Should Unstable Surfaces Be Used for the Development of Strength and Power?

Recently Researchers from Australia investigated the effects of performing squats on increasingly unstable environments. Fourteen active men performed three repetitions of back squats with three different resistances: 1) 10-repetition maximum (10-RM), 2) 40% of 10-RM, and 3) 20.45 kg. All squats were performed on a stable floor, a foam pad, and a half dome stability ball. When transitioning from a stable environment to a very unstable environment (ball) it was determined that a clinically significant decrease in squat depth and concentric force occurred when comparing the most unstable condition (ball) to the most stable condition regardless of resistance used. Additionally, the stable condition exhibited the highest movement velocities, while both of the unstable conditions resulted in significantly slower movement velocities. Based upon these results the authors concluded that the performance of squats on unstable surfaces most likely does not provide an optimal stimulus for strength and power training. Additionally, it was suggested that the use of instability devices in conjunction with resistance training is “mis-guided” for individuals attempting to optimize strength power gains. Thus the authors suggested that balance training should be separated from strength and power training.


Performing Push-ups on Unstable Surfaces Does Not Increase Muscle Activation.

The electromyographic (EMG) effects of performing various push-up exercises on an unstable (stability Ball) and stable surfaces (Bench) were recently compared by researchers from Canada. Ten male subjects performed pushups with feet or hands placed upon a stable bench or on a ball in order to determine if EMG activity of the scapulohoracic muscles (upper trapezius, lower trapezius, serratus anterior, and biceps) are affected by the type of surface. Additionally, various hand positions were evaluated. Interestingly there were no differences in EMG activity of the scapulohoracic muscles between the stable and unstable environments. Additionally, while no difference was noted between the conditions, placing the feet on either the ball or flat bench resulted in significantly greater EMG activity when compared to when the hands were placed on the ball or flat bench. The authors suggested that this study demonstrates that the use of a stability ball with this type of exercise does not result in a greater recruitment of “stabilizing muscles”. Thus suggesting that the type of unstable environment does not result in a greater muscle activation when compared to stable environments.


How does muscle activation compare between stable and relatively unstable environments?

Recently researchers from Brazil compared the electromyography (EMG) activity during axial load exercises on stable and relatively unstable environments. EMG activity was recorded from the biceps brachii, anterior deltoid, clavicular portion of the pectoralis major, upper trapezius, and the serratus anterior using surface electrodes during the performance of a wall-push up, a traditional push up, and a bench press exercise performed on either a stable or relatively unstable environment. The deltoid exhibited significantly greater EMG activation when performed on a relatively unstable environment regardless of exercise used. When looking at the pectoralis major and the serratus anterior, it was noted that there was no difference in EMG activation between the stable and unstable environments for both the wall push up and the bench press. However, the push-up when performed on a stable environment resulted in significantly greater EMG activation than the push performed on the unstable environment. Additionally, there was no significant difference between the EMG activation patterns during the push up or bench press for the trapezius or biceps brachii when performed on a stable or unstable environment. However, the trape-
zius appeared to exhibit a greater EMG activation pattern when performing the wall push up in the unstable environment. As a whole the data collected in this investigation demonstrate that performing exercises on unstable environments does not always result in greater muscle activation when compared to the same exercise performed on a stable surface.


How does a periodized resistance training regime affect accelerative sprint performance?

The development of strength appears to play a crucial role in sprinting ability. However, different types of resistance training regimes appear to result in alterations to different phases of a straight-line sprint. Prior to the beginning of this investigation all subjects (n = 16) participated in a four week familiarization period. After the familiarization period the subject were randomly divided into an experimental (n = 10) and a control (n = 6) group. The experimental group performed eight weeks of resistance training three times per week on non-consecutive days. The first mesocycle was a strength-endurance phase in which higher volumes of training were encountered with 12 repetition maximum (RM) loads. The second mesocycle was representative of a maximum strength and power phase of training and utilized sets of five performed at 5-RM loads. Sprint performance was measured before and after the eight weeks of training with the use of a 20 meter sprint test. Sprint time was recorded at 10 and 20 meters. Additionally, sprint performance was videotaped over the first and second 10 meters. The video was then analyzed for kinematic variables (flight time, stance time, stride length, and stride frequency). Finally, changes in lower body strength were assessed with the use of a 1-RM back squat test, while explosive strength was determine by measuring peak power output while performing loaded (30% 1-RM) and unloaded jumps on a force plate. The eight week resistance training program resulted in significant increases in maximal strength (+19%) and explosive strength (+6 – 10%). Conversely, both groups improved their sprint times (experimental = +7%; control = +4%). No significant differences were noted between the groups for stance time or stride length. Both groups exhibited a decrease in stride frequency after the eight weeks of training. While there were no significant differences between the groups, the authors suggested that the data may suggest that a delayed effect of resistance training on performance might occur. The sprint time improved by almost 3% more in the experimental group, and if the testing was conducted after a taper significance may have occurred. Therefore this data suggests that there is a time delay before muscular strength and power adaptations translate to sprinting performance.