Contemporary Training Practices in Elite British Powerlifters: Survey Results from an International Competition.

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ABSTRACT. Training practices in elite British powerlifters: Survey results from an international competition. - The primary objective of this study was to investigate current powerlifting training methods in light of anecdotal evidence purporting increased similarity with the explosive training practices of weightlifters. The study also assessed the prevalence of contemporary training practices frequently recommended for powerlifters in the popular literature. A 20-item survey was distributed to 32 elite British powerlifters at an International competition. The subject group included multiple national, international and commonwealth champions and record holders. Based on 2007 competition results the average Wilks score of the group was 450.26 ± 34.7. The response rate for the surveys was 88% (28 of 32). The survey was sectioned into 6 areas of inquiry (a) repetition speed, (b) explosive training load, (c) resistance materials used, (d) adjunct power training methods, (e) exercise selection, (f) training organization. The results demonstrate that the majority of powerlifters train with the intention to explosively lift maximal and submaximal loads (79% and 82% respectively). Results revealed that 39% of the lifters regularly used elastic bands and 57% incorporated chains in their training. Evidence for convergence of training practices between powerlifters and weightlifters was found when 69% of the subjects reported using the Olympic lifts or their derivatives as part of their powerlifting training. Collectively, the results demonstrate that previous notions of how powerlifters train are outdated. Contemporary powerlifters incorporate a variety of training practices that are focused on developing both explosive and maximal strength.

Key Words. powerlifting, compensatory acceleration, chains, elastic bands, box squats, board press

INTRODUCTION

Elite powerlifters are amongst the strongest and most muscular athletes in the world. As a result, their unique phenotype and training practices have served as a model for research in a range of disciplines including biomechanics (7, 24), anthropometry (2, 20) and physiology (4, 13). Powerlifters are frequently grouped with Olympic style weightlifters in research pertaining to high-intensity resistance training (12). Due to assumed differences in training methods, some authors have commented that training-specific adaptations may necessitate demarcation of the groups (12). However, there exists little information on current powerlifting training practices in the scientific literature.

Previous research describes the training practices of powerlifters as overcoming heavy loads at low velocities (11, 23). In contrast, the training practices of weightlifters are characterised by performance of explosive movements that generate substantial power outputs (11, 14). Whilst most acknowledge that some overlap in training methodology does exist, the core training practices of the respective groups are considered to be distinct. These differences in training methods have enabled researchers to investigate intricacies of strength training and debate which practices are best extrapolated for the development of athletes (6, 23).

In a seminal research study, Hakkinen *et al* (15) reported that powerlifters were not as strong or as powerful as weightlifters. Similar research findings were established in a subsequent comparison by McBride *et al* (23) utilising squats and loaded jumps. In the latter study weightlifters generated significantly greater peak power outputs across

all load conditions from body weight to 90% 1RM despite equivalence of maximal strength.

Using a longitudinal approach, Hoffman et al (17) investigated the relative efficacy of powerlifting and weightlifting modalities with American football players. Position matched groups were exposed to ten weeks of powerlifting or weightlifting orientated training with field-test measures assessing improvements in sprint, agility and vertical jump performance. Whilst concurrent sprint and agility sessions may have confounded results for 40-yard sprint and T-test measures, the weightlifting group demonstrated significantly greater improvements in jump performance. When combined with results from McBride et al (23) this suggests that weightlifting is a more effective modality for jump training, and more generally, athletic development.

However, it has recently been indicated that previous research may be based on outdated notions of how powerlifters train (6). Moreover, it has been suggested that contemporary powerlifting training more closely resembles the explosive practices of weightlifters (6). These views are coincident with the large volume of lay training information that has been disseminated via the internet and powerlifting journals. Information from popular sources suggests that contemporary powerlifters successfully implement novel exercises, power development protocols, and heavy resistance materials such as bands and chains in their training (29, 30, 31, 34). To our knowledge there is yet to be a study of the contemporary training practices of elite powerlifters. Such information would be invaluable for future research with powerlifters and may elucidate areas for subsequent study.

METHODS

Experimental approach to the problem

Anecdotal evidence purports that powerlifting training practices have recently evolved and include methodologies designed to enhance explosive force production (6, 34). This was an exploratory descriptive study to establish the prevalence of contemporary training practices in elite British powerlifters and assess the veracity of the anecdotal claims.

Research instrument

A 20-item survey was administered to elite powerlifters prior to an International competition. The survey was sectioned into 6 areas of inquiry: repetition speed, explosive training load, resistance materials used, adjunct power training methods, exercise selection, and training organization. Closed questions featured for all segments except for exercise selection where both closed and open questions were presented. The time frame for the survey was delimited to the macrocycle preceding competition. Prior to its use, the survey was piloted with local powerlifters and the research design approved by the ethical review panel at the Robert Gordon University, Aberdeen.

Subjects

The subjects for this study included the top 15 ranked male Scottish powerlifters and 17 additional competitors invited to the 2007 Four Nations International Championship held in Livingston, Scotland. The subjects included multiple national, international and commonwealth champions and record holders in weight categories

ranging from the under 75kg class to the unlimited class. Based on 2007 competition results the average Wilks score of the group was 450.26 ± 34.7. Surveys were administered to the subject group at the Four Nations International Competition between the official weigh-in and competition start.

RESULTS

Of the 32 subjects 28 (88%) completed the survey. Table 1 provides a summary of the results.

Table 1 Summary of item responses

	Percentage that reported using the training practice
Repetition Speed (Heavy Loads 80-100% 1RM)	
Performed squat as fast as possible	64.3%
Performed bench press as fast as possible	60.7%
Performed deadlift as fast as possible	64.3%
Repetition Speed (Submaximal Loads 0-70% 1RM)	
Performed squat as fast as possible	75.0%
Performed bench press as fast as possible	67.9%
Performed deadlift as fast as possible	75.0%
Explosive Training Load (0-70% 1RM)	
Used 0-10% for speed repetitions	0%
Used 11-20% for speed repetitions	0%
Used 21-30% for speed repetitions	0%
Used 31-40% for speed repetitions	3.6%
Used 41-50% for speed repetitions	39.3%
Used 51-60% for speed repetitions	39.3%
Used 61-70% for speed repetitions	53.6%
Resistance Material Used	
Used chains in training	57.1%
Used elastic bands in training	39.3%
Adjunct Power Training Methods	
Performed the clean in training	60.7%
Performed the jerk in training	10.7%
Performed the snatch in training	14.3%

Performed pulls in training	17.9%
Performed upper body plyometrics in training	14.3%
Performed lower body plyometrics in training	17.9%
Exercise Selection	
Performed box squats in training	46.4%
Performed board press in training	57.1%
Periodization	
Used periodization in training organization	96.4%

Repetition Speed

Subjects were asked if they performed their heavy sets (80-100% 1RM) in the squat, bench press and deadlift as fast as possible (maximum), or at controlled speeds (less than maximum). Thirteen of the 28 (46%) subjects performed all of the power lifts as fast as possible and 22 (79%) performed at least one at maximum speed.

Explosive Training Load

Subjects were asked if they attempted to lift submaximal loads (0-70% 1RM) as fast as possible in the squat, bench press or deadlift. The submaximal loads were presented to the subjects in 7 categories (0-10%, 11-20%. 21-30%, 31-40%, 41-50%, 51-60%, 61-70%) with instructions to select multiple loads if appropriate. The results show that the majority of the powerlifters (82%) performed "speed repetitions" with submaximal loads for at least one of the power lifts. None of the subjects used loads equal to or below 30% of their maximum for explosive training. Figure 1 illustrates the percentage of powerlifters that used submaximal loads for each of the power lifts.

Resistance Materials Used

Thirty nine percent of the powerlifters surveyed incorporated elastic bands in their training and 57% included chains. Figure 2 illustrates that chains and bands were most commonly used with the bench press exercise.

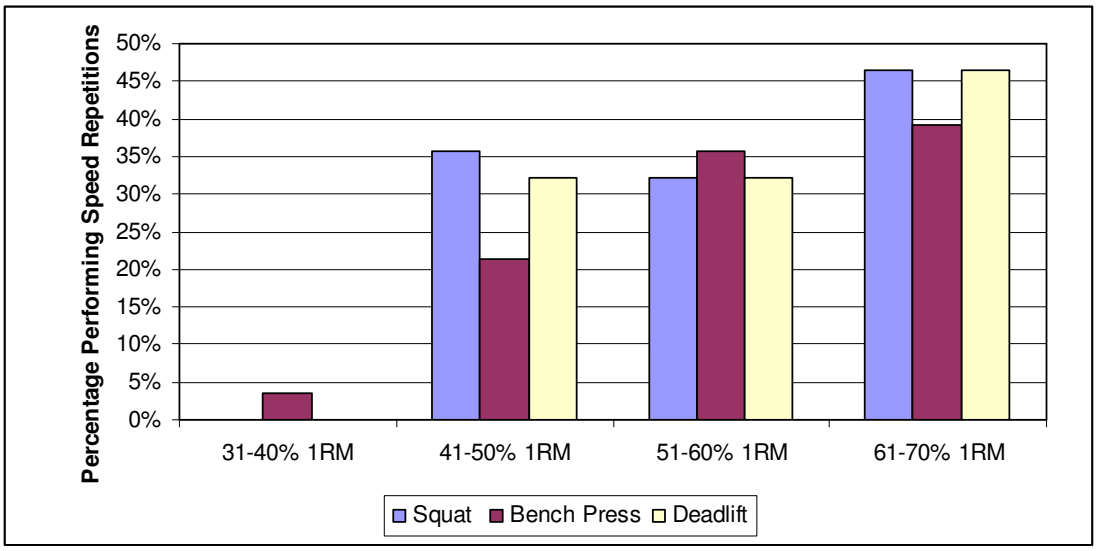

Figure 1. Analysis of submaximal loads used for speed repetitions in the squat, bench press and deadlift.

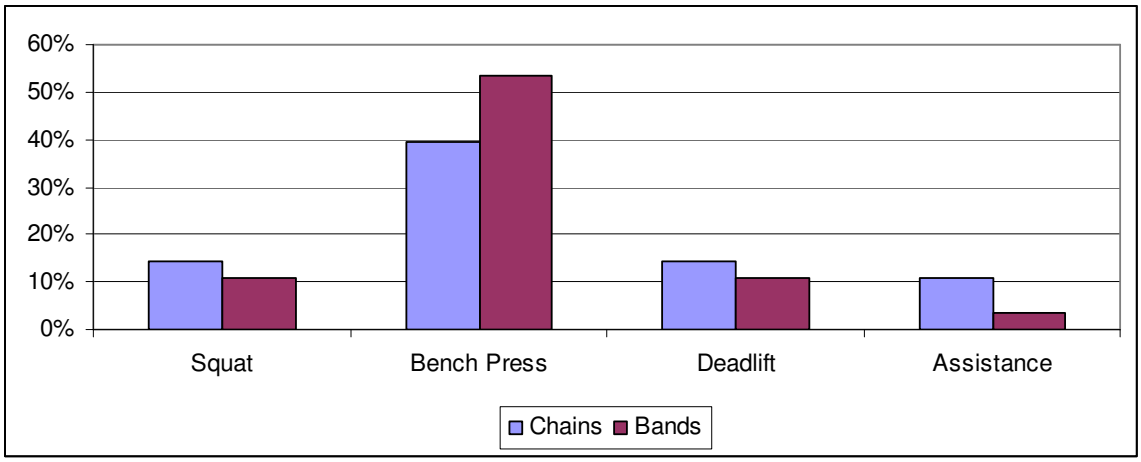

Figure 2. Percentage of powerlifters that used bands or chains for the squat, bench press, deadlift or assistance exercises.

Adjunct Power Training Methods

Sixty nine percent of the subjects reported that they regularly performed the Olympic lifts or their derivatives (cleans, snatch, pulls, and the jerk) as part of their powerlifting training. A minority of the powerlifters also reported performing upper and lower body plyometric drills (14% and 18% respectively).

Exercise Selection

Thirteen of the 28 (46%) subjects performed the box squat in their training. Subjects who included the box squat were asked to indicate how frequently they performed the lift in comparison to the free squat. Twenty one percent of the whole group reported performing the box squat less often than the free squat, 11% reported that they performed both lifts with the same frequency, and 14% reported performing the box squat more often than the free squat.

Subjects were also asked which assistance exercise they felt best improved the squat, bench press and deadlift. Box squats were cited most frequently for the squat (29%), close grip bench press was cited most frequently for the bench press (43%), and platform deadlifts were cited most frequently for the deadlift (29%).

Training Organization

Twenty seven of the 28 (96%) subjects included some method of periodization in their training organization.

DISCUSSION

The results of this study support the notion that powerlifting training methods have evolved and more closely resemble the explosive practices of weightlifters. The

majority of the elite powerlifters attempted to lift heavy loads (80-100%1RM) in the squat, bench press or deadlift as fast as possible. This training practice is commonly referred to as compensatory acceleration and may provide a superior means of strength development (21). Research has established that the increased voluntary effort required to lift loads as fast as possible increases motor unit recruitment and as a result augments force and power production (26, 28). Experimental findings also indicate that the intention to explosively overcome maximal resistances provides the most effective method for increasing speed with heavy loads (26). As a result, compensatory acceleration and improvements in the ability to impart momentum to heavy loads may facilitate powerlifting performance by enabling lifters to circumvent initial sticking regions.

Debate over extrapolation of powerlifting or weightlifting practices to athletic development has focused on research of actual movement velocity versus intended movement velocity. Regardless of powerlifters' intention to lift heavy loads as fast as possible, the ensuing velocity is slow due to the load and lift biomechanics (23). On the contrary, the Olympic lifts are performed at high velocities across the load spectrum (19). Findings from research studies have demonstrated that velocity specific adaptations in force and power occur even when voluntary effort is maximal (18, 22). With this in mind, traditional views of the groups training methods would support the use of weightlifting practices that more closely match the velocity profiles of explosive sporting movements. It has been proposed however, that contemporary powerlifters combine compensatory acceleration with heavy and submaximal loads to enhance force and rate of force development across a range of velocities (6). In both lay and academic sources traditional power lifts performed explosively with

submaximal loads are commonly referred to as speed squats, speed bench presses, and speed deadlits (8, 30, 31, 36). Results from this study support the belief that powerlifters incorporate submaximal loads in their explosive training; with 75% of the elite group performing speed squats and speed deadlifts, and 68% performing speed bench presses.

One further line of evidence for increased similarity between powerlifters and weightlifters was the finding that 69% of the subjects regularly performed the Olympic lifts or their derivatives. The clean was most frequently performed, followed by high pulls, the snatch, and jerk. In addition to the Olympic lifts a small percentage (16%) of the subjects performed appurtenant power training exercises including plyometric movements such as depth jumps and bench throws. It is likely that the elite powerlifters included the Olympic lifts and plyometric exercises as a means of developing power and whole body explosiveness. In addition, a modicum of the powerlifters reported that power type exercises including the clean and high pull were their most effective means for improving deadlift performance.

Two training practices that have become linked with contemporary powerlifting methods is the use of heavy chains and elastic bands (32, 33). Of the lifters surveyed, 39% regularly used elastic bands and 57% incorporated chains in their training. Whilst there is extensive anecdotal support for the use of both elastic bands (35) and chains (3), the majority of research thus far has addressed elastic resistance (1, 9, 10, 16, 27, 35). Generally, the results have established that combining elastic and isoinertial resistance augments force, velocity and power in traditional lifts (27, 35). In addition, longitudinal research suggests that combining elastic and isoinertial

resistance may be more effective in increasing maximal strength than standard resistance training practices at least in the short-term (1, 16).

Research of popular literature revealed that in addition to using chains and bands unique assistance exercises were commonly recommend for improving powerlifting performance. The board press and box squat were upper and lower-body assistance exercises that we found to be frequently recommended (30, 34). Despite the fact box-squats are considered dangerous by some (5), almost half the powerlifters in this study performed the box squat and 14% performed the variation more often than the free squat. In addition, the elite powerlifters cited the box squat most often as the best assistance exercise for improving free squat performance.

Targeting the upper-body, the board press is a partial range of motion exercise that is recommended to improve bench press performance (34). During the board press the lifter adopts a supine position whilst a training partner places wooden blocks of varying thickness across the upper torso. By manipulating the thickness of the blocks the lifter can target specific areas of the bench press range of motion. Some researchers have suggested that supramaximal loads with partial range of motion exercises provides a strong stimulus for adaptations (25, 37). In support of this theory the majority of the surveyed powerlifters performed the board press and 21% of the group believed that the exercise was the most effective training movement for improving bench press performance.

Of significant interest was the apparent individualisation of training practices implemented by the elite powerlifters. Analysis of each subject's item responses

revealed that 79% used different combinations of speeds, loads and resistance materials for the squat, bench press or deadlift. It is likely that the individualisation of loading strategies for the competitive lifts represents a prolonged period of trial and error whereby the lifter determines the most efficacious protocols for each lift. It is also possible that the group periodically altered loading strategies during different stages of their training. Nearly all of the elite powerlifters from this study incorporated some form of periodized training and future research studies may wish to examine the efficacy of advocated models.

Further analysis across individual item responses revealed as expected differences in acute programme variable selection. However, it is clear that in addition to performing the traditional power lifts with heavy loads the training practices of elite powerlifters are characterized by inclusion of various accessory methods hypothesized to improve performance. The results from this study highlight the use of submaximal loads, Olympic lifts and additional resistance material as popular accessory methods.

PRACTICAL APPLICATIONS

The results of this study strongly suggest that the training practices of elite powerlifters have evolved and now comprise a contemporary blend of training methods aimed at improving strength and power. As a consequence, new research studies are required to investigate the effect of contemporary training practices on the powerlifter phenotype and determine the potential benefits for athletic development. Moreover, debate concerning which strength training practices (powerlifting or

weightlifting) is best suited for athletes appear unproductive in light of the increasing similarities between the groups. Instead, researchers and practitioners should focus on developing optimal training protocols for athletes that draw from the practices of both groups.

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