A Practical Approach to Deloading: Recommendations and Considerations for Strength and Physique Sports

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ABSTRACT

Deloading is a period of reduced training stress where training demand is intentionally reduced to mitigate physiological and psychological fatigue and promote recovery. A deload is commonly implemented to enhance readiness for subsequent training and occurs between or during training phases. During a deload, training is typically modified by reducing the intensity of effort, training volume, duration, or frequency. Adjustments in exercise selection are based on recovery goals and the specific demands of the athlete's training. Deloads are commonly pre-planned and implemented into the training program every 4 to 8 weeks based on the structure of the training cycle and recovery needs. Alternatively, deloads are sometimes applied reactively using an autoregulatory approach to accommodate unexpected fatigue or performance decrements. While deloading shares conceptual similarities with tapering and training cessation, it should be differentiated based

on its objective, structure, and positionality with the overall training program. The purpose of this article is to describe the current research landscape, propose areas for future research, and to provide broad practical recommendations for implementing deloading within the strength and physique sports training program.

INTRODUCTION

In strength sports such as powerlifting, weightlifting, and strongman/woman, it is normal practice for athletes to undertake strategically planned training to augment strength performance (69). These sports are characterized by select strength characteristics such as maximal strength, rate of force development, and impulse (42,64,83). To achieve optimal athletic performance, strength athletes undertake long-term structured (e.g., periodized) training that is generally organized into distinct phases or blocks relative to the competition schedule (78). In this sense, training involves the manipulation of specific training variables (e.g., intensity of effort, training volume, and exercise selection) to enhance strength characteristics over time relative to the competition schedule (49). Training is planned logically and often organized into sequential or parallel blocks, each with a specific objective (i.e., muscular hypertrophy, maximal strength) based on the requirements of the sport and the individual athlete's needs (66).

While training for strength sports emphasizes performance-driven attributes, physique sports assert training that develops aesthetic characteristics, such as muscularity and leanness, while enhancing symmetry and proportionality (24,52). Physique sports athletes do not generally follow traditional periodized training models designed to enhance athletic performance. Instead, they will organize their training into two distinct phases: off-season and pre-competition (2,31,62). The off-season has the primary goal of increasing muscle mass by adhering to training practices, which elicit increases in muscle hypertrophy. The pre-competition phase (typically beginning 8-16 weeks before a competition) focuses on reducing body fat while preserving muscle mass; therefore, it usually involves caloric restriction and increased aerobic exercise volume (48). During the final phase of competition preparation, physique athletes may employ advanced training techniques (e.g., forced repetitions where a training partner helps the athlete to perform additional repetitions once muscular failure has been achieved, and drop sets where the athlete performs a set to concentric muscular failure, reduces the load by 10-25% and immediately performs another set to concentric muscular failure) and vary these methods across training phases (31,48).

While there are inherent differences between strength and physique sports, a fundamental similarity is the frequent resistance training stimulus required to provoke the neural and morphological adaptations necessary to achieve successful competition performance (45). Training must be of sufficient magnitude to stimulate the physiological adaptations required for a meaningful and positive influence on competition performance. To this end, it is common for both strength and physique athletes to implement intermittent, concentrated loading phases into the training program, designed to elicit the desired physiological adaptations. During these phases, there is often a deliberate and dramatic increase in training volume or intensity of effort, facilitated through additional training sessions (e.g., 4 sessions increased to 6 sessions per week) or increasing total training demand (e.g., all exercises increased by 1 set of 6 repetitions or there is a 5% increase in relative intensity) (10). However, for the training program to be successful, coaches must also be cognizant of recovery constraints and athlete safety (49).

From a physiological perspective, the need for implementing a deloading strategy is argued to arise from the manifestation of ‘cumulative fatigue’ (40,44,78). Previous commentary has proposed that cumulative fatigue occurs due to additive fatiguing effects elicited by discrete bouts of challenging resistance training (15). Acute fatigue occurs during or immediately after a resistance training bout and is defined by a temporary inability to maintain muscle performance (i.e., force or power output) (80) that may manifest with transient subjective symptoms, e.g., a temporary feeling of increased tiredness (3). The mechanisms of acute fatigue in response to resistance training are complex and beyond the scope of this article, but collectively depend on a combination of peripheral (e.g., muscle substrate depletion, changes in muscle pH and/or electrolyte balance) (1) and central (e.g., changes in neurotransmitter balance) (3,70) factors. The overall magnitude of acute fatigue in response to resistance training will vary depending on the intensity and volume of the individual training session but may also be influenced by external factors such as nutritional, emotional, or sleep status (44). In essence, cumulative fatigue relates to the continued exposure to subsequent acute training bouts before the complete dissipation of fatigue stimulated from a previous training bout. Consequently, the magnitude and persistence of subjective and objective symptoms of acute fatigue begin to increase, generating a state of 'cumulative fatigue', which may have greater recovery requirements compared to what is elicited by a single training bout (15). It is notable that the physiological basis of 'cumulative fatigue' is considerably less established than that of acute fatigue (60), and there is uncertainty about whether repeated exposure to resistance training truly results in 'accumulated fatigue' per se or, instead, that impaired muscle function observed in the days following cumulated training is the result of muscle damage (44).

Nevertheless, periods of reduced training stress (e.g., deloading periods) are traditionally implemented into the strength training program to mitigate the risk of long-term performance decrement that manifests from prolonged exposure to difficult training bouts by temporarily shifting the emphasis of training to the promotion of recovery and restoration (25,26). These phases of reduced training stress also facilitate peak performance by permitting the cumulative effects of consistent training to be realized before competition (60). Importantly, while phases of reduced training stress might assist the athlete in managing the risk associated with prolonged, highly demanding training, extended periods of reduced training stress will eventually result in detraining, resulting in a loss of adaptations and diminished performance. Therefore, successful training in strength and physique sports is a dynamic balance between increased and decreased training demands across the calendar (33,68).

DEFINING DELOADING

Periods of reduced training have been referred to as “light weeks”, “recovery weeks”, “restitution cycles”, and, more recently, “deloading” (19,21,79). Within the last few years, the term deloading has appeared more frequently in the literature and has appeared in research on bodybuilding (40,61), powerlifting (23), mixed martial arts (36), and Brazilian Ju-Jitsu (54). However, none of these studies have objectively defined what a deload is. Based on the lack of a clear definition in the research, Bell et al. (12) published a Delphi consensus study to enhance understanding by reducing ambiguity surrounding deloading. The study recruited a group of expert strength and physique sports coaches and developed a framework of good practice for sports scientists and coaches to follow when implementing deloading. From this study, the following definition of deloading was proposed:

“*A deload is a period of reduced training stress designed to mitigate physiological and psychological fatigue, promote recovery, and enhance preparedness for subsequent training*.”

Based on this definition, deloading is characterized by a *reduction* in overall training demand with the primary objective of enhancing readiness by managing training-related fatigue and encouraging restoration. In this sense, the reduction in training stress occurs as a decrease in the sport-specific stimulus (e.g., technical sessions) strength and conditioning (e.g., resistance training), or a combination of both (20). Deloading acts as a preparatory tool to enhance readiness for subsequent training. Importantly, “subsequent training” could mean that the deload is positioned between two blocks of training (a common feature of strength and physique training) or positioned more sporadically (i.e., *during* a training block) (22,40). Deloading may be strategically implemented during various phases of an athlete's schedule to optimize performance and recovery. For example, during the pre-competition phase, a deload permits a reduction in fatigue while maintaining training adaptations. During the competition phase or a tournament with condensed competition days, deloading may help manage acute fatigue and prevent maladaptation. Additionally, deloading may be beneficial during travel periods, such as between competitions, to mitigate the physiological stress associated with long-haul transit or disrupted routines (20). However, the deload can occur *at any point* within a training block (e.g., a lighter day), not necessarily between two distinct phases of the training program (12).

It is worth noting that some commentators have stated that deloading is an inappropriate term when describing periods of lighter training stress that occur between training blocks. Ide et al. (37) argue that the term "load" relates specifically to imposed mechanical load; therefore, a de-"load" only occurs when there is a reduction in external resistance. Indeed, the term deload has been specifically related to a reduction in absolute or relative training intensity independent of alterations in training volume (58). However, the term "load" has recently received criticism for breaching scientific principles and being misapplied within sports science (e.g., "training load") (65). To this end, load describes force and, therefore, should be measured in Newtons (N) as per the international system of units (SI). The authors proposed that the term "regeneration period" is a more precise description of how lighter training periods impact athlete preparedness. However, this argument has been countered by Impellizerri and colleagues (38), who state that not all exercise-related taxonomy must abide by the SI. Moreover, the argument that the nomenclature used *to describe* exercise should abide by the SI is conceptually flawed, and misuse of terminology only occurs when the term is decontextualized. Importantly, the term deloading has recently been operationally defined through expert consensus (12). Alternative terms such as regeneration period are vague and do not appropriately differentiate deloading from other types of lighter training (e.g., tapering), which might lead to misinterpretation and misapplication in a practical or research context.

THE OBJECTIVE OF DELOADING FOR THE STRENGTH AND PHYSIQUE ATHLETE

Deloading is increasingly recognized as a purposeful intervention in strength and physique sports. Bell et al. (9) pioneered the exploration of deloading, recruiting 18 experienced coaches (10.9 ± 3.9 years at ≥ national level) to share their perspectives. Coaches described deloading as a short-term training cycle designed to adjust training intensity and volume, providing a physical and mental break from challenging training. This approach aims to reduce staleness, mitigate risks associated with monotonous training, and maintain motivation. Rather than enhancing performance directly, deloading was seen as a strategy to offset factors such as injury or illness stemming from prolonged training stress. Coaches colloquially referred to deloading as a "reset" or "refresh," enabling athletes to "push again" in subsequent training blocks.

Expanding on these findings, Rogerson et al. (60) surveyed 246 competitive strength and physique athletes from various sports, including powerlifting (63.4%), weightlifting (3.7%), strongman (3.7%), and physique (18.3%). The athletes, experienced in resistance training (8.2 ± 6.2 years) and competition (3.8 ± 3.2 years), overwhelmingly cited reducing fatigue (92.3%), preparing for the next training cycle (64.6%), and enhancing performance (59.8%) as the primary objectives of deloading. These responses reinforced the notion that deloading is a recovery-focused tool to manage training stress.

Building on these perspectives, Bell et al. (12) conducted a Delphi study with a panel of accredited strength and physique coaches to develop consensus on design principles for deloading. Experts selected for their qualifications and coaching experience (e.g., National Strength and Conditioning Association (NSCA), United Kingdom Strength and Conditioning Association (UKSCA) or a university degree in Sport and Exercise Science), emphasized deloading as a strategy to mitigate fatigue, promote recovery, and enhance adherence to training programs. Additionally, the panel highlighted its role in reducing the risk of non-functional overreaching (NFOR), overtraining syndrome, training monotony, and musculoskeletal injury. These findings echoed the results of both Bell et al. (9) and Rogerson et al. (60), underscoring the value of the deload in promoting readiness and long-term athlete development.

DELOADING VERSUS TRAINING CESSATION

Training cessation is a temporary interruption of sporting activities while continuing everyday activities (56,73). Training cessation might be intentional e.g., off-season, vacations (5,44) but also unplanned e.g., injury or illness (86). An important factor to consider in understanding deloading is to acknowledge the potential similarities and differences between deloading and training cessation.

Strength and physique practitioners describe deloading specifically as a *reduction in training* stress while emphasizing that some training *is maintained* during the deload, even when the objective is to decrease training stress (9,12). Training cessation, however, is defined as a period of complete rest where all sporting activities cease while continuing everyday activities (14,56,74). Therefore, during periods of training cessation, training stress is *totally reduced* (training is temporarily but completely halted, and training stress is technically 'zero', i.e., a 'training break'). If the magnitude of training is zero, an individual cannot, by definition, be in training. Consequently, it is argued that training cessation and deloading are similar but distinct methods that should be selectively employed by practitioners to enhance athlete readiness (79,86).

While considering deloading and training cessation as distinct may be philosophically valid, from a practical standpoint, there is complexity in determining how distinctions between deloading and training cessation might manifest. For example, a 'mixed athlete' (those who engage in multiple types of training, e.g., resistance and aerobic training) might intentionally cease resistance training but maintain aerobic training. Have they engaged in deloading or training cessation? The cumulative magnitude of training stress is *reduced*, but the athlete still trains, implying that the athlete is *deloading*. However, an entire *type* of exercise training has been halted, which concurrently implies that *training cessation* has occurred. The answer is that both might be simultaneously true. This is congruent with other interpretations of deloading, where a reduction in training stress during deloading comes from either sport-specific training or from a reduction in strength and conditioning training (or both) (20). Similarly, some coaches might opt to deload select aspects of a training program (e.g., only deloading some exercises such as accessory movements) (58,75,84,85) while continuing to progressively overload others (e.g., competition lifts) (12). In this case, certain components of the training program are *ceased* while others are continued (either maintained or progressively loaded). These cyclical fluctuations arguably underpin the process of periodization (19).

Evidence directly comparing deloading and training cessation is highly limited. A 6-week study examined the effects of a 1-week deload on select measures of muscle morphology and strength performance following high-volume, whole-body resistance training (consisting of 10 sets per exercise per week in week one, increasing to 32 sets of 10 repetitions per exercise in week six using 60% of the one-repetition maximum (1-RM)) (79). In this study, trained participants implemented either a one-week period of training cessation or an active recovery period referred to as a deload upon completion of the training program (an ~85% reduction in training volume). No differences in barbell back squat velocity or vastus lateralis thickness were observed between the deload or training cessation groups in the post-deload period. Interestingly, a more recent study has observed that participants who engaged in 1-week of training cessation presented no differences in estimates of body composition (total lean body mass, quadriceps and soleus thickness) but did demonstrate smaller increases in Smith machine squat 1-RM (6% lower) compared to participants who trained through the training cessation period (16). An essential caveat of this study, however, is that the post-intervention measurements were taken four weeks after the training cessation period. Therefore, it is not entirely clear whether any differences between the training cessation and continuous training groups were a direct result of the training cessation period per se or the more limited exposure to training experienced by the training cessation.

Short periods of training cessation might augment strength performance due to reduced neuromuscular fatigue (56,81). This might be particularly useful, for example, when athletes are obligated to travel in the days or hours preceding competition (7,75). However, maximal strength might decrease after ≥5 days of training abstinence due to neuromuscular factors

(27). Indeed, previous research has demonstrated that as few as five days of training cessation is sufficient to reduce isometric bench press force without inducing any changes in lean body mass (74). It is worth acknowledging that there is a 'skill' component to strength training, and force production can be enhanced through high levels of deliberate and specific practice over time (17,47). Therefore, a theoretical reason why deloading assists in maintaining strength performance compared to training cessation may be due to enabling athletes to mitigate fatigue and enhance training readiness while also offsetting degradations in motor learning that might occur when training is ceased (4,5). Of course, this is likely more beneficial for skill-oriented sports (e.g., Olympic weightlifting compared to bodybuilding) (5). The potential to maintain the practice of key movements is likely one reason some coaches maintain competition-specific exercises during deloading while removing accessory work (9,12). Relatedly, some coaches also use deload periods to introduce new training exercises with reduced loads to enhance athlete readiness while providing the athlete with an opportunity for motor familiarization with novel training exercises (9). Inevitably, a successful deload should consider the specific nature of the preceding training block and the individual recovery needs of the athlete, as well as the athlete's training status. Therefore, it could be argued that the deload does not need to be specific to the strength or physique sport per se, but instead, specific to the nature of the previous training block (including the athlete's response to that block), as well as the next training phase. Additionally, while short-term cessation (e.g., 1–3 days off) may suffice for individuals with low to moderate training status, more structured deloading may be necessary for advanced athletes undergoing prolonged or intensive training cycles. This approach ensures recovery strategies are tailored to the athlete's specific requirements, optimizing readiness for subsequent training phases. However, little is known about the value of deloading for athletes at different competitive levels.

There is a valid degree of philosophical argument and empirical evidence to suggest that a deload and a training cessation period are distinct methods with the potential to elicit slightly varied effects. For instance, while a deload may involve reducing training volume or intensity, such as substituting heavy compound lifts with lighter accessory movement or reducing session frequency, training cessation involves complete abstinence from structured training. This distinction is critical because deloading allows athletes to maintain neuromuscular engagement and preserve skill-related adaptations, whereas training cessation might be more appropriate in cases of susceptibility to injury, illness, or during periods of prolonged performance decrement. Despite their distinct purposes, training cessation and deloading are often conflated in both practice and discussion. However, each serves a unique function. Understanding these nuances is essential for tailoring each approach to an athlete's specific needs and circumstances.

DELOADING VERSUS TAPERING

The primary objective of the taper is to enhance competition performance via mitigating fatigue to have the athlete experience a supercompensation effect (82). In contrast, the deload seeks to enhance recovery in preparation for subsequent training (9,12). Moreover, an integral aspect of the taper is to reduce the risk of detraining (67). However, the deload prioritizes fatigue management and recovery over performance improvement per se (9,12).

Tapering and deloading are both phases of training where training stress is intentionally reduced for a period of days to weeks. Therefore, they share fundamental similarities (60). Indeed, some commentators consider a taper a form of deload due to the inherent reduction in training stimulus applied in both approaches (20,58). However, strength and physique coaches do not generally believe that deloading is a form of tapering (9,12). Therefore, it is important to acknowledge the potential similarities and differences between the two.

The taper is the final period of training before a major competition and is considered a key feature of athlete performance and the event outcome (53). Therefore, the primary objective of a taper is to maintain or peak performance on competition day by mitigating fatigue via the manipulation of training volume and intensity while emphasizing competition-lift specificity (55,75). In strength sports, tapering is a common practice (58,75), with 78% of highland games athletes (84), 87% of strongmen, 99% of hybrid sport athletes (57), and 99% of weightlifters (85), implementing a taper into their training in final few days before a competition. When an effective taper has been used to enhance muscular strength, a ~2 to 8% improvement in performance has been observed (18,28,41,87). Importantly, such improvements are likely the combined result of the training preceding the taper and the taper itself (85).

A reduction in training stress during the taper is achieved using different modes from the classical tapering models (53). These include a linear reduction (gradual reduction in training stress), an exponential taper (characterized by either a fast or slow decay), and a step taper (constant reduction in training load) (59,73). Before 2015, tapering research focused on endurance sports (13). However, recent studies in strength sports suggest that small reductions in training volume (e.g., 30-50% decrease relative to normal training) are used to achieve performance supercompensation, and training intensity is typically increased, decreased, or maintained (73). Training frequency is generally maintained except for short-term training cessation involved in the final 2-4 days before competition.

As a byproduct of reduced training demand, a key concern during tapering in strength sports is the potential muscle loss and diminished neuromuscular excitability. Evidence suggests that a step taper is particularly effective in enhancing muscle cross-sectional area at structural and ultrastructural levels (77). Such improvement may result from the taper coinciding with a return to normal training following a planned overreach (e.g., training work increases to 200%, then reduces to 50% of the overreach level before returning to 100% of normal) (77). Conversely, an exponential taper may be more favorable for enhancing neuromuscular performance, as evidenced by improvements in maximal isometric peak force (IPF) capabilities (77). Importantly, IPF, as assessed at mechanically relevant joint angles corresponding to the sticking points of a given lift, has been shown to correlate with 1-RM outcomes in the back squat, bench press, and deadlift (6,8,74). This mechanical specificity is critical, as generic isometric testing methods such as the isometric mid-thigh pull have consistently shown poor predictive validity for dynamic strength performance (8,43,71).

Recent findings demonstrate that even simple isometric tests, such as handgrip strength, can serve as practical surrogates for dynamic strength, though specificity remains an important consideration (e.g., seated handgrip strength with a 90º elbow angle more closely reflects 1-RM bench press capabilities, whereas standing handgrip strength with an extended elbow better corresponds to deadlift lockout performance) (76). Importantly, different isometric assessments may vary in their sensitivity to fatigue and recovery dynamics, making certain tests potentially more responsive to the effects of longer versus shorter tapering periods**.** In this context, lift-specific or grip-specific isometric assessments may offer practical utility for monitoring neuromuscular readiness and fatigue during taper periods, particularly when mechanical specificity is considered in the testing approach (6,8,32,39,71,76). Therefore, it could be assumed that by providing a longer recovery period via an exponential taper, enhanced neuromuscular performance might be observed compared to other tapering strategies (7,72,77). It is important to note, however, that improvements in neuromuscular function do not always translate directly into superior competition performance, as athletes in step taper groups, despite shorter recovery periods, can outperform exponential taper groups in competition-specific outcomes. This highlights the nuanced role of tapering strategies in optimizing performance.

Nevertheless, the general recommendation for tapering in strength sports is to begin reducing training volume during the final two weeks before competition after a planned overreach while manipulating intensity as per individual needs (73). It is also recommended to implement short-term training cessation of 2-7 days immediately before competition to express muscular strength potential (73,83,85). However, it should be noted that training cessation is often lift-specific and should be altered around individual recovery needs (e.g., remove deadlift 7-10 days, back squat 4-7 days, bench press 2-4 days). **Table 1** summarizes the recommendations for strength athletes wanting to implement a taper into their training program.

Table 1. Recommendations for implementing a taper into strength sport training program based on the work of Pritchard et al. (56) and Travis et al. (73).

Training parameter	**Recommended adjustment during taper**
Training volume	A reduction in training volume between 30-60%
Intensity	Maintain training intensity ≥85% 1-RM when neuromuscular adaptations are prioritized. Alternatively, reduce intensity by ~25-30% if recovery or other individual needs take precedence
Duration	1-2-week taper followed by 2-7-day training cessation
Approach to the taper	Implement either a progressive or step taper

Table 2. A summary of the main conceptual differences between the taper and deload

	Tapering	**Deloading**
Positionality	Before competition	At any pre-determined point within the training program but also sporadically based on a temporary reduction in

		training readiness
Objective	To peak performance	To enhance readiness for subsequent training
Approach	Progressive or step	Step

While tapering and deloading share some structural similarities (i.e., both involve manipulation of training to elicit a reduction in fatigue), they have distinct primary objectives (**Table 2**). As mentioned, a taper is typically implemented using a step or progressive (i.e., exponential) approach. However, strength and physique coaches implement a deload using a step approach, with a single, sudden, and non-progressive decrease in training (relative to the previous training phase) occurring at the beginning of the deload phase (9,12). This is due to the emphasis on fatigue management and promotion of recovery rather than retaining adaptations or achieving performance improvements. Consequently, tapering and deloading are differentiated by how they are applied within the training program (**Table 2**). Finally, while the taper is the final stage of the competition cycle (75), the deload occurs at any point during the training program. Therefore, the deload might be distinguished from the taper by its position within the overall training program (i.e., proximity to competition) (**Figure 1**).

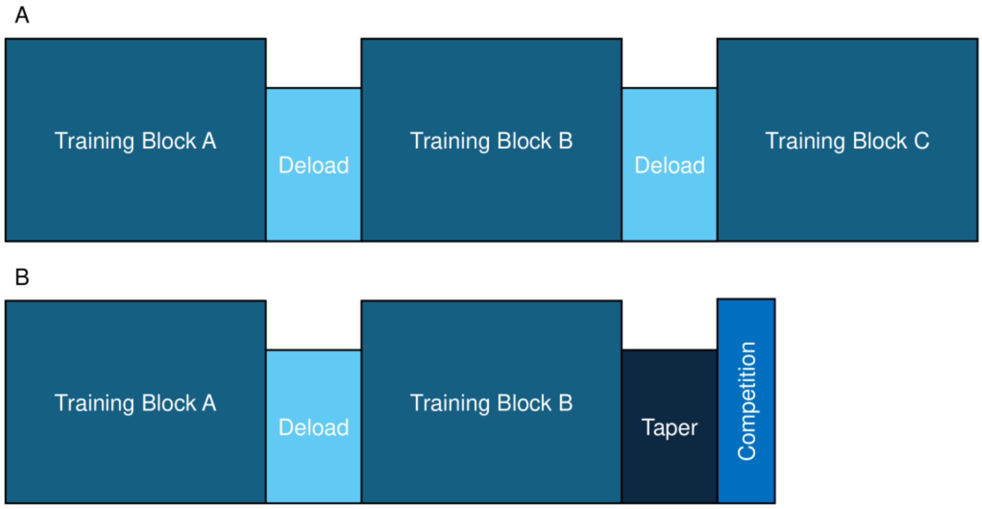

Figure 1. A hypothetical schematic to demonstrate the difference between the deload and taper based on proximity to competition. In example A, the deload occurs between two distinct training blocks. In B, the taper occurs following a training block but directly before competition.

Physique athletes do not implement a taper in the same way that a strength athlete does, most likely due to the emphasis on aesthetics rather than athleticism (24,52). During the final week of the training program (known as "peak week"), physique athletes will maintain resistance training practice and reduce cardiovascular exercise in an attempt to replenish glycogen stores (24). However, some athletes will include additional cardiovascular exercise to increase fat loss and enhance stage condition (24). Subtle changes to the resistance training program might include increasing repetitions in reserve (RIR) and omitting exercises that increase the risk of muscle soreness. In the final few days before competition, it is common for physique athletes to reduce or completely exclude lower body resistance training (35) in the belief that the resulting reduction in muscle damage will enhance stage condition (i.e., reduced edema leading to more pronounced separation of the quadriceps and hamstrings). Athletes may modify training to try and minimize glycogen depletion, as bodybuilders have been reported to anecdotally believe that maximizing muscle glycogen stores before a show enhances the perceptual 'fullness' of the muscle (31). In the final days before a competition, physique athletes will modify macronutrient and energy intake and hydration status to refine their competition physique. Following a competition, physique athletes normally employ a recovery period (training cessation) to restore anabolic function that can be impaired by chronic energy restriction while preparing for competition (50).

PRE-PLANNED VERSUS AUTOREGULATED DELOADING

In periodized training programs, it is normal practice to implement pre-planned deloads. In this sense, having semi-frequent deloads built into the program provides the athlete with regular opportunities to dissipate fatigue and mitigate the risk of maladaptation. Pre-planned deloading, therefore, offers prophylactic benefits. For example, in summated microcycles, training demand increases each week followed by a lighter training period that is shorter in duration than the loading period (78). However, some commentators have suggested that a deload every few weeks is too frequent and might suppress potential performance improvements by reducing the concentrated loading within a mesocycle. Indeed, the risk of NFOR following prolonged high-volume or high-intensity resistance training without deloading is low (11,29), suggesting that athletes likely do not need to deload frequently. Moreover, high-performance strength coaches feel that the risk of an athlete developing long-term maladaptive disorders (e.g., the overtraining syndrome) due to undertaking challenging training blocks without deloading is minimal, with several coaches believing that strength athletes can work at a higher relative intensity than is typical of their habitual training without deleterious effects (10). Nevertheless, pre-planned deloads provide the coach and athlete with a “checkpoint” within the training program where an informed decision regarding the need for deloading can be assessed, rather than compulsory changes to programming made based only on predetermined time points (9).

Autoregulation is an emergent approach used in strength and muscular hypertrophy training to acutely adjust training volume or intensity based on daily fluctuations in readiness (30,46). In strength training programs, autoregulation can be used within a session (e.g., adjusting the load on the bar, training volume, or RIR) as well as between sessions (e.g., changes in strength performance, readiness to train) (63). Therefore, autoregulation permits adjustments in training based on an individual athlete's response to training (i.e., fatigue, readiness, adaptation) (51). Consequently, a more reactive and flexible approach to deloading might be taken by adopting autoregulation methods within the training program. Indeed, previous research has shown that strength and physique coaches favor a flexible approach to deloading, where the coach and athlete decide to use "lighter days" within a training block based on triangulation of objective (i.e., performance testing data) and subjective (perceived wellbeing, fatigue, recovery status) measures (12). In this sense, pre-planned deloads can be replaced (or combined) with a more adaptable approach where intermittent light days are used within a training block.

Autoregulatory deloading offers a more individualized approach (compared to pre-planned) by adjusting recovery periods based on the athlete's current physiological and psychological state rather than adhering to a predetermined schedule (34,46). In strength and muscular hypertrophy training programs, this method involves continuously monitoring indicators such as performance metrics (e.g., load lifted, barbell velocities), perceived exertion, mood states, and fatigue levels to determine the timing for a deload (12). Autoregulatory deloading recognizes that athletes' responses to training stimuli vary due to genetics, lifestyle stressors, and individual recovery capacities, as well as the unpredictable nature of competition and training decisions (both within and outside of the strength and conditioning environment). Therefore, by responding to real-time feedback, coaches and athletes can tailor training loads to immediate needs, providing greater flexibility and personalization within the training program. Indeed, previous research has shown that strength and physique coaches favor a flexible approach to deloading, where the coach and athlete decide to use “lighter days” within a training block based on triangulation of objective and subjective assessment (12). This flexibility is particularly beneficial when unexpected factors—such as illness, travel, or personal commitments—impact the athlete's ability to train effectively. However, the success of autoregulatory deloading relies on accurate assessment methods and honest communication between the athlete and coach. It requires heightened self-awareness and may require monitoring tools or technologies to track readiness and recovery status (30). While implementing deloads presents possible practical challenges, its potential to optimize training outcomes by aligning deloading periods with the athlete's actual needs may make it a desirable strategy for strength and physique athletes.

PRACTICAL APPLICATIONS FOR THE STRENGTH AND PHYSIQUE ATHLETE: IMPLEMENTING THE DELOAD

The following recommendations (**Table 3**) have been developed using recommendations from the available strength and physique research (9,12,60).

TABLE 3. General recommendations for the implementation of deloading into the strength and physique athletes’ training program

Training parameter	Recommendation(s)
Approach	A single step reduction in overall training load that occurs at the beginning of the deload
Training volume	• Low recovery needs: Reduced by ≤25-45% relative to normal training volume* • Moderate recovery needs: Reduced by 40-60% relative to normal training volume*

	• High recovery needs: Reduced by 60-90% relative to normal training volume* Achieved through a reduction in 1) repetitions per set or by 2) a reduction in the total number of sets per training session (or in some cases, both). Training volume can be decreased in some or all exercises per session or by reducing the number of accessory exercises (see exercise selection). ** ‘Normal’ training volume refers to the volume undertaken in the previous training block*
Training frequency	A reduction in weekly training sessions (relative to normal training) is a viable way of managing training volume. However, training frequency will generally remain unchanged (relative to normal training frequency). However, in the presence of extreme fatigue, training frequency should be reduced as required In the presence of extreme fatigue, athletes should precede the deload with short-term period of training cessation
Training intensity	A decrease in absolute or relative intensity should be achieved through a decrease in %RM (~10%) while maintaining repetitions A decrease in the number of sets or an increase in (RIR) (reduction in repetitions while maintaining absolute load; 1-3 RIR, thus increasing proximity to failure)

	A reduction in intensity should be implemented in isolation or through combined alterations in absolute or relative load
Exercise selection	Increased focus on technique and reduction in accessory exercises Some athletes will favor variation in exercise selection to reduce the risk of monotony and burnout The deload provides an opportunity to implement alternative resistance training strategies such as body weight training, resistance bands, blood flow restriction training, and isometric training Typically, some sport-specific exercises (or derivatives of these exercises) will remain in the training program. Consequently, the physique athlete will have more flexibility in the exercises they select for the deload compared to the strength athlete
Duration	For structured deloads, the typical duration is 5 to 7 days. However, the duration of the deload must consider the duration and intensity of the previous training block. For longer or more challenging blocks, a longer deload might be required, along with the inclusion of training cessation for 2-5 days Reactive deloads may be a single training session in duration

Periodicity	Every 4 to 8 weeks where deloading is pre-planned Lighter days should be implemented where required, utilizing an autoregulatory approach

FUTURE RESEARCH DIRECTIONS

There is a clear absence of high-quality experimental research elucidating the objective benefits of deloading and the optimal organization of training variables to elicit those benefits. According to strength and physique coaches (12), deloading needs to be sufficiently represented in the strength and conditioning literature. Additionally, there is a lack of clear and accurate representation of deloading in strength and conditioning coaching qualifications. Therefore, future research must acknowledge the specific philosophical and structural underpinnings of deloads and investigate their utility accordingly. There is also a lack of appropriate interpretation of deloading in some existing experimental research studies, where the construct of the training phase is misunderstood (e.g., a complete cessation of training rather than a relative reduction in training demand). Future research should explore the effects of deloading on broader measures of strength (e.g., maximal strength, repetition velocity, power measurements), morphology (e.g., muscular hypertrophy), and aspects of technique/skill and psychological measures. Currently, little is known about the specific value of deloading for different competitive groups (e.g., highly trained athletes versus those of a low-to-moderate training status). Therefore, comparisons between different configurations of deloading with a range of athletes across varying durations (e.g., days and weeks) must be undertaken to better understand the efficacy of deloading in strength and physique sports (using the above framework as a decision-making guide when creating deload interventions). Moreover, comparisons between deloads and training cessation should also be made to understand better the unique effects of each approach on strength and physique sports outcomes. Lastly, sporadic deloading should be investigated, exploring the efficacy of ‘optional’ deloads using an autoregulated approach, where deloads are pre-planned but undertaken only if required.

CONCLUSION

Deloading is a period of reduced training stress designed to enhance recovery and preparedness for subsequent training. A deload is typically pre-planned and implemented within the strength and physique training program every 4 to 8 weeks. Additionally, deloads might be applied flexibly using an autoregulatory approach. When pre-planned, deloads take place either in the final week of the mesocycle (using the same exercises or with a reduction in accessory work) or the first week of a new mesocycle (using new exercises). In either scenario, a deload is applied through a reduction in training volume and intensity, with alteration in exercise selection also a common method of application. When a flexible, reactive approach is taken, the decision to implement a deload should be agreed upon by the coach and athlete and guided by changes in objective (e.g., strength performance) and subjective (e.g., perceived readiness, recovery) measures.

REFERENCES

1. Allen DG. Fatigue in working muscles. *J Appl Physiol*. 2009;106(2):358–359. doi:10.1152/japplphysiol.91599.2008

2. Alves RC, Prestes J, Enes A et al. Training Programs Designed for Muscle Hypertrophy in Bodybuilders: A Narrative Review. *Sports.* 2020;8(11):149. doi:10.3390/sports8110149

3. Ament W, Verkerke GJ. Exercise and Fatigue. *Sports Med* 2009;39(5):389–422. doi:10.2165/00007256-200939050-00005

4. Arthur Jr. W, Bennett Jr. W, Stanush PL, McNelly TL. Factors That Influence Skill Decay and Retention: A Quantitative Review and Analysis. *Hum Perf* 1998;11(1):57–101. doi:10.1207/s15327043hup1101_3

5. Arthur W, Day EA. Skill Decay: The Science and Practice of Mitigating Skill Loss and Enhancing Retention. In: Ward P, Maarten Schraagen J, Gore J, Roth EM, editors. The Oxford Handbook of Expertise. Oxford University Press; 2019. p. 0. https://doi.org/10.1093/oxfordhb/9780198795872.013.47. doi:10.1093/oxfordhb/9780198795872.013.47

6. Bazyler CD, Beckham GK, Sato K. The use of the isometric squat as a measure of strength and explosiveness. *J Strength Cond Res* 2015;29(5):1386–1392. doi:10.1519/JSC.0000000000000751

7. Bazyler CD, Mizuguchi S, Zourdos MC et al. Characteristics of a National Level Female Weightlifter Peaking for Competition: A Case Study. *J Strength Cond Res* 2018;32(11):3029. doi:10.1519/JSC.0000000000002379

8. Beckham GS. Lamont H, Sato KW et al. Isometric Strength of Powerlifters in Key Positions of the Conventional Deadlift. *J Train* 2012;1(2):32–35. doi:10.17338/trainology.1.2_32

9. Bell L, Nolan D, Immonen V et al. “You can’t shoot another bullet until you’ve reloaded the gun”: Coaches’ perceptions, practices and experiences of deloading in strength and physique sports. *Front Sports Act Living*. 2022;4. doi:10.3389/fspor.2022.1073223

10. Bell L, Ruddock A, Maden-Wilkinson T, Rogerson D. “I Want to Create So Much Stimulus That Adaptation Goes Through the Roof”: High-Performance Strength Coaches’

Perceptions of Planned Overreaching. *Front Sports Act Living.* 2022. doi:10.3389/fspor.2022.893581

11. Bell L, Ruddock A, Maden-Wilkinson T, Rogerson D. Recommendations for Advancing the Resistance Exercise Overtraining Research. *App Sci*. 2022;12(24):12509. doi:10.3390/app122412509

12. Bell L, Strafford BW, Coleman M, Androulakis Korakakis P, Nolan D. Integrating Deloading into Strength and Physique Sports Training Programmes: An International Delphi Consensus Approach. *Sports Med - Open*. 2023;9(1):87. doi:10.1186/s40798-023-00633-0

13. Bosquet L, Merkari S, Arvisais D, Aubert AE. Is heart rate a convenient tool to monitor over-reaching? A systematic review of the literature. *Br J Sports Med*. 2008;42(9):709–714. doi:10.1136/bjsm.2007.042200

14. Burke BI, Carroll KM, Travis SK, Stone ME, Stone MH. Two Days Versus Four Days of Training Cessation Following a Step-Taper in Powerlifters. *J Strength Cond Res.* 2023;37(12):625. doi:10.1519/JSC.0000000000004564

15. Chiu LZF, Barnes JL. The Fitness-Fatigue Model Revisited: Implications for Planning Short- and Long-Term Training. *Strength Cond J*. 2003;25(6):42.

16. Coleman M, Burke R, Augustin F et al. Gaining more from doing less? The effects of a one-week deload period during supervised resistance training on muscular adaptations. *Peer J.* 2024;12:e16777. doi:10.7717/peerj.16777

17. Comfort P, Haff GG, Suchomel TJ et al. National Strength and Conditioning Association Position Statement on Weightlifting for Sports Performance. *J Strength Cond Res.* 2023;37(6):1163. doi:10.1519/JSC.0000000000004476

18. Coutts A, Reaburn P, Piva TJ, Murphy A. Changes in Selected Biochemical, Muscular Strength, Power, and Endurance Measures during Deliberate Overreaching and Tapering in Rugby League Players. *Int J Sports Med.* 2007;28(2):116–124. doi:10.1055/s-2006-924145

19. Cunanan AJ, DeWeese BH, Wagle JP et al. The General Adaptation Syndrome: A Foundation for the Concept of Periodization. *Sports Med.* 2018;48(4):787–797. doi:10.1007/s40279-017-0855-3

20. De Marco K, Goods PSR, Baldwin KM, Hiscock DJ, Scott BR. Resistance Training Prescription During Planned Deloading Periods: A Survey of Strength and Conditioning Coaches Across Varying Sporting Codes. *J Strength Cond Res*. 2024;38(12):2099. doi:10.1519/JSC.0000000000004932

21. DeWeese BH, Hornsby G, Stone M, Stone MH. The training process: Planning for strength–power training in track and field. Part 1: Theoretical aspects. *J Sport Health Sci.* 2015;4(4):308–317. doi:10.1016/j.jshs.2015.07.003

22. DeWeese BH, Hornsby G, Stone M, Stone MH. The training process: Planning for strength–power training in track and field. Part 2: Practical and applied aspects. *J Sport Health Sci*. 2015;4(4):318–324. doi:10.1016/j.jshs.2015.07.002

23. Dugdale JH, Hunter AM, Di Virgilio TG, Macgregor LJ, Hamilton DL. Influence of the “Slingshot” Bench Press Training Aid on Bench Press Kinematics and Neuromuscular Activity in Competitive Powerlifters. *J Strength Cond Res.* 2019;33(2):327. doi:10.1519/JSC.0000000000001853

24. Escalante G, Stevenson SW, Barakat C, Aragon AA, Schoenfeld BJ. Peak week recommendations for bodybuilders: an evidence based approach. *BMC Sports Sci, Med Rehab.* 2021;13:68. doi:10.1186/s13102-021-00296-y

25. Fleck SJ. Periodized Strength Training: A Critical Review. *J Strength Cond Res*. 1999;13(1):82.

26. Flockhart M, Nilsson LC, Ekblom B, Larsen FJ. A Simple Model for Diagnosis of Maladaptations to Exercise Training. *Sports Med - Open*. 2022;8(1):136. doi:10.1186/s40798-022-00523-x

27. García-Pallarés J, Sánchez-Medina L, Pérez CE, Izquierdo-Gabarren M, Izquierdo M. Physiological effects of tapering and detraining in world-class kayakers. *Med Sci Sports Exerc*. 2010;42(6):1209–1214. doi:10.1249/MSS.0b013e3181c9228c

28. Gibala MJ, MacDougall JD, Sale DG. The effects of tapering on strength performance in trained athletes. *Int J Sports Med.* 1994;15(8):492–497. doi:10.1055/s-2007-1021093

29. Grandou C, Wallace L, Coutts AJ, Bell L, Impellizzeri FM. Symptoms of Overtraining in Resistance Exercise: International Cross-Sectional Survey. *Int J Sports Physiol Perf.* 2021;16(1):80–89. doi:10.1123/ijspp.2019-0825

30. Greig L, Stephens Hemingway BH, Aspe RR, Cooper K, Comfort P, Swinton PA. Autoregulation in Resistance Training: Addressing the Inconsistencies. *Sports Med.* 2020;50(11):1873–1887. doi:10.1007/s40279-020-01330-8

31. Hackett DA, Johnson NA, Chow C-M. Training Practices and Ergogenic Aids Used by Male Bodybuilders. *J Strength Cond Res.* 2013;27(6):1609. doi:10.1519/JSC.0b013e318271272a

32. Haff GG, Jackson JR, Kawamori N, Carlock JM, Hartman MJ, Kilgore JL, Morris RT, Ramsey MW, Sands WA, Stone MH. Force-Time Curve Characteristics and Hormonal Alterations During an Eleven-Week Training Period in Elite Women Weightlifters. *J Strength Cond Res*. 2008;22(2):433. doi:10.1519/JSC.0b013e31816191be

33. Helms ER, Aragon AA, Fitschen PJ. Evidence-based recommendations for natural bodybuilding contest preparation: nutrition and supplementation. *J International Soc Sports Nutr.* 2014;11(1):20. doi:10.1186/1550-2783-11-20

34. Helms ER, Storey A, Cross MR et al. RPE and Velocity Relationships for the Back Squat, Bench Press, and Deadlift in Powerlifters. *J Strength Cond Res*. 2017;31(2):292. doi:10.1519/JSC.0000000000001517

35. Homer KA, Cross MR, Helms ER. A Survey of Resistance Training Practices Among Physique Competitors During Peak Week. *J Strength Cond Res*. 2024 Aug 14. doi:10.1519/JSC.0000000000004869

36. Huldi FJ, Cisar CJ. Developing an Annual Training Program for the Mixed Martial Arts Athlete. *Strength & Cond J.* 2023;45(6):745. doi:10.1519/SSC.0000000000000785

37. Ide B, Silvatti A, Staunton C et al. External and Internal Loads in Sports Science: Time to Rethink? *Int J Strength and Cond.* 2023. doi:10.47206/ijsc.v3i1.234

38. Impellizzeri FM, Jeffries AC, Weisman A et al. The ‘training load’ construct: Why it is appropriate and scientific. *J Sci Med Sport.* 2022;25(5):445–448. doi:10.1016/j.jsams.2021.10.013

39. Ishida A, Bazyler CD, Suarez DG et al. The difference between several neuromuscular tests for monitoring resistance-training induced fatigue. *J Sports Sci*. 2023;41(3):209–216. doi:10.1080/02640414.2023.2207852

40. Israetel M, Feather J, Faleiro TV, Juneau C-E. Mesocycle Progression in Hypertrophy: Volume Versus Intensity. *Strength Cond J*. 2020;42(5):2. doi:10.1519/SSC.0000000000000518

41. Izquierdo M, Ibañez J, González-Badillo JJ et al. Detraining and tapering effects on hormonal responses and strength performance. *J Strength and Cond Res.* 2007;21(3):768–775. doi:10.1519/R-21136.1

42. James LP, Talpey SW, Young WB et al. Strength Classification and Diagnosis: Not All Strength Is Created Equal. *Strength Cond J*. 2023;45(3):333. doi:10.1519/SSC.0000000000000744

43. James LP, Weakley J, Comfort P, Huynh M. The Relationship Between Isometric and Dynamic Strength Following Resistance Training: A Systematic Review, Meta-Analysis, and Level of Agreement. *Int J Sports Physiol Perf*. 2024;19(1):2–12. doi:10.1123/ijspp.2023-0066

44. Kataoka R, Vasenina E, Hammert WB et al. Is there Evidence for the Suggestion that Fatigue Accumulates Following Resistance Exercise? *Sports Med.* 2022;52(1):25–36. doi:10.1007/s40279-021-01572-0

45. Kraemer WJ, Ratamess NA, Flanagan SD et al. Understanding the Science of Resistance Training: An Evolutionary Perspective. *Sports Med*. 2017;47(12):2415–2435. doi:10.1007/s40279-017-0779-y

46. Larsen S, Kristiansen E, van den Tillaar R. Effects of subjective and objective autoregulation methods for intensity and volume on enhancing maximal strength during resistance-training interventions: a systematic review. *Peer J.* 2021;9:e10663. doi:10.7717/peerj.10663

47. Latella C, van den Hoek D, Teo W-P. Differences in Strength Performance Between Novice and Elite Athletes: Evidence From Powerlifters. *J Strength Cond Res*. 2019;33:S103. doi:10.1519/JSC.0000000000002823

48. Li J, Davies TB, Hackett DA. Self-Reported Training and Supplementation Practices Between Performance-Enhancing Drug-User Bodybuilders Compared with Natural Bodybuilders. *J Strength Cond Res*. 2023;37(5):1079. doi:10.1519/JSC.0000000000004356

49. Lorenz D, Morrison S. Current Concepts In Periodization Of Strength And Conditioning For The Sports Physical Therapist. *Int J Sports Phys Ther*. 2015;10(6):734–747.

50. Mäestu J, Eliakim A, Jürimäe J, Valter I, Jürimäe T. Anabolic and Catabolic Hormones and Energy Balance of the Male Bodybuilders During the Preparation for the Competition. *J Strength Cond Res*. 2010;24(4):1074. doi:10.1519/JSC.0b013e3181cb6fd3

51. Mann JB, Thyfault JP, Ivey PA, Sayers SP. The Effect of Autoregulatory Progressive Resistance Exercise vs. Linear Periodization on Strength Improvement in College Athletes. *J Strength Cond Res*. 2010;24(7):1718. doi:10.1519/JSC.0b013e3181def4a6

52. Mitchell L, Slater G, Hackett D, Johnson N, O’connor H. Physiological implications of preparing for a natural male bodybuilding competition. *Eur J Sport Sci.* 2018;18(5):619–629. doi:10.1080/17461391.2018.1444095

53. Mujika I, Padilla S. Scientific bases for precompetition tapering strategies. *Med Sci Sports and Exerc*. 2003;35(7):1182–1187. doi:10.1249/01.MSS.0000074448.73931.11

54. Øvretveit K. High-Intensity, Non-Sport-Specific Strength and Conditioning for Brazilian Jiu-Jitsu Athletes: Theoretical and Practical Considerations. *Strength Cond J.* 2020;42(3):58. doi:10.1519/SSC.0000000000000542

55. Pritchard H, Keogh J, Barnes M, McGuigan M. Effects and Mechanisms of Tapering in Maximizing Muscular Strength. *Strength Cond J.* 2015;37(2):72. doi:10.1519/SSC.0000000000000125

56. Pritchard HJ, Barnes MJ, Stewart RJC, Keogh JWL, McGuigan MR. Short-Term Training Cessation as a Method of Tapering to Improve Maximal Strength. The Journal of Strength & Conditioning Research. 2018;32(2):458. doi:10.1519/JSC.0000000000001803

57. Pritchard HJ, Keogh JW, Winwood PW. Tapering practices of elite CrossFit athletes. International Journal of Sports Science & Coaching. 2020;15(5–6):753–761. doi:10.1177/1747954120934924

58. Pritchard HJ, Tod DA, Barnes MJ, Keogh JW, McGuigan MR. Tapering Practices of New Zealand's Elite Raw Powerlifters. *J Strength Cond Res*. 2016;30(7):1796. doi:10.1519/JSC.0000000000001292

59. Pyne DB, Mujika I, Reilly T. Peaking for optimal performance: Research limitations and future directions. *J Sports Sci.* 2009;27(3):195–202. doi:10.1080/02640410802509136

60. Rogerson D, Nolan D, Korakakis PA et al. Deloading Practices in Strength and Physique Sports: A Cross-sectional Survey. *Sports Med - Open*. 2024;10(1):26. doi:10.1186/s40798-024-00691-y

61. Rolnick N, Schoenfeld BJ. Blood Flow Restriction Training and the Physique Athlete: A Practical Research-Based Guide to Maximizing Muscle Size. *Strength Cond J.* 2020;42(5):22. doi:10.1519/SSC.0000000000000553

62. Rukstela A, Lafontant K, Helms E et al. Bodybuilding Coaching Strategies Meet Evidence-Based Recommendations: A Qualitative Approach. *J Funct Morphol Kinesiol.* 2023;8(2):84. doi:10.3390/jfmk8020084

63. Shattock K, Tee JC. Autoregulation in Resistance Training: A Comparison of Subjective Versus Objective Methods. *J Strength Cond Res*. 2022;36(3):641. doi:10.1519/JSC.0000000000003530

64. Slater G, Phillips SM. Nutrition guidelines for strength sports: sprinting, weightlifting, throwing events, and bodybuilding. *J Sports Sci.* 2011;29 Suppl 1:S67-77. doi:10.1080/02640414.2011.574722

65. Staunton CA, Abt G, Weaving D, Wundersitz DWT. Misuse of the term 'load' in sport and exercise science. *J Sci Med Sport.* 2022;25(5):439–444. doi:10.1016/j.jsams.2021.08.013

66. Stone MH, Hornsby WG, Haff GG et al. Periodization and Block Periodization in Sports: Emphasis on Strength-Power Training—A Provocative and Challenging Narrative. *J Strength Cond Res*. 2021;35(8):2351. doi:10.1519/JSC.0000000000004050

67. Stone MJ, Knight CJ, Hall R, Shearer C, Nicholas R, Shearer DA. The Psychology of Athletic Tapering in Sport: A Scoping Review. *Sports Med*. 2023;53(4):777–801. doi:10.1007/s40279-022-01798-6

68. Storey A, Smith HK. Unique Aspects of Competitive Weightlifting. *Sports Med* 2012;42(9):769–790. doi:10.1007/BF03262294

69. Suchomel TJ, Nimphius S, Stone MH. The Importance of Muscular Strength in Athletic Performance. *Sports Med.* 2016;46(10):1419–1449. doi:10.1007/s40279-016-0486-0

70. Taylor JL, Amann M, Duchateau J, Meeusen R, Rice CL. Neural Contributions to Muscle Fatigue: From the Brain to the Muscle and Back Again. *Med Sci Sports Exerc.* 2016;48(11):2294–2306. doi:10.1249/MSS.0000000000000923

71. Travis SK, Goodin JR, Beckham GK, Bazyler CD. Identifying a Test to Monitor Weightlifting Performance in Competitive Male and Female Weightlifters. *Sports*. 2018;6(2):46. doi:10.3390/sports6020046

72. Travis SK, Mizuguchi S, Stone MH, Sands WA, Bazyler CD. Preparing for a National Weightlifting Championship: A Case Series. *J Strength Cond Res*. 2020b;34(7):1842. doi:10.1519/JSC.0000000000003312

73. Travis SK, Mujika I, Gentles JA, Stone MH, Bazyler CD. Tapering and Peaking Maximal Strength for Powerlifting Performance: A Review. *Sports*. 2020;8(9):125. doi:10.3390/sports8090125

74. Travis SK, Mujika I, Zwetsloot KA, Gentles JA, Stone MH, Bazyler CD. The Effects of 3 vs. 5 Days of Training Cessation on Maximal Strength. *J Strength Cond Res*. 2022;36(3):633. doi:10.1519/JSC.0000000000004183

75. Travis SK, Pritchard HJ, Mujika I et al. Characterizing the Tapering Practices of United States and Canadian Raw Powerlifters. *J Strength Cond Res*. 2021;35:S26. doi:10.1519/JSC.0000000000004177

76. Travis SK, Schwarz AV, Burke BI. Locked and Loaded: Divergent Handgrip Tests as Surrogate Measures for One-Repetition Maximal Strength. *Biomechanics*. 2025;5(1):16. doi:10.3390/biomechanics5010016

77. Travis SK, Zwetsloot KA, Mujika I, Stone MH, Bazyler CD. Skeletal Muscle Adaptations and Performance Outcomes Following a Step and Exponential Taper in Strength Athletes. *Front Physiol* 2021;12. doi:10.3389/fphys.2021.735932

78. Turner A. The Science and Practice of Periodization: A Brief Review. *Strength Cond J.* 2011;33(1):34. doi:10.1519/SSC.0b013e3182079cdf

79. Vann CG, Haun CT, Osburn SC et al. Molecular Differences in Skeletal Muscle After 1 Week of Active vs. Passive Recovery from High-Volume Resistance Training. *J Strength Cond Res*. 2021;35(8):2102–2113. doi:10.1519/JSC.0000000000004071

80. Vieira JG, Sardeli AV, Dias MR et al. Effects of Resistance Training to Muscle Failure on Acute Fatigue: A Systematic Review and Meta-Analysis. *Sports Med*. 2022;52(5):1103–1125. doi:10.1007/s40279-021-01602-x

81. Weiss LW, Wood LE, Fry AC et al. Strength/Power Augmentation Subsequent to Short-Term Training Abstinence. *J Strength Cond Res*.. 2004;18(4):765.

82. Wilson JM, Wilson GJ. A Practical Approach to the Taper. *Strength Cond J.* 2008;30(2):10. doi:10.1519/SSC.0b013e3181636dd5

83. Winwood PW, Dudson MK, Wilson D et al. Tapering Practices of Strongman Athletes. *J Strength Cond Res*. 2018;32(5):1181. doi:10.1519/JSC.0000000000002453

84. Winwood PW, Keogh JWL, Travis SK, Grieve I, Pritchard HJ. The Training and Tapering Practices of Highland Games Heavy Event Athletes. *J Strength Cond Res.* 2024;38(3):e116–e124. doi:10.1519/JSC.0000000000004638

85. Winwood PW, Keogh JWL, Travis SK, Pritchard HJ. The Tapering Practices of Competitive Weightlifters. *J Strength Cond Res*. 2023;37(4):829. doi:10.1519/JSC.0000000000004324

86. Yamashita D, Hirata K, Yamazaki K, Mujika I, Miyamoto N. Effect of two weeks of training cessation on concentric and eccentric knee muscle strength in highly trained sprinters. *PLoS ONE*. 2023;18(7):e0288344. doi:10.1371/journal.pone.0288344

87. Zaras ND, Stasinaki A-NE, Krase AA et al. Effects of tapering with light vs. heavy loads on track and field throwing performance. *J Strength Cond Res*. 2014;28(12):3484–3495. doi:10.1519/JSC.0000000000000566