

# ROCK CLIMBING TRAJECTORY: A GLOBAL VARIABLE OF ROCK CLIMBING PERFORMANCE

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## Purpose

The purpose of this study was to investigate the relationship between competitive climbing performance and the total length of the climbing trajectory (path traced by the centre of gravity). *Cordier et al. (1993 Int J Sport Psy, 24 370-378 and 1994)* identified a significant difference in the complexity of a climber's trajectory for two distinct climbing groups, average and elite. However, no studies have investigated complexity in order to differentiate performance in a group of elite performers. Since athletic performance is strongly dependent on choosing relevant areas of training, coaches and athletes need to know what are the 'winning' characteristics they should be training.

## Methods

A total of 4 competitive climbs from 2 national and 2 international leading competitions were analysed. 72 male ( $21.9 \pm 5.4$  years, mean age  $\pm$  S.D) competitive rock climbers took part in the study. Competitive climbing performance was generated by rank order of the resulting position (taken as the highest point achieved up the wall) from each competitive climb. A 2D unpanned digital video image of each climb was taken perpendicular to the climbing wall. Climbing trajectory was defined by the movement of a fixed point on the climber's back at waist level. Manual computerised motion analysis was carried out at 1 frame per second. Rock climbing performance was correlated against length of trajectory using Spearman correlation coefficient.

## Results

The mean climbing vertical height analysed for the 4 competitions was  $8.2 \pm 1.3$ m. There was a significant correlation between the length of trajectory and competition climbing performance in that better climbing performance was related to a shorter trajectory ( $P < 0.05$ ) for against was obtained for all 4 competitions. The average correlation coefficient was  $r_s = - 0.75 \pm 0.05$ .

## Conclusion

This research identifies length of climbing trajectory as an important predictor of competitive climbing performance in male rock climbers. Further work is required in order to ascertain what are the key components, which manifest this global variable. This simple climbing specific movement test may be used by coaches to assess an athlete's general movement and route finding capability.

factors contributing to climbing performance. Climbing involves sophisticated movements with complex biomechanics and the constant management of forces such as gravity, elastic recoil, torque and momentum. Its training therefore needs to be a rigorous, disciplined and sophisticated integrated movement practice that develops your full physical and mental potential. The Weakest Link Principle. One concept that still guides my approach to any kind of training and preparation, is the Weakest Link Principle that Dale Goddard and I first described in *Performance Rock Climbing* in 1993. Although performance represents the combined result of many different abilities, it is not the simple sum of them. Rock climbing is primarily a strength-based workout. That said, it also gets your heart pumping and burns some serious calories. In fact, a 155-pound person can burn around 600 calories per hour climbing. When comparing it to other workouts though, rock climbing is more like interval-based training since it produces more short anaerobic bursts of power compared to a cardiovascular workout like running or cycling that tends to produce a more steady and sustained heart rate. When it comes to rock climbing, the pros certainly outweigh the cons, but it's still worth noting some of the common concerns people express about the workout. Pros. Uncertainty in extreme sports performance environments, like rock and ice climbing, provides considerable psycho-emotional and physiological demands which challenge the acquisition of... Cordier P, Mendès-France M, Pailhoux J, Bolon P. Entropy as a global variable of the learning process. *Hum Mov Sci.* 1994;13:745-63. CrossRefGoogle Scholar. Rock climbing is generally broken down into three categories: sport climbing, traditional (trad) climbing, and bouldering. Climbers tend to specialize in or prefer one discipline over the others, though many climbers participate in all three. Sport climbing is a style of climbing where the leader attaches quickdraws to pre-existing bolts, looping the rope through the quickdraws for protection while ascending the cliff. Sport climbs are often one-pitch climbs where the leader then comes back to the ground after fixing the rope to the anchor, though in some cases these climbs might continue up larger faces for multiple pitches. As a discipline, sport climbing focuses on difficult movement, endurance, learning to face fears, and risking a fall (and being caught by the rope, of course!).