Scientific-methodological considerations for the implementation of new plyometric and ballistic training programs

1. Soft surfaces, being more associated with the production of maximal dynamic strength, can be used for the drop jump, when a greater emphasis on countermovement and jump height is sought and when short contact times are not required (DJs with countermovement or Depth Jumps).

2. Soft surfaces can be used for rehabilitation, during the plyometric preparation phase or general preparation phase of athletes, as the training in those phases does not require short ground contact times.

3. Soft surfaces can be more adequate during the first developmental phase of sprint acceleration, where more work on high-force production at relatively low speeds is sought, as well as for quintuple and deca-jumps in general preparation. In addition, they can be used with a wide variety of jumps which constitute the general preparation of top athletes.

4. During training on soft surfaces, athletes should be guided to eliminate heel strikes against the ground so that these are not transferred to hard surface work.

5. Hard surfaces are recommended to be introduced after working on soft surfaces.

6. Hard surfaces are associated with short ground contact times, and bouncing jumps with open knee joint angles.

7. It is recommended not to instruct the landing as “straight leg”. Substitute that instruction with “bouncing fast off the ground with the smallest possible knee angle” or a similar orientation.

8. Hard surfaces are more associated with the development of power, muscle stiffness and reactive strength, so they should be introduced gradually in specific preparation, and kept being used in the pre-competitive and competitive phases.

9. A wide variety of jumps that require short contact times and are primarily based on fast bouncing, can be introduced while training on hard surfaces, as long as metrics such as maximum power output, best reactive strength, etc., are being monitored.

10. Plyometric exercises with less rapid contact times, involving a countermovement and higher drop heights, aiming at producing maximal dynamic strength, increases in ground reaction forces or maximal eccentric force production, can be combined with general or maximal strength work. In this case, Depth Landings, Depth Jumps, Horizontal Drop Jumps, and jumping between high hurdles are recommended.

Ref: Montoro-Bombú, R., Sarmento, H., Buzzichelli, C., Moura, N. A., Gonzáles Badillo, J. J., Santos, A., & Rama, L. (2023). Methodological considerations for determining the volume and intensity of drop jump training. A systematic, critical and prepositive review. Frontiers in Physiology, 14, 1181781. https://doi.org/10.3389/fphys.2023.1181781

11. Plyometric exercises with more open knee and hip angles, fast contact times and optimal drop heights, used for the development of maximum power output production, RFD, and Reactive Strength, can be combined with power-oriented weight training work. In this case, exercises such as Tuck Jumps, Drop Jumps, and jumping between medium hurdles are recommended.

12. The combination of fast and slow plyometric exercises (rebounding and countermovement) can be introduced gradually in the stages of transition from general to special preparation or have a specific application during the preparation. For example, if plyometric jumps are used to reinforce maximum dynamic strength during special preparation, or the competitive or tapering phases, Drop Jumps can be combined with horizontal Drop Jumps or Depth Jumps.

13. To determine the level of experience of the participants in a plyometric training program, we recommend the use of the following equation:

Level of plyometric experience=A+B+C/2 /3 x D+E

14. The training intensity can be individualized by determining (evaluating) the optimal height for the highest power output, reactive strength, RFD, ground reaction forces, stiffness, reactive jump height, or other performance parameters.

15. Training programs for large groups of athletes should contain different drop heights so that each athlete can train according to his or her level of adaptation. In addition, this facilitates work organization as the group is distributed over several plyo boxes.

16. Training volume can be individualized using two strategies: a) monitoring the individual session so that each athlete does not increase ground contact times, or lose power output or reactive strength, while seeking to maintain the best values for a given metric. Alternatively, b) by establishing a percentage of performance loss compared to the best result in each metric. This ensures that the athlete can train with different performance orientations (as required by the coach), at the same time, it allows athletes to work according to their daily capabilities without having a pre-established number of sets or repetitions that can sometimes be excessive or inadequate.

17. The selection of the optimal drop height should be determined via a specific performance metric. For instance, plyometric training programs aiming at the improvement of maximum power production should establish the DJ fall height that maximize that metric.

18. For a correct execution of the drop, it is recommended that the athlete stands at the edge of the box (not in the center), determines a starting leg, directs the toe up and lets the body fall freely (without pushing forward).

19. We recommend that both the drop height and the training volume (sets and repetitions) should only be increased when real adaptations to the proposed training variables are observed.

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