

Mixing Weights and Plyometrics for Maximum Results (Throws)

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Definition and Purpose

Using Hartmann and Tunnemann's definition of strength training it is defined as "a person's capacity to use muscular activity (enhanced by the use of weights) to exert resistance on external forces in order to overcome these forces."

When we mix weight training and plyometrics the purpose is the enhancement of speed - strength. We are concerned not just with the application of force but the rate of force development. Speed strength deals with the "amount of internal strength which the neuromuscular system (the body's electrical system) is able to mobilize per unit of time."

Strength is the basis of high level performance in Track and Field. For the purpose of this talk I shall refer to speed strength as Explosive Strength.

There are some prerequisites that must be developed in order to make this mix of plyometrics and weight training and to work at maximum efficiency. Let us deal with one at a time before mixing these training regimes.

Weight Training

- Classic periodisation even in the most elite level athlete is a period of high volume weight training, with no emphasis at all on plyometrics, must exist in order to create the physiological environment for speed strength work.
- In the most elite athlete, the period of high volume work may only be 3 weeks at the very beginning of the preparation phase, nevertheless it is a very important ingredient in the development of explosive strength. Research has shown this to be the case.
- High Volume work can be defined as 4 to 6 sets including the warm up sets and reps from 8 to 15. During this high volume period there must be No Plyometric work included, as this inclusion will lead to overtraining and injuries.
- After this high volume period we must consider the type of weight training exercises which will encourage the enhancement of explosive strength. The following list of exercises are among the best:

Assistance Exercises

PULLS FROM THE FLOOR (SNATCH & CLEAN	SHRUGS (VARIATION OF GRIP)
ROMANIAN DEAD LIFTS	HAMMER TWIST
PRESS BEHIND NECK (STANDING & SEATED)	PUSH PRESS (STANDING & SEATED)
SWING LEG SQUAT	STEP UP
HYPEREXTENSION	GLUTE HAM RAISE
OVERHEAD SQUATS	SINGLE LEG SQUAT

Full Lifts

SNATCH	FRONT SQUATS
POWER CLEAN	BACK SQUATS
SQUAT CLEAN	CLEAN & JERK

Plyometrics

Plyometrics refers to human movement that involves an eccentric (lengthening) muscle contraction immediately and rapidly followed by a concentric (shortening) contraction. This is often referred to as the stretch-shortening cycle. The phase between these two contractions is referred to as the amortization phase. Energy stored during the eccentric phase is partially recovered during the concentric phase. In order to best use this stored energy the eccentric phase must be rapidly followed by the concentric.

A sprinter's contact time on the ground is in the region of 0.0084 of a second and a high jumper may spend as little as 0.12 seconds on the ground at take-off. A great deal of force must be generated in this brief period of time. Through the correct use of plyometric exercises this rate of force development can be enhanced. High volume plyometric workouts will not enhance speed development. What are we trying to accomplish?

1. Shorten the time spent in the amortization phase
2. Decrease the time spent on the ground yet generate maximum force

Research shows that athletes involved in explosive strength types of sports such as track and field, spend very little time on the ground, yet generate a great deal of force.

Many authorities have attempted to standardize and categorize plyometric exercises and references are provided at the end of these notes for further research.

Words of Caution

1. Plyometric exercises are probably the most overused exercises generally in the training program. Overtraining the neuromuscular system can be very difficult to recognize and leads to problems.
2. In the highest volume of training, it is advisable to omit these exercises from the training program altogether and use speed sets in the weight program in preparation for the speed strength mesocycle.
3. Plyometrics are anaerobic activities and must be used as such as in weight training. Endurance involving aerobic work is serving no functional purpose.
4. The purpose of placing plyometrics in the training program is to enhance speed and rate of force production. This cannot be done in an endurance setting.
5. Use plyometrics activities and limit the use and work on speed of movement.
6. Many authorities have placed qualifications upon the use of plyometric training for example:
 - Anyone using plyometrics should first be able to squat 1.5 times their body weight.
 - Research tells us that children engage in plyometric activities all the time without this qualification, therefore the wisdom of the coach and close observation of the state of training of the athlete are prerequisites to the use of this type of training.

Weight Training and Plyometrics in Combination

Having described the type of weight training exercises involved (see examples) and having looked at the purpose of plyometric training, we now have the background knowledge to blend these training modalities. This blend of training should be used in the speed strength mesocycle in the specific preparation, pre-competition or competition phases of training.

Weight Training and Plyometrics

The neuromuscular system must be continually stimulated in anaerobic activities. Knowledge of bioenergetics and the neuromuscular system is yet another prerequisite to understanding the theory behind what you want to accomplish in a particular training period.

Weights

Step Ups	Back & Front Squats
Hammer Twists	Romanian Dead Lifts
Glute Ham Raise	Overhead Squats
Hyper Extensions	Pulls from the Floor
Power Clean	Press Behind Neck
Snatch	Push Press
Jerk/Nieder	Single Leg Squat
Flys	

Plyometrics

Hurdles Box Jumps, 30m Sprints	Hammer Twists (M, B,)
Russian Leg Curls	Glute Ham Raise (M. B.)
Overhead M. B.	Hyper Extensions (M. B.)
M. B. Backwards	Front Throw, Box Hurdles, Sprints
Wide Range One Hand Throws	Back Throw, Box Hurdles, Sprints
M. B. (Shot Put Action)	Angles Chest Pass, Shot + Discus Slings
Single Leg Kicks (M. B.)	Discus Slings
Double Leg Kicks (M.B.)	

REFERENCES

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