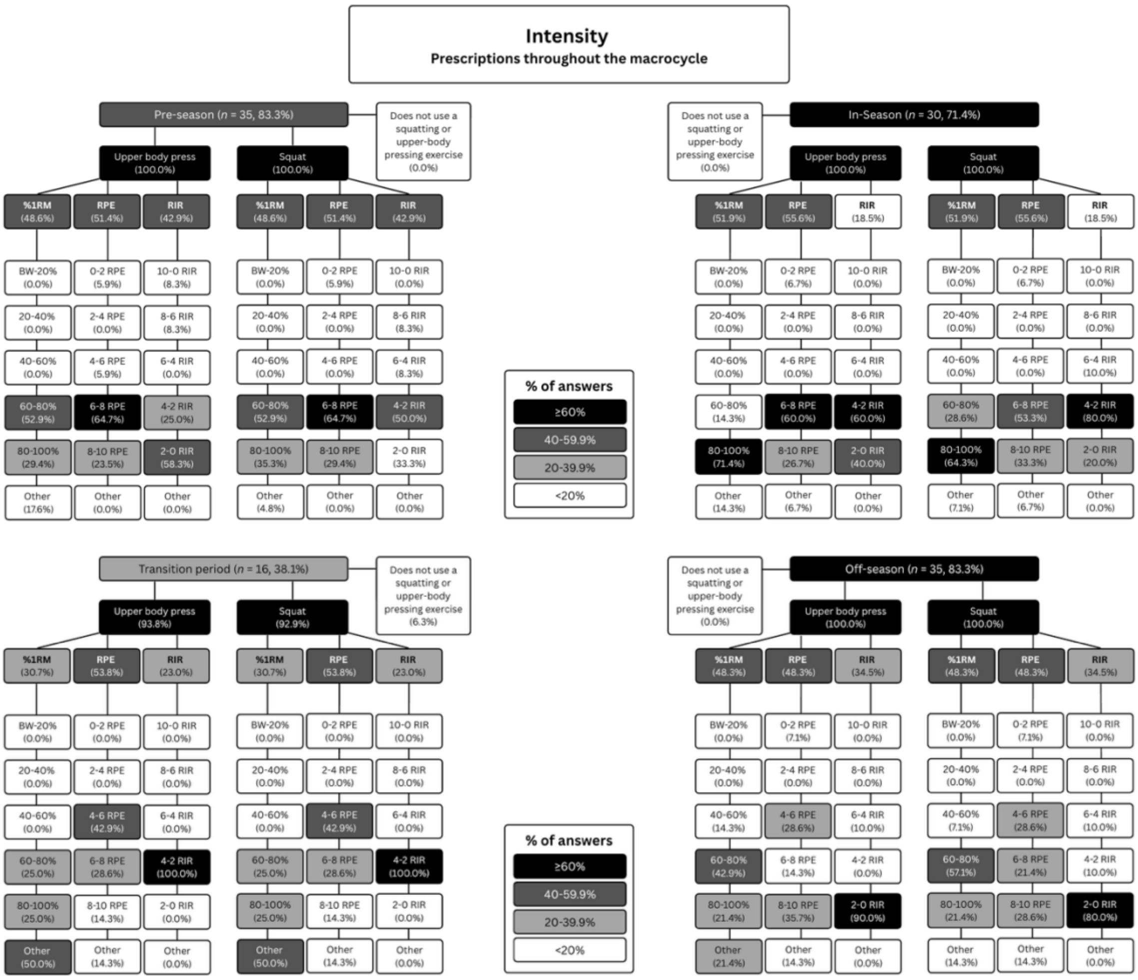

Figure 7. Frequency of intensity metric use by field-team sport SCCs throughout the macrocycle.

Intensity manipulations differed significantly throughout the macrocycle phases, Q(3) = 31.89, $p < .001$. Post-hoc tests revealed manipulation was significantly more common in the pre-season (83%) than in the transition period (38%; $p < .001$), with no significant differences between pre-season and either in-season (71%; $p = .180$) or the off-season (83%; $p = 1.000$). Similarly, the in-season (71%) and off-season (83%) had significantly higher rates of manipulation compared to the transition period (38%; $p = .001$ and $p < .001$, respectively). No significant difference was found between the in-season and off-season ($p = .302$).

Range of motion

Figure 8 depicts the frequency of ROM manipulation, and which prescription types were used (shortened partials, lengthened partials, or isometrics), followed by the proportion/portion of ROM the prescription was used in (bottom/top quarter, bottom/top half, bottom/top three quarters, other for partials, quarter, half, three quarters, bottom or other for isometrics).

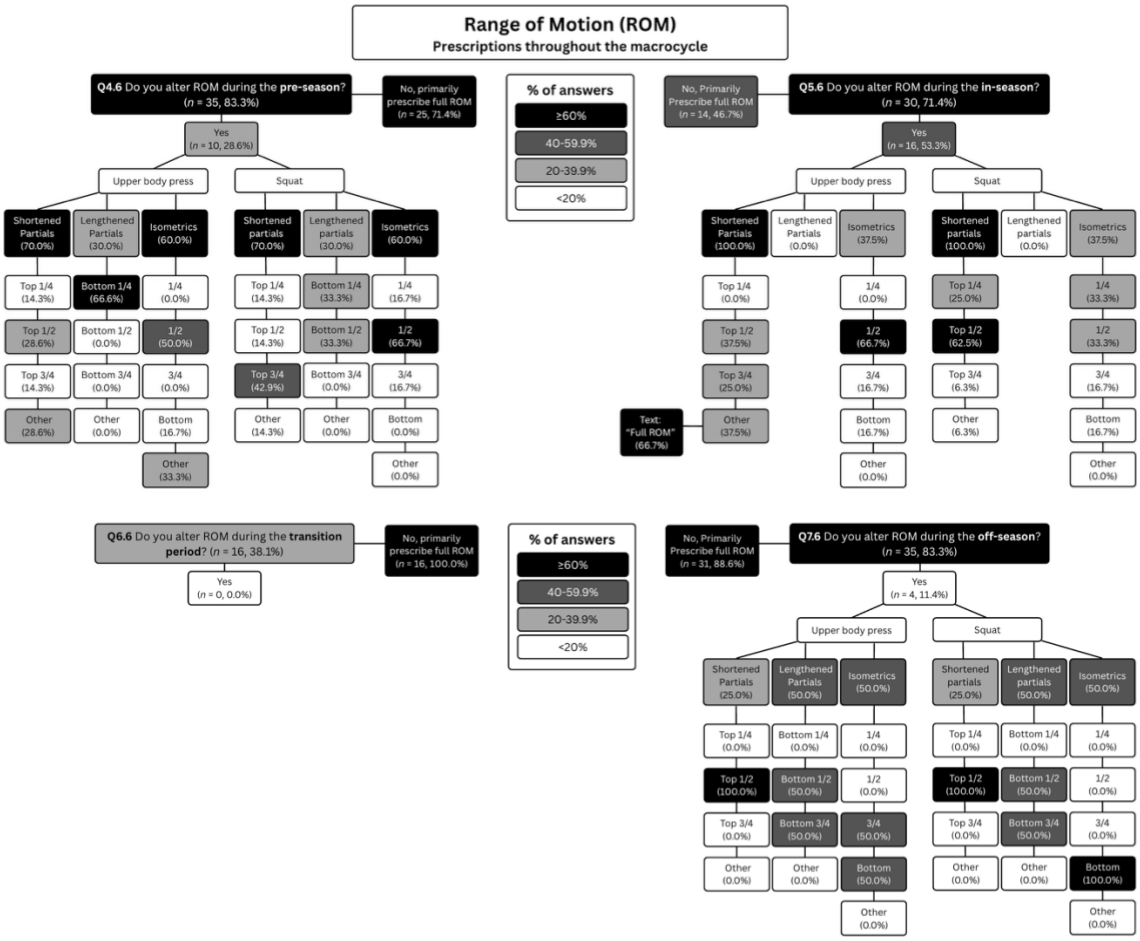

Figure 8. Frequency of ROM prescriptions by field-team sport SCCs throughout the macrocycle.

There was significant ROM manipulation throughout the macrocycle phases, Q(3) = 22.62, $p < .001$. ROM manipulation was significantly more common in the pre-season (24%) and in-season (38%) compared to the transition period (0%; $p = .002$ and $p < .001$, respectively). Additionally, SCCs were significantly more likely to manipulate ROM during the in-season (38%) than the off-season (10%; $p = .004$). No significant differences were found between the pre-season and in-season ($p = .238$), pre-season and off-season ($p = .180$), or transition period and off-season ($p = .125$).

Tempo

Figure 9 depicts the frequency of tempo manipulation by lifting phase (concentric, eccentric, pause) and to what degree (how long [measured in seconds]).

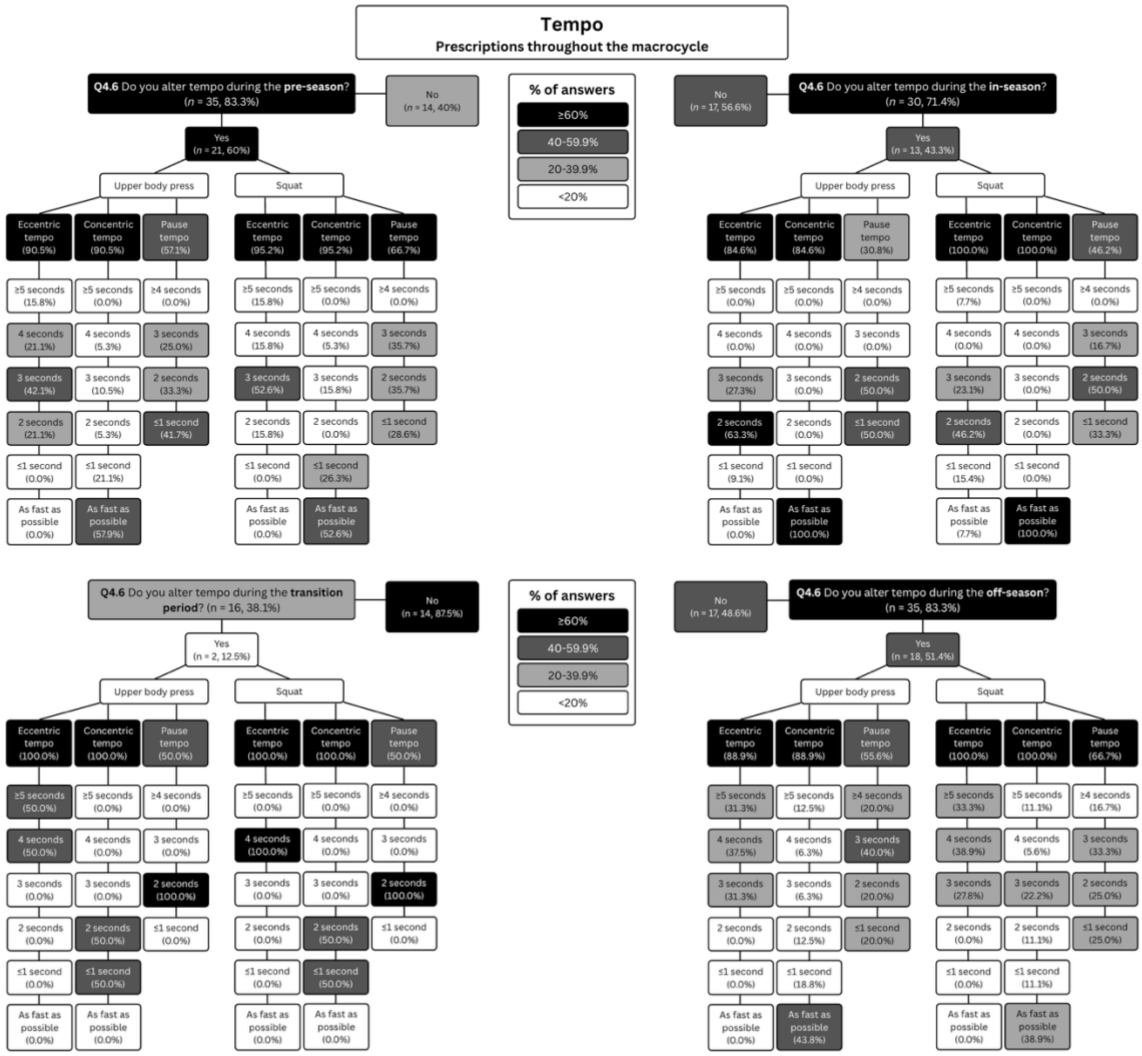

Figure 9. Frequency of tempo prescriptions by field-team sport SCCs throughout the macrocycle.

Tempo manipulation differed significantly across the macrocycle phases, Q(3) = 23.66, $p < .001$, being significantly more common in the pre-season (50%) and in-season (31%) compared to the transition period (5%; $p < .001$ and $p = .007$, respectively). Coaches were also more likely to manipulate tempo during the off-season (43%) than the transition period (5%; $p < .001$). No significant differences were found between the pre-season and in-season ($p = .077$), pre-season and off-season ($p = .664$), or in-season and off-season ($p = .302$).

Discussion

This study aimed to investigate how SCCs working in field-team sports manipulated training variables (intensity, ROM, and tempo) across the macrocycle. We hypothesised that these prescriptions would differ significantly between phases, consistent with periodisation models. Our findings partially supported this hypothesis, with significant phase-based differences in all three variables; however, not all pairwise comparisons reached significance.

Descriptive statistics, which outlined the frequency of specific training variable prescriptions, illustrate phase-dependent manipulation aligned with periodisation principles. To our knowledge, this is the first study to examine the manipulation of training variables across every phase of the macrocycle within this population, addressing a notable gap in the literature using an appropriate observational design.

Our primary finding was that field-team sport SCCs manipulate key training variables in a phase-dependent manner. Overall comparisons revealed significant phase-dependent differences in manipulation. However, not all pairwise comparisons between phases reached significance. The transition period stood out, with training variable manipulation being significantly less common compared to every other phase—except ROM between transition and off-season. This difference may be attributable to an intentional deprioritisation of targeted training in the transition period, as recommended in the literature (Bompa & Buzzichelli, 2018; Gamble, 2006; Haff, 2016). However, over a third of SCCs (n = 16; 38.1%; Figure 6) still reported utilising the transition period to target adaptations, potentially to mitigate de-training, a process that results from insufficient training stimuli (Haff, 2016; Mujika & Padilla, 2000a; Silva et al., 2016), and is exacerbated by prolonged training cessation (~≥4 weeks) (Mujika & Padilla, 2000b). Since de-training is time-sensitive and athlete-specific, the SCCs in this study may have chosen to continue exposing athletes to resistance training during the transition period to preserve adaptations, particularly if this phase is extended or unpredictable. Descriptive statistics also indicate phase-dependent manipulation. For example, the off-season had most lengthened partial prescriptions (50%) compared to the other phases, and the least shortened partial prescriptions (25%). In contrast, the in-season saw no (0%) lengthened partial use, and exclusive (100%) shortened partial use for squatting and upper body pressing exercises (Figure 8). Furthermore, no participants (0%) indicated manipulating ROM during the transition period. Tempo prescriptions were similarly phase-dependent and were also most pronounced comparing the off-season to the in-season. These disparate findings between the off-season and in-season may be attributable to the disparate competitive demands of those two seasonal phases, likely necessitating different training strategies.

Across preparatory (off-season and pre-season) and competitive phases (in-season), our findings aligned with the principle of increasing specificity over time, which is core to traditional (linear) and block periodisation models. Markers of general training, such as increased use of lengthened partials, slow tempos, and longer pauses, were more prevalent in the off-season. In contrast, sport-specific strategies, such as shortened partials, shorter amortisation, fast eccentric, and maximal concentric intent dominated in-season. These shifts likely reflect a deliberate progression from hypertrophy and general strength development toward task-specific strength and power development (Cormie et al., 2011b; Pallarés et al., 2021; Suchomel et al., 2018; Suchomel et al., 2016; Wolf et al., 2023), aligned with recommendations for team-sport periodisation (Bompa & Buzzichelli, 2018; Gamble, 2006).

For instance, maximal concentric intent prescriptions increased from ~40% in the off-season, to 100% in-season (Figure 9), suggesting an increasing emphasis on power (rate of force development), a critical quality in field-team sports (Cormie et al., 2011a, 2011b). Slower tempos early in the macrocycle may also indicate an attempt to improve resistance training technique, given that 66% of athletes trained by SCCs in this study had ≤3 years of resistance training experience (Table 2). Ultimately, these patterns reflect a practical adherence to the specificity principle, expressed through deliberate manipulation of training variables that guide execution rather than exercise selection alone.

Not all results aligned with traditional periodisation principles. While the descriptive ROM and tempo findings support the principle of increasing specificity, the same cannot be said for the linearity of intensity. According to traditional and block models, training intensity should increase over time, either gradually or in concentrated blocks (Bompa & Buzzichelli, 2018). However, our data revealed relatively stable prescriptions of moderate-to-high intensity throughout all phases, including the off-season and transition period (Figure 7). Hence, at face value, field team sport SCCs do not reduce intensity during general preparation to the extent arguably recommended by most theoretical models and could indicate that SCCs prioritise strength maintenance and development throughout the macrocycle. However, volume data were not captured. Therefore, it remains unclear whether linear progression was achieved through a trade-off in training volume rather than load. It is possible that SCCs implemented linear progression by decreasing volume rather than increasing intensity, which would still achieve the goal of fatigue management inherent in this aspect of periodisation. Thus, while we cannot definitively confirm or reject the presence of linearity; our findings suggest that coaches favour stable intensity while modulating other variables like ROM and tempo.

Homogeneity of variable prescription differed by phase. While intensity was consistent throughout the year, including the transition period, within phase variations were common for ROM and tempo during preparatory periods. For example, ROM and tempo prescriptions varied widely during the preparatory phases but became more uniform by the in-season. This increased variation in the off-season and pre-season potentially indicates a mixed methods approach, aimed at targeting multiple adaptations, or perhaps simply a lack of consensus among SCCs on variable manipulation within phases in preparatory periods. However, some prescriptions were unanimous among our sample. All SCCs (100%) who reported manipulating concentric tempo in-season prescribed maximal concentric intent (i.e., intent to move as fast as possible; Figure 9), indicating widespread consensus on the value of high rate of force-development strategies during competitive periods. Additionally, the aforementioned observation that no respondents (0%) reported using lengthened partials in-season (Figure 8) implies a consensus that this strategy may carry fatigue risks that outweigh benefits during competition (Hadjisavvas et al., 2025; Hody et al., 2019), where readiness to perform is the priority (Gamble, 2006). These findings could also be interpreted as reinforcing the trend towards specificity, shifting from more varied, general prescriptions, to targeted and specific.

Limitations and conclusions

Several limitations should be considered when interpreting this research. First, as with all self-reported data, there is a risk of recall and social desirability bias; coaches may have reported what they believe they typically do or what they perceive as best practice, rather than their actual behaviour. Second, the survey did not allow participants to provide open-ended responses, limiting the confidence with which we could interpret why they practice the way they do. Third, the survey's cross-sectional and observational nature, while maximising breadth, limits causal inference. Fourth, despite the relatively narrow target population, our sample size may not be adequate to generalise findings to all field-team sport SCCs. To conclude, this study provides novel insight into how SCCs manipulate key training variables across the macrocycle in field-team sports. Our findings suggest that SCCs alter training prescriptions in a deliberate, phase-dependent manner, supporting our hypothesis. These variations in training often resembled recommendations in the team-sport periodisation literature. Practically, these findings support coaches in refining their training strategies by demonstrating how SCCs manipulate training variables to balance adaptation and readiness. However, further longitudinal and intervention-based research is needed to validate the efficacy of specific strategies across training phases and athlete populations. Qualitative approaches may also be valuable in clarifying the rationale behind coaching decisions, helping to interpret the "why" behind observed practices. Replicating this study in other sports, countries, or competitive levels would help establish the validity of our findings, improve generalisability, and build a more robust body of comparative literature in this understudied area.

Chapter 4 – Discussion

Summary

This thesis aimed to investigate how SCCs working in field-team sports manipulate intensity, ROM, and tempo across the macrocycle. To contextualise these practices, a review of the literature was conducted to clarify the concept of periodisation, evaluate the strength of its empirical foundation, and explore how periodisation is applied in team-sport contexts. This review revealed that while periodisation is grounded in strong anecdotal and practical foundations (Stone et al., 2024), it remains challenging to study empirically due to its complexity and the interdependence of its variables (Afonso et al., 2017; Kataoka et al., 2021). Experimental designs that isolate variables to maximise reliability often sacrifice ecological validity, limiting the relevance of findings to real-world sport environments (Stone et al., 2021). Consequently, observational research, despite its limitations, may offer a more ecologically valid approach to understanding how periodisation is applied in practice. However, caution must be applied when applying practices from observational research, as cause and effect cannot be discerned, nor the influence of other non-qualified factors. Nonetheless, this thesis focused on three training variables that can be strategically manipulated to elicit specific adaptations (e.g., hypertrophy, strength, power). By employing an observational study design to investigate how SCCs adjust these variables across macrocycle phases and comparing these practices to periodisation models and mechanistic rationales, this thesis contributes by elucidating the extent to which real-world practices reflect theoretical recommendations.

The survey study (Chapter 3) included 42 qualified SCCs with at least one year of experience working with field-team sport athletes. Participants indicated which macrocycle phases they used to target adaptations, and for each, whether and how they manipulated intensity, ROM, and tempo. These responses enabled an analysis of phase-dependent manipulation patterns and the extent to which coaching practices align with periodisation principles.

Significant phase-based differences in training variable manipulation were observed, primarily due to reduced manipulation during the transition period. This aligns with recommendations to temporarily cease structured training following the competitive season, allowing for physical and psychological recovery (Gamble, 2006; Haff & Triplett, 2016). However, 38.1% of SCCs ($n = 16$) still prescribed structured training during this phase, likely reflecting an attempt to mitigate performance decrements during extended or unpredictable transition periods, given the time-sensitive and athlete-specific nature of de-training (Mujika & Padilla, 2000a, 2000b; Silva et al., 2016).

Phase-dependent manipulation was further supported by descriptive statistics, which also indicated that training progressed from general in the off-season to specific in-season, broadly aligning with recommendations in the team-sport periodisation literature, which suggests training strategies should reflect competitive demands (Gamble, 2006; Mujika et al., 2018; Turner & Stewart, 2014). Off-season strategies aligned with GPP outcomes such as hypertrophy, movement competence and strength. For example, ROM and tempo prescriptions had the highest rate of lengthened partials, slow tempos, and long amortisation phases (Haff & Triplett, 2016; Moreno-Villanueva et al., 2022; Suchomel et al., 2018; Suchomel et al., 2016; Wolf et al., 2023). Conversely, in-season prescriptions were aligned with specific physical preparation strategies, indicated by the increased use of shortened partials, shorter pause durations, and faster tempos. The interpretation that training becomes increasingly specific across the macrocycle aligns with the literature review in Chapter Two, which outlines the variations in training stimuli that can be achieved through the manipulation of these training variables. Interestingly, these patterns suggest that SCCs may view ROM and tempo as important tools for progressively increasing training specificity across the macrocycle, aligning with the conclusion of the literature review—which proposed that intensity, ROM, and tempo largely influence training specificity.

While specificity appeared to guide variable selection across phases, other classical principles such as linearity were less evident. Linearity, referring to a gradual (linear) or stepwise (block) increase in training intensity, alongside a concurrent decrease in volume (Haff, 2016; Turner, 2011), was not observed, or rather, could not be observed. While moderate-to-high intensities were consistently prescribed in every phase, volume was not measured in this survey. Viewed in isolation, these stable intensity prescriptions would suggest SCCs do not adhere to the linearity principle. However, due to the lack of volume data, it remains unclear whether linearity was achieved through alternative means, such as decreasing volume rather than intensity to manage fatigue in-season. Given the importance of strength for athletic performance (Suchomel et al., 2018; Suchomel et al., 2016; Yu et al., 2021), adopting training strategies to maximise strength development or maintenance could be logical.

Variability in training prescriptions differed by phase. While intensity was stable, ROM and tempo prescriptions were highly variable in the off-season and became increasingly specific through the pre-season, culminating in highly uniform prescriptions in-season. The increased variety of prescriptions during the off-season potentially suggests an attempt to develop multiple physical qualities concurrently, consistent with GPP strategies. Whereas the noticeably increased uniformity and specificity of prescriptions in-season—such as the finding that no (0%) SCCs used lengthened partials, while all (100%) used shortened partials and maximal concentric intent, may indicate a consensus among SCCs that strengthening specific joint angles while developing rate of force development is favourable in-season (Cormie et al., 2011; Moreno-Villanueva et al., 2022; Wolf et al., 2023). These patterns appear to support the notion that SCCs adhere to periodisation principles that training should progress chronologically from broad (general) to more specific prescriptions.

Limitations

Due to the observational nature of this research, some limitations should be considered. First, the data collected was self-reported. Although we asked SCCs about their practices, it is possible that respondents described practices they believe to be optimal or widely accepted, even if these do not reflect their own methods. Second, this survey was anonymous. Therefore, we could not conclusively check whether participants had the required experience to participate in this study; however, several questions in the background information section of the survey were used to check eligibility and eliminate participants who did not meet the inclusion criteria. Third, the survey did not allow for open-ended responses, meaning we could not conclusively determine their intentions behind training variable decisions. Fourth, as a cross-sectional observational study, our findings are correlational and cannot establish causation. Because prescriptions were neither tracked prospectively nor linked to outcome data, we cannot determine the effectiveness of the reported methods. Finally, our survey had 42 valid responses. Although the population in question is relatively niche, our sample size may not be large enough to generalise our results to all field-team sport SCCs accurately.

Future research

To address ongoing critiques, future research should prioritise long-term studies that more accurately reflect the ecological realities of training in team sport environments. Specifically, well-controlled, year-long studies that distinguish periodisation from programming, include concurrent stressors, and make clear predictions about performance outcomes are needed. Investigations comparing periodised models with non-periodised, yet varied programs would also help clarify the unique value of periodisation. Mixed-methods research, which combines quantitative survey questions with qualitative open-ended survey questions, interviews or case studies, may offer valuable insights by linking observational findings to the underlying coaching rationale. For future surveys conducted with the same population, it would be beneficial for researchers to assess complementary variables such as volume to give a more complete picture of SCC practice. Finally, a clearer, consensus-based definition of periodisation would improve research consistency and theoretical validity of all research in this area.

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Glossary

FFM – fitness-fatigue model

GAS – general adaptation syndrome

GPP – general physical preparation

RIR – repetitions in reserve

ROM – range of motion

RPE – rating of perceived exertion

SCC(s) – strength and conditioning coach(es)

SPP – specific physical preparation

S&C – strength and conditioning

%1RM – percentage of one repetition maximum

Appendices

Appendix A – Ethical Approval (Chapter 3)

Auckland University of Technology Ethics Committee (AUTEC)

31 October 2024

Alyssa-Joy Spence
Faculty of Health and Environmental Sciences

Dear Alyssa-Joy

Re Ethics Application: **24/292 An analysis of sport-specificity in relation to periodisation by field-sport strength and conditioning (S&C) coaches.**

Thank you for your responses to AUTEC's conditions.

Your ethics application has been approved for three years until 31 October 2027.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC.
2. All public facing documents must have the AUTEC approval number and be of a high standard of spelling and grammar. Dates on the Information Sheet(s) and Consent Form(s) must be consistent.
3. Any amendments to the project must be approved by AUTEC prior to being implemented.
4. A progress report is due annually on the anniversary of the approval date.
5. A final report is due at the expiration of the approval period, or, upon completion of project.
6. Any serious or adverse events must be reported to AUTEC, this includes unforeseen issues that might affect continued ethical acceptability of the project.
7. AUTEC grants ethical approval only. You are responsible for obtaining management permission for access from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

The application number and title need to be referenced on all correspondence related to this project.

All forms are available online http://www.aut.ac.nz/research/researchethics

For any enquiries, please contact the Secretariat at ethics@aut.ac.nz
(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat
Auckland University of Technology Ethics Committee

Cc: robwillems@xtra.co.nz

Auckland University of Technology, D-88, Private Bag 92006, Auckland 1142, New Zealand.
T: +64 9 921 9999 ext. 8316: E: ethics@aut.ac.nz: www.aut.ac.nz/researchethics

Appendix B – Survey

MSEH Thesis Survey

Survey Flow

Standard: Information Page (1 Question)

Block: Background information (16 Questions)

Standard: Sport-specificity (7 Questions)

Standard: Periodisation (7 Questions)

Standard: Disclaimer (1 Question)

Branch: New Branch

If

If Which seasonal phases apply to your sport and are utilised to impose training adaptations? Check... Pre-season (period immediately prior to competitive season) Is Selected

Standard: Pre-season training planning strategy (periodisation) (28 Questions)

Branch: New Branch

If

If Which seasonal phases apply to your sport and are utilised to impose training adaptations? Check... In-season (competitive season – athletes compete on a regular [often weekly] basis) Is Selected

Standard: In-season periodisation (28 Questions)

Branch: New Branch

If

If Which seasonal phases apply to your sport and are utilised to impose training adaptations? Check... Post-season / transition period (period immediately after competitive season finishes) Is Selected

Standard: Post-season (transition period) periodisation (28 Questions)

Branch: New Branch

If

If Which seasonal phases apply to your sport and are utilised to impose training adaptations? Check... Off-season (period between transition period and pre-season) Is Selected

Standard: Off-season periodisation (28 Questions)

Page Break

Start of Block: Information Page

Participant Information Sheet

Project Title:

Field-team sport strength and conditioning coaches' training strategies throughout the year.

Invitation to participate

Hello! Thank you for taking the time to consider my survey. My name is Rob Willems. I'm a Master's student at Auckland University of Technology (AUT) in New Zealand, supervised by Dr. Alyssa-Joy Spence and Dr. Eric Helms. I would like to invite you to participate in this survey on the practices of strength and conditioning (S&C) coaches regarding sport-specificity (how much exercises simulate realistic sporting actions) as it relates to periodisation (training planning strategy).

What is the purpose of this research?

The purpose of this research is to analyse the programming decisions typically made by S&C coaches across the different competitive phases of the year for field-team sports regarding three key training variables: intensity, range of motion and tempo. Thus, this research will provide a realistic perspective of current S&C practice in field-team sports.

The findings of this research may be used for academic publications and presentations.

How was I identified and why am I being invited to participate in this research?

Because you clicked the link, indicating interest in this study. To participate, you must:

1. Have a minimum of one years' experience as a strength and conditioning coach– professional or otherwise (e.g. internships, volunteer work, etc.).
2. Experience working with field-team sports (e.g. football (soccer), American football, rugby, etc.).

How do I agree to participate in this research?

Your participation in this research is voluntary (it is your choice), and whether you choose to participate will neither advantage nor disadvantage you.

By submitting the survey questionnaire, you consent to participate.

What will happen in this research?

This survey is completed online, and it consists of 4 – 102 questions, depending on the answers. The survey will take approximately 15-20 minutes to complete.

What are the discomforts and risks?

You are unlikely to experience any discomfort or risk by completing this survey.

What are the benefits?

By participating in this study, you will improve our understanding of field-team sport training strategies. You will also have access to the findings once the study has concluded (through a URL presented upon completion of the survey), which may contribute to your understanding and practice. Completing this project will also contribute to achieving my Master of Sport, Exercise and Health (MSEH) qualification.

How will my privacy be protected?

This survey is anonymous; therefore, your answers will not be identifiable.

What are the costs of participating in this research?

Participation in this research by answering the questions in the survey will take approximately 15-20 minutes of your time.

What opportunity do I have to consider this invitation?

The survey will be available for eligible participants to answer until March 2025. You will have until then to participate in this research.

Will I receive feedback on the results of this research?

Yes, upon completion of the survey, you will receive a URL that will grant you access to the results once the study has been completed.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Dr Alyssa-Joy Spence, email: alyssa-joy.spence@aut.ac.nz. Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, ethics@aut.ac.nz , (+649) 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Rob Willems, email: gfx3353@autuni.ac.nz

Project Supervisor Contact Details:

Dr Alyssa-Joy Spence, email: alyssa-joy.spence@aut.ac.nz Dr Eric Helms, email: eric.helms@aut.ac.nz

Approved by the Auckland University of Technology Ethics Committee on 31.10.2024, AUTEC Reference number 24/292.

○ I agree

○ I don't agree

End of Block: Information Page

Start of Block: Background information

Background Information

What is your primary job title? *Mark only one option*

- ◯ Head strength and conditioning (S&C) coach
- ◯ Assist. S&C coach
- ◯ Head sport coach
- ◯ Assist. sport coach
- ◯ S&C practitioner
- ◯ S&C contractor
- ◯ Other: ____

What country(ies) do you currently train athletes in? *Check all that apply*

- ☐ USA
- ☐ UK
- ☐ Ireland
- ☐ Canada
- ☐ Australia
- ☐ New Zealand
- ☐ Other ____

Have you previously worked with... *Check all that apply*

- ☐ Individual sport athletes
- ☐ Field-team sport athletes
- ☐ Non-field team sport athletes (e.g. court, rink, etc.)
- ☐ Track and field specific athletes
- ☐ Other: ____

How long have you worked with field-team sport athletes? *Mark only one option*

- ○ < 1 year
- ○ 1-3 years
- ○ 4-7 years
- ○ 8-10 years
- ○ 10+ years

For your primary job, what level do the athletes compete at? (Please answer all following questions pertaining to your S&C role with field-team based athletes). *Mark only one option*

- ◯ Club
- ◯ Provincial / regional
- ◯ College
- ◯ National
- ◯ International
- ◯ Olympic
- ◯ Professional
- ◯ Other ____

What sport do these athletes compete in?

____

Page Break

How long have you worked with **${Q1.4/ChoiceTextEntryValue}** athlete(s) *Mark only one option*

- ◯ < 1 year
- ◯ 1-3 years
- ◯ 4-7 years
- ◯ 8-10 years
- ◯ 10+ years

How much experience do you have as a S&C coach in total? *Mark only one option*

- ◯ < 1 year
- ◯ 1-3 years
- ◯ 4-7 years
- ◯ 8-10 years
- ◯ 10+ years

What is the highest qualification you have achieved relevant to S&C practice? *Mark only one option*

- ◯ No formal education
- ◯ Certification
- ◯ Bachelor's degree
- ◯ Masters degree
- ◯ Doctorate

What is the name of this qualification?

____

Where does your knowledge of periodisation (training planning strategy) primarily come from?
Mark only one option

- ◯ Science-based (peer-reviewed research, textbooks, etc.)
- ◯ Anecdotal evidence (experiential - based on peoples' accounts rather than facts or research)
- ◯ Education (e.g. university, verified clinics / conferences, workshops, etc.)
- ◯ Personal experience
- ◯ Other ____

How confident are you in your knowledge of periodisation? *(0 = not confident at all, 10 = extremely confident)*

	0	1	2	3	4	5	6	7	8	9	10
Confidence in knowledge of periodisation											

Where does your knowledge of training variables (specifically intensity [loading in resistance training, measured as %1RM, RIR, RPE], range of motion [ROM], and tempo) primarily come from? *Mark only one option*

- ◯ Science-based (peer-reviewed research, textbooks, etc.)
- ◯ Anecdotal evidence (experiential - based on peoples' accounts rather than facts or research)
- ◯ Education (e.g. university, verified clinics / conferences, etc.)
- ◯ Personal experience
- ◯ Other: ____

What is the average resistance training experience of the athletes you train? *Mark only one option*

- ◯ < 1 year
- ◯ 1-3 years
- ◯ 4-7 years
- ◯ 8-10 years
- ◯ 10+ years
- ◯ Do not know

What is the average sport-training experience of the athletes you train? *Mark only one option*

- ◯ < 1 year
- ◯ 1-3 years
- ◯ 4-7 years
- ◯ 8-10 years
- ◯ 10+ years
- ◯ Do not know

End of Block: Background information

Start of Block: Sport-specificity

Sport-specificity

Do you program a **squatting pattern** (single leg or bilateral, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including machine based movements like leg press and hack squat, and gait-based movements like lunges and split squats) variation at some point in the year? *Mark only one option*

- ◯ Yes
- ◯ No

Do you program an **upper body pressing** (single arm or bilateral, in any plane, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including decline, incline, flat, and overhead pressing, including movements like dips and ballistic movements like Smith or medicine ball throws) variation at some point in the year? *Mark only one option*

- ◯ Yes
- ◯ No

Do you program an **upper body pressing** (single arm or bilateral, in any plane, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including decline, incline, flat, and overhead pressing, including movements like dips and ballistic movements like Smith or medicine ball throws) variation at some point in the year? *Mark only one option*

◯ Yes

◯ No

Do you vary the intensity (%1RM, RIR, RPE), ROM, and/or tempo of the bench press and squat throughout the year? *Mark only one option*

◯ Yes (for both the squat and bench press)

◯ Yes (for the squat)

◯ Yes (for the bench press)

◯ No

In your opinion, how important are variations in training stimuli (training for strength, power, agility, muscle size, endurance, coordination, etc.) throughout the annual training plan for the **optimisation of performance**? *Mark only one option*

◯ Not at all important

◯ Somewhat important

◯ Moderately important

◯ Very important

◯ Extremely important

In your opinion, how important are variations in training stimuli (training for strength, power, agility, muscle size, endurance, coordination, etc.) throughout the annual training plan for the **minimisation of injury risk**? *Mark only one option*

◯ Not at all important

◯ Somewhat important

◯ Moderately important

◯ Very important

◯ Extremely important

End of Block: Sport-specificity

Start of Block: Periodisation

Periodisation

In your opinion, can periodisation be defined as the strategic manipulation of training variables across time? *Mark only one option*

◯ Yes

◯ No

How do you define periodisation?

____

____

____

____

____

Do you primarily manipulate training variables (such as intensity, range of motion and tempo) on a: *Check all that apply*

- ☐ Within session basis (variables changed in the same training session)
- ☐ Daily basis (variables changed between days in the same week)
- ☐ Weekly basis (variables changed week-to-week)
- ☐ Monthly basis (variables changed month-to-month)
- ☐ Yearly basis (variables changed year-to-year)
- ☐ Competitive schedule (variables changed based on seasonal phase)
- ☐ Other: ____
- ☐ I do not manipulate training variables

Do you consider proximity (length of time) to competition a primary justification for the adjustments of the training variables (intensity [loading in resistance training, measured as %1RM, RIR, RPE], ROM and tempo)? *Mark only one option*

- ○ Yes
- ○ No

Is your training planning strategy influenced by seasonal phase (where you are in the competitive season: pre-season, in-season, transition period, or off-season)? *Mark only one option*

- ○ Yes
- ○ No

Which seasonal phases apply to your sport and are utilised to impose training adaptations?
Check all that apply

▢ Pre-season (period immediately prior to competitive season)

▢ In-season (competitive season – athletes compete on a regular [often weekly] basis)

▢ Post-season / transition period (period immediately after competitive season finishes)

▢ Off-season (period between transition period and pre-season)

End of Block: Periodisation

Start of Block: Disclaimer

DISCLAIMER We have used "primarily" and "typically" in the questions to seek your **general philosophies** on S&C practice. While we acknowledge that training approaches may vary based on specific circumstances, please respond with your general practices or opinions for **each seasonal phase**. We also acknowledge that the different phases of the season contain sub-phases, leading to a slightly varied approach within each respective phase. Once again, please answer in a way that reflects your general approach to each of the phases you have chosen.

End of Block: Disclaimer

Start of Block: Pre-season training planning strategy (periodisation)

Pre-season training planning strategy (periodisation) **Reminder that all questions pertain to your S&C role with field-team based athletes only.*

Do you use: - a **squatting pattern** (single leg or bilateral, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including machine-based movements like leg press and hack squat, and gait-based movements like lunges and split squats) movement as a primary lift during the **pre-season**? **AND/OR** - an **upper body pressing pattern** (single arm or bilateral, in any plane, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including decline, incline, flat and overhead pressing, including movements like dips, and ballistic movements like Smith or medicine ball throws) movement as a primary lift during the **pre-season**? *Mark only one option*

- ○ Yes, both squatting and upper body pressing movements
- ○ Yes, but only squatting movements
- ○ Yes, but only upper body pressing movements
- ○ No, I don't use either of these movements

What is your primary **squatting** movement during the **pre-season**?

____

What is your primary **upper body pressing** movement during the **pre-season**?

____

Which intensity metric do you typically prescribe for resistance training during the **pre-season**? *Check all that apply*

- ☐ Percent of one-repetition maximum (%1RM)
- ☐ Rating of perceived exertion (RPE)
- ☐ Repetitions in reserve (RIR)
- ☐ None of the above

Which intensity (**%1RM**) do you primarily prescribe for the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

- ◯ Bodyweight – 20%1RM
- ◯ 20 – 40%1RM
- ◯ 40 – 60%1RM
- ◯ 60 – 80%1RM
- ◯ 80 – 100%1RM
- ◯ Other (please specify) ____

Which intensity (**%1RM**) do you primarily prescribe for the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

- ◯ Bodyweight – 20%1RM
- ◯ 20 – 40%1RM
- ◯ 40 – 60%1RM
- ◯ 60 – 80%1RM
- ◯ 80 – 100%1RM
- ◯ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

- ○ 0-2 RPE
- ○ 2-4 RPE
- ○ 4-6 RPE
- ○ 6-8 RPE
- ○ 8-10 RPE
- ○ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

- ○ 0-2 RPE
- ○ 2-4 RPE
- ○ 4-6 RPE
- ○ 6-8 RPE
- ○ 8-10 RPE
- ○ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

- ◯ >10-8 RIR
- ◯ 8-6 RIR
- ◯ 6-4 RIR
- ◯ 4-2 RIR
- ◯ 2-0 RIR
- ◯ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

- ◯ >10-8 RIR
- ◯ 8-6 RIR
- ◯ 6-4 RIR
- ◯ 4-2 RIR
- ◯ 2-0 RIR
- ◯ Other (please specify) ____

Do you alter **ROM** during the **pre-season**? *Mark only one option*

- ◯ No, I primarily prescribe full ROM
- ◯ Yes

How do you alter **ROM** during the **pre-season**? *Check all that apply*

- [ ] Shortened partials
- [ ] Lengthened partials
- [ ] Isometrics

Which ROM of **shortened partials** do you primarily prescribe for the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

- ○ Partial ROM (1/4)
- ○ Partial ROM (1/2)
- ○ Partial ROM (3/4)
- ○ Other (please specify) ____

Which ROM of **shortened partials** do you primarily prescribe for the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

- ○ Partial ROM (1/4)
- ○ Partial ROM (1/2)
- ○ Partial ROM (3/4)
- ○ Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Bottom of ROM
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Bottom of ROM
- ◯ Other (please specify) ____

Do you alter **tempo** (duration of movement) during the **pre-season**? *Mark only one option*

- ◯ Yes
- ◯ No

During the **pre-season**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q4.1/ChoiceTextEntryValue}** (squatting variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

- ◯ Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.
- ◯ Yes, I alter the concentric and/or eccentric phases, and also implement pauses.
- ◯ No, I do not alter the concentric and/or eccentric phases but do implement pauses.
- ◯ No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

○ ≥5 seconds (as slow as possible)

○ 4 seconds

○ 3 seconds

○ 2 seconds

○ ≤1 second

○ As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

○ ≥5 seconds (as slow as possible)

○ 4 seconds

○ 3 seconds

○ 2 seconds

○ ≤1 second

○ As fast as possible

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q4.1/ChoiceTextEntryValue}** (squatting variation) during the **pre-season**? *Mark only one option*

- ◯ ≥4 seconds
- ◯ 3 seconds
- ◯ 2 seconds
- ◯ ≤1 second

During the **pre-season**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

- ◯ Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.
- ◯ Yes, I alter the concentric and/or eccentric phases, and also implement pauses.
- ◯ No, I do not alter the concentric and/or eccentric phases but do implement pauses.
- ◯ No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

- ◯ ≥5 seconds (as slow as possible)
- ◯ 4 seconds
- ◯ 3 seconds
- ◯ 2 seconds
- ◯ ≤1 second
- ◯ As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

○ ≥5 seconds (as slow as possible)

○ 4 seconds

○ 3 seconds

○ 2 seconds

○ ≤1 second

○ As fast as possible

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q4.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **pre-season**? *Mark only one option*

○ ≥4 seconds

○ 3 seconds

○ 2 seconds

○ ≤1 second

End of Block: Pre-season training planning strategy (periodisation)

Start of Block: In-season periodisation

In-season periodisation **Reminder that all questions pertain to your S&C role with field-team based athletes only.*

Do you use: - a **squatting pattern** (single leg or bilateral, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including machine-based movements like leg press and hack squat, and gait-based movements like lunges and split squats) movement as a primary lift during the **in-season**? **AND/OR** - an **upper body pressing pattern** (single arm or bilateral, in any plane, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including decline, incline, flat and overhead pressing, including movements like dips, and ballistic movements like Smith or medicine ball throws) movement as a primary lift during the **in-season**? *Mark only one option*

- ◯ Yes, both squatting and upper body pressing movements
- ◯ Yes, but only squatting movements
- ◯ Yes, but only upper body pressing movements
- ◯ No, I don't use either of these movements

What is your primary **squatting** movement during the **in-season**?

____

What is your primary **upper body pressing** movement during the **in-season**?

____

Which intensity metric do you typically prescribe for resistance training during the **in-season**? *Check all that apply*

- ☐ Percent of one-repetition maximum (%1RM)
- ☐ Rating of perceived exertion (RPE)
- ☐ Repetitions in reserve (RIR)
- ☐ None of the above

Which intensity (**%1RM**) do you primarily prescribe for the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

○ Bodyweight – 20%1RM

○ 20 – 40%1RM

○ 40 – 60%1RM

○ 60 – 80%1RM

○ 80 – 100%1RM

○ Other (please specify) ____

Which intensity (**%1RM**) do you primarily prescribe for the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

○ Bodyweight – 20%1RM

○ 20 – 40%1RM

○ 40 – 60%1RM

○ 60 – 80%1RM

○ 80 – 100%1RM

○ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ◯ 0-2 RPE
- ◯ 2-4 RPE
- ◯ 4-6 RPE
- ◯ 6-8 RPE
- ◯ 8-10 RPE
- ◯ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

- ◯ 0-2 RPE
- ◯ 2-4 RPE
- ◯ 4-6 RPE
- ◯ 6-8 RPE
- ◯ 8-10 RPE
- ◯ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ◯ >10-8 RIR
- ◯ 8-6 RIR
- ◯ 6-4 RIR
- ◯ 4-2 RIR
- ◯ 2-0 RIR
- ◯ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

- ◯ >10-8 RIR
- ◯ 8-6 RIR
- ◯ 6-4 RIR
- ◯ 4-2 RIR
- ◯ 2-0 RIR
- ◯ Other (please specify) ____

Do you alter **ROM** during the **in-season**? *Mark only one option*

- ◯ No, I primarily prescribe full ROM
- ◯ Yes

How do you alter **ROM** during the **in-season**? *Check all that apply*

- ☐ Shortened partials
- ☐ Lengthened partials
- ☐ Isometrics

Which ROM of **shortened partials** do you primarily prescribe for the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ○ Partial ROM (1/4)
- ○ Partial ROM (1/2)
- ○ Partial ROM (3/4)
- ○ Other (please specify) ____

Which ROM of **shortened partials** do you primarily prescribe for the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

- ○ Partial ROM (1/4)
- ○ Partial ROM (1/2)
- ○ Partial ROM (3/4)
- ○ Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Bottom of ROM
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

○ Partial ROM (1/4)

○ Partial ROM (1/2)

○ Partial ROM (3/4)

○ Bottom of ROM

○ Other (please specify) ____

Do you alter **tempo** (duration of movement) during the **in-season**? *Mark only one option*

○ Yes

○ No

During the **in-season**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q5.1/ChoiceTextEntryValue}** (squatting variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

○ Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.

○ Yes, I alter the concentric and/or eccentric phases, and also implement pauses.

○ No, I do not alter the concentric and/or eccentric phases but do implement pauses.

○ No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ○ ≥5 seconds (as slow as possible)
- ○ 4 seconds
- ○ 3 seconds
- ○ 2 seconds
- ○ ≤1 second
- ○ As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ○ ≥5 seconds (as slow as possible)
- ○ 4 seconds
- ○ 3 seconds
- ○ 2 seconds
- ○ ≤1 second
- ○ As fast as possible

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q5.1/ChoiceTextEntryValue}** (squatting variation) during the **in-season**? *Mark only one option*

- ◯ ≥4 seconds
- ◯ 3 seconds
- ◯ 2 seconds
- ◯ ≤1 second

During the **in-season**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

- ◯ Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.
- ◯ Yes, I alter the concentric and/or eccentric phases, and also implement pauses.
- ◯ No, I do not alter the concentric and/or eccentric phases but do implement pauses.
- ◯ No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

- ◯ ≥5 seconds (as slow as possible)
- ◯ 4 seconds
- ◯ 3 seconds
- ◯ 2 seconds
- ◯ ≤1 second
- ◯ As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

◯ ≥5 seconds (as slow as possible)

◯ 4 seconds

◯ 3 seconds

◯ 2 seconds

◯ ≤1 second

◯ As fast as possible

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q5.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **in-season**? *Mark only one option*

◯ ≥4 seconds

◯ 3 seconds

◯ 2 seconds

◯ ≤1 second

End of Block: In-season periodisation

Start of Block: Post-season (transition period) periodisation

Post-season (transition period) periodisation **Reminder that all questions pertain to your S&C role with field-team based athletes only.*

Do you use: - a **squatting pattern** (single leg or bilateral, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including machine-based movements like leg press and hack squat, and gait-based movements like lunges and split squats) movement as a primary lift during the **transition period**? **AND/OR** - an **upper body pressing**

pattern (single arm or bilateral, in any plane, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including decline, incline, flat and overhead pressing, including movements like dips, and ballistic movements like Smith or medicine ball throws) movement as a primary lift during the **transition period**? *Mark only one option*

○ Yes, both squatting and upper body pressing movements

○ Yes, but only squatting movements

○ Yes, but only upper body pressing movements

○ No, I don't use either of these movements

What is your primary **squatting** movement during the **transition period**?

____

What is your primary **upper body pressing** movement during the **transition period**?

____

Which intensity metric do you typically prescribe for resistance training during the **transition period**? *Check all that apply*

☐ Percent of one-repetition maximum (%1RM)

☐ Rating of perceived exertion (RPE)

☐ Repetitions in reserve (RIR)

☐ None of the above

Which intensity (**%1RM**) do you primarily prescribe for the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ◯ Bodyweight – 20%1RM
- ◯ 20 – 40%1RM
- ◯ 40 – 60%1RM
- ◯ 60 – 80%1RM
- ◯ 80 – 100%1RM
- ◯ Other (please specify) ____

Which intensity (**%1RM**) do you primarily prescribe for the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

- ◯ Bodyweight – 20%1RM
- ◯ 20 – 40%1RM
- ◯ 40 – 60%1RM
- ◯ 60 – 80%1RM
- ◯ 80 – 100%1RM
- ◯ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ◯ 0-2 RPE
- ◯ 2-4 RPE
- ◯ 4-6 RPE
- ◯ 6-8 RPE
- ◯ 8-10 RPE
- ◯ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

- ◯ 0-2 RPE
- ◯ 2-4 RPE
- ◯ 4-6 RPE
- ◯ 6-8 RPE
- ◯ 8-10 RPE
- ◯ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ◯ >10-8 RIR
- ◯ 8-6 RIR
- ◯ 6-4 RIR
- ◯ 4-2 RIR
- ◯ 2-0 RIR
- ◯ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

- ◯ >10-8 RIR
- ◯ 8-6 RIR
- ◯ 6-4 RIR
- ◯ 4-2 RIR
- ◯ 2-0 RIR
- ◯ Other (please specify) ____

Do you alter **ROM** during the **transition period**? *Mark only one option*

- ◯ No, I primarily prescribe full ROM
- ◯ Yes

How do you alter **ROM** during the **transition period**? *Check all that apply*

- Shortened partials
- Lengthened partials
- Isometrics

Which ROM of **shortened partials** do you primarily prescribe for the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- Partial ROM (1/4)
- Partial ROM (1/2)
- Partial ROM (3/4)
- Other (please specify) ____

Which ROM of **shortened partials** do you primarily prescribe for the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

- Partial ROM (1/4)
- Partial ROM (1/2)
- Partial ROM (3/4)
- Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Bottom of ROM
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

◯ Partial ROM (1/4)

◯ Partial ROM (1/2)

◯ Partial ROM (3/4)

◯ Bottom of ROM

◯ Other (please specify) ____

Do you alter **tempo** (duration of movement) during the **transition period**? *Mark only one option*

◯ Yes

◯ No

During the **transition period**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q6.1/ChoiceTextEntryValue}** (squatting variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

◯ Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.

◯ Yes, I alter the concentric and/or eccentric phases, and also implement pauses.

◯ No, I do not alter the concentric and/or eccentric phases but do implement pauses.

◯ No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ≥5 seconds (as slow as possible)
- 4 seconds
- 3 seconds
- 2 seconds
- ≤1 second
- As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ≥5 seconds (as slow as possible)
- 4 seconds
- 3 seconds
- 2 seconds
- ≤1 second
- As fast as possible

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q6.1/ChoiceTextEntryValue}** (squatting variation) during the **transition period**? *Mark only one option*

- ≥4 seconds
- 3 seconds
- 2 seconds
- ≤1 second

During the **transition period**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

- Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.
- Yes, I alter the concentric and/or eccentric phases, and also implement pauses.
- No, I do not alter the concentric and/or eccentric phases but do implement pauses.
- No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

- ≥5 seconds (as slow as possible)
- 4 seconds
- 3 seconds
- 2 seconds
- ≤1 second
- As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**?
Mark only one option

- ○ ≥5 seconds (as slow as possible)
- ○ 4 seconds
- ○ 3 seconds
- ○ 2 seconds
- ○ ≤1 second
- ○ As fast as possible

Page Break

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q6.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **transition period**? *Mark only one option*

◯ ≥4 seconds

◯ 3 seconds

◯ 2 seconds

◯ ≤1 second

End of Block: Post-season (transition period) periodisation

Start of Block: Off-season periodisation

Off-season periodisation **Reminder that all questions pertain to your S&C role with field-team based athletes only.*

Do you use: - a **squatting pattern** (single leg or bilateral, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including machine-based movements like leg press and hack squat, and gait-based movements like lunges and split squats) movement as a primary lift during the **off-season**? **AND/OR** - an **upper body pressing pattern** (single arm or bilateral, in any plane, using any type of resistance, free weight, band, bodyweight, machine or otherwise, including decline, incline, flat and overhead pressing, including movements like dips, and ballistic movements like Smith or medicine ball throws) movement as a primary lift during the **off-season**? *Mark only one option*

◯ Yes, both squatting and upper body pressing movements

◯ Yes, but only squatting movements

◯ Yes, but only upper body pressing movements

◯ No, I don't use either of these movements

What is your primary **squatting** movement during the **off-season**?

____

What is your primary **upper body pressing** movement during the **off-season**?

____

Which intensity metric do you typically prescribe for resistance training during the **off-season**?
Check all that apply

- ☐ Percent of one-repetition maximum (%1RM)
- ☐ Rating of perceived exertion (RPE)
- ☐ Repetitions in reserve (RIR)
- ☐ None of the above

Which intensity (**%1RM**) do you primarily prescribe for the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ○ Bodyweight – 20%1RM
- ○ 20 – 40%1RM
- ○ 40 – 60%1RM
- ○ 60 – 80%1RM
- ○ 80 – 100%1RM
- ○ Other (please specify) ____

Which intensity (**%1RM**) do you primarily prescribe for the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

◯ Bodyweight – 20%1RM

◯ 20 – 40%1RM

◯ 40 – 60%1RM

◯ 60 – 80%1RM

◯ 80 – 100%1RM

◯ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

◯ 0-2 RPE

◯ 2-4 RPE

◯ 4-6 RPE

◯ 6-8 RPE

◯ 8-10 RPE

◯ Other (please specify) ____

Which intensity (**RPE**) do you primarily prescribe for the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

- ○ 0-2 RPE
- ○ 2-4 RPE
- ○ 4-6 RPE
- ○ 6-8 RPE
- ○ 8-10 RPE
- ○ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ○ >10-8 RIR
- ○ 8-6 RIR
- ○ 6-4 RIR
- ○ 4-2 RIR
- ○ 2-0 RIR
- ○ Other (please specify) ____

Which intensity (**RIR**) do you primarily prescribe for the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

- ○ >10-8 RIR
- ○ 8-6 RIR
- ○ 6-4 RIR
- ○ 4-2 RIR
- ○ 2-0 RIR
- ○ Other (please specify) ____

Do you alter **ROM** during the **off-season**? *Mark only one option*

- ○ No, I primarily prescribe full ROM
- ○ Yes

How do you alter **ROM** during the **off-season**? *Check all that apply*

- ☐ Shortened partials
- ☐ Lengthened partials
- ☐ Isometrics

Which ROM of **shortened partials** do you primarily prescribe for the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Which ROM of **shortened partials** do you primarily prescribe for the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Which ROM of **lengthened partials** do you primarily prescribe for the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Bottom of ROM
- ◯ Other (please specify) ____

Where in the ROM do you primarily prescribe **isometric training** for the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

- ◯ Partial ROM (1/4)
- ◯ Partial ROM (1/2)
- ◯ Partial ROM (3/4)
- ◯ Bottom of ROM
- ◯ Other (please specify) ____

Do you alter **tempo** (duration of movement) during the **off-season**? *Mark only one option*

- Yes
- No

During the **off-season**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q7.1/ChoiceTextEntryValue}** (squatting variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

- Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.
- Yes, I alter the concentric and/or eccentric phases, and also implement pauses.
- No, I do not alter the concentric and/or eccentric phases but do implement pauses.
- No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ≥5 seconds (as slow as possible)
- 4 seconds
- 3 seconds
- 2 seconds
- ≤1 second
- As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ≥5 seconds (as slow as possible)
- 4 seconds
- 3 seconds
- 2 seconds
- ≤1 second
- As fast as possible

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q7.1/ChoiceTextEntryValue}** (squatting variation) during the **off-season**? *Mark only one option*

- ≥4 seconds
- 3 seconds
- 2 seconds
- ≤1 second

During the **off-season**, do you alter the **tempo** of the concentric (lifting portion) and/or eccentric (lowering portion) phases of the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation), and do you implement **pauses** between the eccentric and concentric phases (bottom of ROM)? *Mark only one option*

- Yes, I alter the concentric and/or eccentric phases, but do not implement pauses.
- Yes, I alter the concentric and/or eccentric phases, and also implement pauses.
- No, I do not alter the concentric and/or eccentric phases but do implement pauses.
- No, I do not alter the concentric and/or eccentric phases, and also do not implement pauses.

Which **tempo** (measured in seconds) do you primarily prescribe for the **eccentric phase** of the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

- ◯ ≥5 seconds (as slow as possible)
- ◯ 4 seconds
- ◯ 3 seconds
- ◯ 2 seconds
- ◯ ≤1 second
- ◯ As fast as possible

Which **tempo** (measured in seconds) do you primarily prescribe for the **concentric phase** of the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

- ◯ ≥5 seconds (as slow as possible)
- ◯ 4 seconds
- ◯ 3 seconds
- ◯ 2 seconds
- ◯ ≤1 second
- ◯ As fast as possible

Which tempo (measured in seconds) do you primarily prescribe for the **pause** between the eccentric and concentric phases of the **${Q7.2/ChoiceTextEntryValue}** (upper body pressing variation) during the **off-season**? *Mark only one option*

○ ≥4 seconds

○ 3 seconds

○ 2 seconds

○ ≤1 second

End of Block: Off-season periodisation
