Perspectives on Periodization and Polyometrics

By Matt Brzycki

Coaches and athletes are always looking for ways to improve performance on the wrestling mat. And there is no shortage of methods that are purported to develop various physiological functions such as strength, speed, power and explosiveness. Two popular methods of training are examined here: periodization and plyometrics.

PERIODIZATION

Also referred to as "cycling," periodization is a theoretical schedule of preplanned workouts that has been popularized by competitive weightlifters as their preferred method of training to peak for a one-repetition maximum (1-RM) during their contests. Essentially, the idea is to change or "cycle" program variables such as the number of sets and repetitions, the workloads (which are based upon percentages of a 1-RM) and the recovery intervals between the sets / exercises. These variables are manipulated during rigidly defined "phases" of training which usually are designated as "hypertrophy," "basic strength," "strength-power," "peaking," "maintenance" and "active rest." It is thought that by manipulating the variables, athletes can selectively target specific physiological functions.

Here is a relatively simple example of a classic (linear) model of periodization that is divided into two seven-week "cycles" or "periods" (to supposedly develop strength and power): During the first three weeks of each cycle, wrestlers are required to do 2 - 3 sets of 8 - 10 repetitions in each exercise with 50 – 70 percent of their 1-RMs; during the fourth and fifth weeks of each cycle, they must do 3 – 4 sets of 6 repetitions in each exercise with 70 – 85 percent of their 1-RMs; and during the sixth and seventh weeks of each cycle, they must do 3 – 5 sets of 1 - 4 repetitions in each exercise with 85 – 95 percent of their 1-RMs.

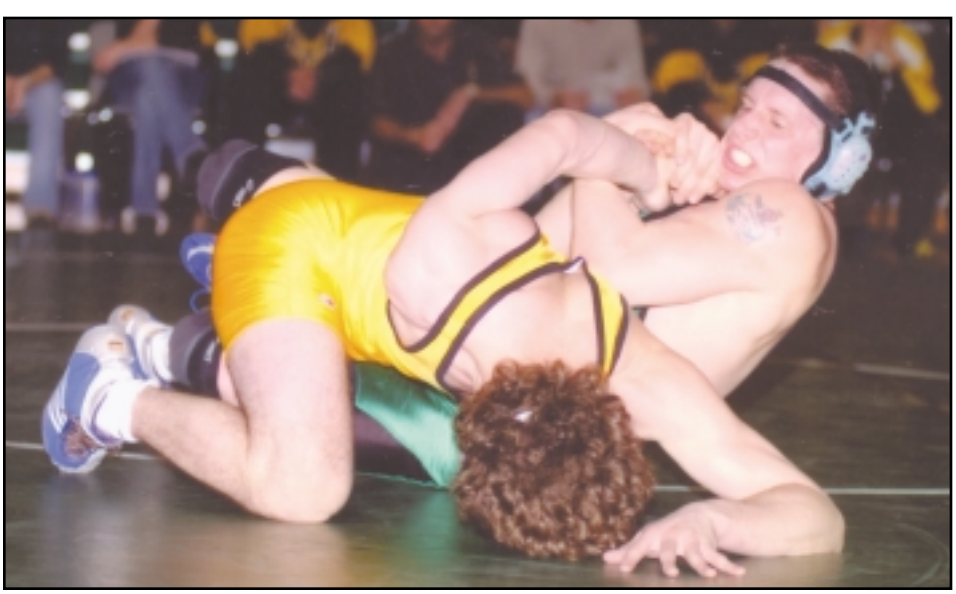
There are several issues and concerns relating to the use of periodization. Perhaps first and foremost is the fact that there is no legitimate scientific evidence to support the wild claim that doing different numbers of sets and repetitions with different percentages of a 1-RM while taking different intervals of recovery between sets will specifically influence hypertrophy, strength, strength-power or anything else.

Second, periodization is overly — and unnecessarily — complicated and correspondingly confusing. The use of pseudoscientific terminology coupled with preplanned workouts that specify inflexible instructions to vary the sets, repetitions, workloads and recovery intervals in rigidly defined phases adds to the confusion. Equally confusing is the notion of "active rest" — a contradiction in terms if there ever was one. Strength training is actually quite simple: Overload the muscles by increasing the resistance and / or repetitions from one workout to the next.

Third, periodization is far too inflexible because of the precise nature of preplanned workouts. The reality is that wrestlers often get sick or injured and are forced to miss workouts. In the event of a missed workout, do they renew their training according to their pre-planned schedule? If not, at what point in the preplanned schedule do they resume? Essentially, "periodization" is a sexy word for "variety." But incorporating variety into a program — which is certainly important — can be done as needed in a manner that is far less regimented and much more informal.

Fourth, periodization requires all athletes to perform specific numbers of repetitions with certain percentages of their 1-RMs. For instance, wrestlers might be required to do 8 repetitions with 70% of their 1-RMs. Because of wide variations in muscular endurance, however, such a prescription might be far too easy for some and literally impossible for others. Therefore, pre-planned workouts that demand the same number of repetitions be done with a specific percentage of a maximal load are only effective for the relatively small segment of the population that has inherited a particular level of muscular endurance that corresponds exactly to the specifications and parameters of the training schedule.

Fifth, periodization makes some sense for competitive weightlifters since — for the most part — they only peak for two or three contests a year. But it makes little sense for other athletes such as wrestlers who might have to peak once or twice a week for three or four months. Indeed, for what matches do they peak? Isn't every one important? Imagine a wrestler saying apologetically, "Sorry about my perform-



Minnesota 2A 171 pound state-ranked Travis Gottschalk Litchfield, won the match 7-4 over Minnesota Class 3A state-ranked Mike Felling, Hutchinson. Photo by Lyle Dieckmann.

ance today, coach, but I'm not scheduled to peak in my Strength-Power Phase for two more weeks." Remember, too, that references to the training methods or techniques of competitive weightlifters are irrelevant and, therefore, do not apply to any athletes other than competitive weightlifters. The question that a wrestler must ask is, "Am I training to become a better wrestler or a better weightlifter?"

To summarize: Besides being confusing, trying to implement periodization with athletes other than competitive weightlifters is impractical, irrelevant, illogical and unnecessary. There are other ways to address a wrestler's needs that are considerably less complicated as well as more practical, relevant and logical.

PLYOMETRICS

Since the mid-1960s, plyometrics have been romantically endorsed as a way to "bridge the gap" between strength and speed. In the United States, the first reference to these types of exercises in athletic literature appears to have been in 1966 by the Soviet author Yuri Verhoshanski (whose surname has also been spelled "Verkhoshansky"). The term "plyometrics," however, seems to have been coined in 1975 by Fred Wilt who was an American track and field coach.

Plyometrics apply to any exercise or jumping drill that uses the myotatic (or stretch) reflex of a muscle. This particular reflex is triggered when a muscle is pre-stretched prior to a muscular contraction, resulting in a more powerful movement than would otherwise be possible. Just before lifting an opponent, for example, a wrestler bends at the hips and knees. This "countermovement" pre-stretches the hip and leg muscles allowing the wrestler to generate more force than if the lift was performed without first bending the hips and knees. Plyometrics for the lower body include bounding, hopping and various box drills such as depth jumping (in which an athlete steps off a box and, upon landing, immediately does a vertical jump); plyometrics for the upper body include ballistic (or "drop") push-ups and often incorporate medicine balls to induce the stretch reflex.

Understand that the use of plyometrics has been highly controversial for quite some time. It is important to know that most of the support for plyometrics is based upon anecdotal — not scientific — evidence. The truth of the matter is that there is little unbiased research that convincingly and consistently proves plyometrics are effective.

Although some research has shown that plyometrics are effective, roughly an equal amount of research has shown that they are no more effective than regular strength-training or jumping activities when it comes to improving strength, speed, power, explosiveness or any other physiological function. For instance, a study that involved 26 subjects found no significant improvement in the vertical jump in those who performed depth jumps two times per week. In a study that involved 38 subjects, researchers found no significant difference in the vertical jump between a group that trained with an isokinetic leg press and a group that trained with depth jumps. In a study that involved 44 subjects (in two different experiments), researchers concluded that depth jumps (of varying heights) are no more effective than "other more common training methods" for improving leg strength and the vertical jump. A study that involved 50 subjects found no significant differences in the 40-yard dash and vertical jump between one group that did strength training and two groups that did plyometrics. A study that involved 31 subjects showed no significant differences in dynamic leg strength and leg power

REMEMBER

Wrestling USA Magazine's Publication Contest

- Collegiate Publications, Newsletters & Posters
- High School Publications, Newsletters & Posters
- National Tournament Programs
- State Tournament Programs
- General Wrestling Posters

Send to:
Shannon Wolfe
P.O. Box 1608
Big Timer, MT 59011

ENTRIES DUE BEFORE APRIL 1

between one group who performed maximum vertical jumps from ground level and two groups who performed depth jumps from different heights. And in a study that involved 24 subjects, researchers found no significant differences in the vertical jump, leg press and peak power of the quadriceps between a group that performed a strength-training program and a group that performed a strength-training program and plyometrics.

One other bit of research deserves special note: In a study that involved 30 subjects, researchers found that as the height of the depth jump increased the performance in the vertical jump and maximal vertical power output decreased in a linear fashion. Actually, the greatest performances were produced by depth jumping from a height of only *4.72 inches*. Given this information, it is difficult to understand why depth jumping is even done.

So while the mechanical output of a muscle is certainly increased by the prestretch mechanism, it does not necessarily follow that a physiological or neurological adaptation / alteration occurs. Even if there was indisputable evidence that plyometrics were an effective way to improve strength, speed, power and explosiveness — or anything else — it is extremely important to consider the risks. Frankly, the potential for injury from plyometrics is enormous. A large number of strength and fitness professionals have questioned the safety of plyometrics for many years. When performing plyometrics, the musculoskeletal system is exposed to repetitive trauma and high-impact forces. The extreme biomechanical loading places an inordinate amount of stress on the muscles, bones and connective tissues. Research has suggested that the stress from the impact forces increases the potential for injury. This is particularly true of plyometrics that have a large vertical component such as depth jumping.

The most common plyometric-related injuries in the lower body are patellar tendinitis ("jumper's knee"), stress fractures, shin splints, muscle strains, heel bruises and sprains of the knee and ankle. Other potential injuries include compression fractures, ruptured tendons and meniscal (cartilage) damage. Another area that is highly susceptible to injury from plyometrics is the lower back. Several studies have found that depth jumping results in "spinal shrinkage" — that is, a loss of stature — presumably from compression of the intervertebral discs. It is reasonable to think that decreases in the height of the discs increases the potential for injury to the spine. And performing depth jumps from greater heights or with added weight significantly increases the impact forces and spinal shrinkage. Doing so may also cause athletes to alter their landing strategies as a protective mechanism thereby increasing the potential for other injuries. Young athletes are especially vulnerable because their musculoskeletal systems are relatively immature.

When aerobic dancing was introduced years ago, most fitness enthusiasts eagerly accepted this activity with little or no reservation. Within a short period of time, untold numbers of participants suffered injuries that were directly attributable to the high-impact forces that were absorbed by their musculoskeletal systems. The concerns about these inherent dangers ushered in the development and acceptance of low-impact aerobics. If a multitude of injuries resulted from jumping up and down several *inches*, how many injuries can be expected from jumping up and down several *feet*? Also consider this: Most authorities recommend that athletes should stretch under control without any bouncing or ballistic movements to reduce their risk of injury. The fact that plyometrics are an extremely violent form of stretching is a blatant contradiction to these safety concerns.

It is no surprise, then, that many individuals in the sportsmedical community view plyometrics as "an injury waiting to happen." According to Dr. Ken Leistner — who has treated his share of injuries in his New York office — plyometrics "are not safe under any circumstances, nor for any particular athlete, no matter how 'advanced' he or she may be." Adds Dr. Leistner, " . . . plyometrics are dangerous stuff and it is not fair, right or ethical for a coach to impose plyometrics on his or her athletes. Plyometrics are dangerous in themselves and will also do things to the body that will increase the probability of injuries during future events."

Before plyometrics can be accepted as an appropriate method of training, research must show that they are effective and safe on a more convincing and consistent basis. At this point in time, a compelling number of scientific studies have found that plyometrics are no more effective than regular strength-training and jumping activities. Moreover, plyometrics carry an unreasonably — and unjustifiably — high risk of injury.

That being said, it is important to understand that many plyometric drills are actually nothing more than glorified agility drills that are intended to improve specific skills, kinesthetic awareness and anaerobic conditioning. When these drills have a small vertical component and involve a low amount of impact forces, they are an effective and safe method of training. But when these drills have a large vertical component and involve a high amount of impact forces that aggressively pre-stretch muscles in an attempt to make the stretch reflex more responsive, they are an ineffective and dangerous method of training.

Wrestlers can improve their strength, speed, power and explosiveness in a much safer manner by simply practicing their wrestling skills and techniques in the same way that they are used on the mat and by strengthening their major muscle groups, especially the hips and legs.

Sooner or later, jumping off a plyometrics box will send you limping to a doctor's office. The bottom line: Look before you leap.

Matt Brzycki has been involved in the strength and conditioning of collegiate wrestlers for more than 20 years. Since 1986, he has authored more than 60 articles for *Wrestling USA Magazine*. Reprints of 42 of these articles have been updated and adapted into book form (Wrestling Strength: The Competitive Edge and Wrestling Strength: Prepare to Win) and are available through Cardinal Publishers Group (800-296-0481). He is also the author of A Practical Approach to Strength Training and the editor of Maximize Your Training, a 455-page book that features chapters written by more than 30 strength and fitness professionals.