

EXECUTIVE FUNCTIONS AND SPORT CLIMBING IN ADOLESCENCE

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[Funzioni esecutive ed arrampicata sportiva nell'adolescenza]

ABSTRACT

The art of climbing is a skill we all possess; in fact, by climbing we have learned to get the upright position. Sport Climbing has become fully a recognized discipline at the Olympic level. The research aims to investigate the role of executive functions in young athletes, aged between 8 and 18 years, practicing Sport Climbing.

Key words: Executive functions, Sport Climbing, Tower of London, attention.

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Introduction

Climbing is one of the basic motor skills that already experiences in the acquisition of the upright position. A correct learning of climbing seems to be indispensable to the formation of complete, decided and balanced personalities^(1,2,3,4,5).

Sport Climbing is a form of natural climbing, since does not require the use of artificial tools for progression, and it can be carried out on both natural or artificial environments.

Each route in the wall must be provided with all the anchorages of safety (plates and chains) in order to allow the athlete of coupling of the safety rope through hooks. Sport Climbing, especially at a competitive level, consists of three different disciplines: Lead, Speed and Boulder.

It is evident that the successful performance requires the typical capability forming the executive functions, i.e. planning, problem solving and set shifting^(6,7,8,9,10).

The purpose of the present research was to investigate the efficacy of executive functions in young athletes, aged between 8 and 18 years, who practice sport climbing.

In particular, we wanted to investigate, for all ages, the relations between executive functions and performances with the aim 1) to design a training protocol capable of improving the performance during the race and 2) to determine the weight of executive functions at the moment of the choice of sport to practice^(11,12,13).

Materials and methods

The sample

The sample consisted of 40 adolescents aged between 6 and 18 years who practice sport climbing 3 times a week, following training speed and resistance in the gym "Etna Gym" a.s.d. of Nicolosi.

The Tower of London

The test of the Tower of London has been used to assess executive functions⁽¹⁴⁾.

The test assesses the ability of planning and problem solving and is especially suitable for subjects aged 4 to 18 years. The test requires three rods of different lengths in which are strung three balls of different colors (red, green and blue): by starting from an initial position, the subject must move the

balls one at a time, in the minimum number of moves, up to obtain the configuration indicated by the examiner.

The complete test consists of a series of twelve tasks with gradually increasing difficulty, in relation to the number of moves that must be performed for arriving at the solution.

The test is also used for clinical purposes to assess the level of skills impairment, such as planning, attention, strategic decision and efficient execution of a task, in patients with brain injury both anatomical, as in the case of traumatic brain injury^(14,15,16,17), and functional, as in the case of metabolic alterations observed in depression^(18,19,20), autism⁽²¹⁾, etc. ..

The alterations in the execution of this task are characterized by a slow and not accurate performance^(22,23). According to the theory of Shallice⁽¹⁴⁾, a deficiency in the frontal areas of the brain, involving in particular the prefrontal cortex, impairs the functionality of the Attention System Supervisor, so causing difficulty⁽²⁴⁾.

Result

Figure 1 shows, on the left, the results obtained by analyzing the number of moves performed by the three groups of climbers. As can be seen, under 12 climbers performed the test by using a number of moves significantly lower compared to the seniors ones. No significant difference was observed between juniors and seniors.

Figure 1 shows, on the right, the analysis of the decision time used by climbers to resolve the test; it can be seen that under 12 employed a total time significantly lower compared to seniors.

As shown in Figure 2, no significant differences between the three groups (under 12, juniors and seniors) were observed for the total number of correct answers (A), violations of the rules (B), execution time (C) and total time (D).

Discussion

The data obtained from the present research show a significant difference in the executive functions, evaluated with the Tower of London test, of young athletes practicing Sport Climbing for the number of moves for resolving the task and the time of decision making.

Surprisingly, the under-12 climbers used a lower number of moves compared to the junior and

senior climbers; moreover, under-12 climbers have employed less time for decision-making.

This would lead us to conclude that in these very young climbers the planning and problem solving capabilities are faster and more effective with respect to older climbers.

This suggests that younger athletes seem to have a great impulsivity in tackling the climbing wall and this impulsivity in these climbers appears to be less hampered by an overestimation of the possible disadvantages of their choices. The weight of this overestimation seems to increase with age, probably as the result of enhanced self-control obtained with training and learning.

Furthermore, it should be noted that the results of performance are higher just in the climbers who get the highest scores in the Tower of London test, so underlining that more efficient executive functions^(14,15,16,17,25,26,27) represent an indisputable advantage in Sport Climbing.

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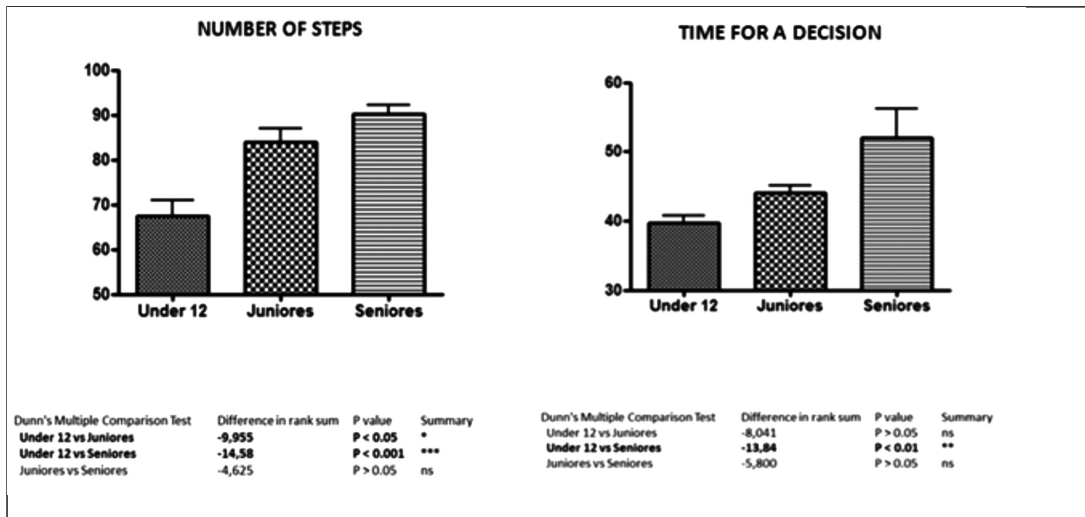


Fig.1: The number of moves and Time for a decision in the Tower of London

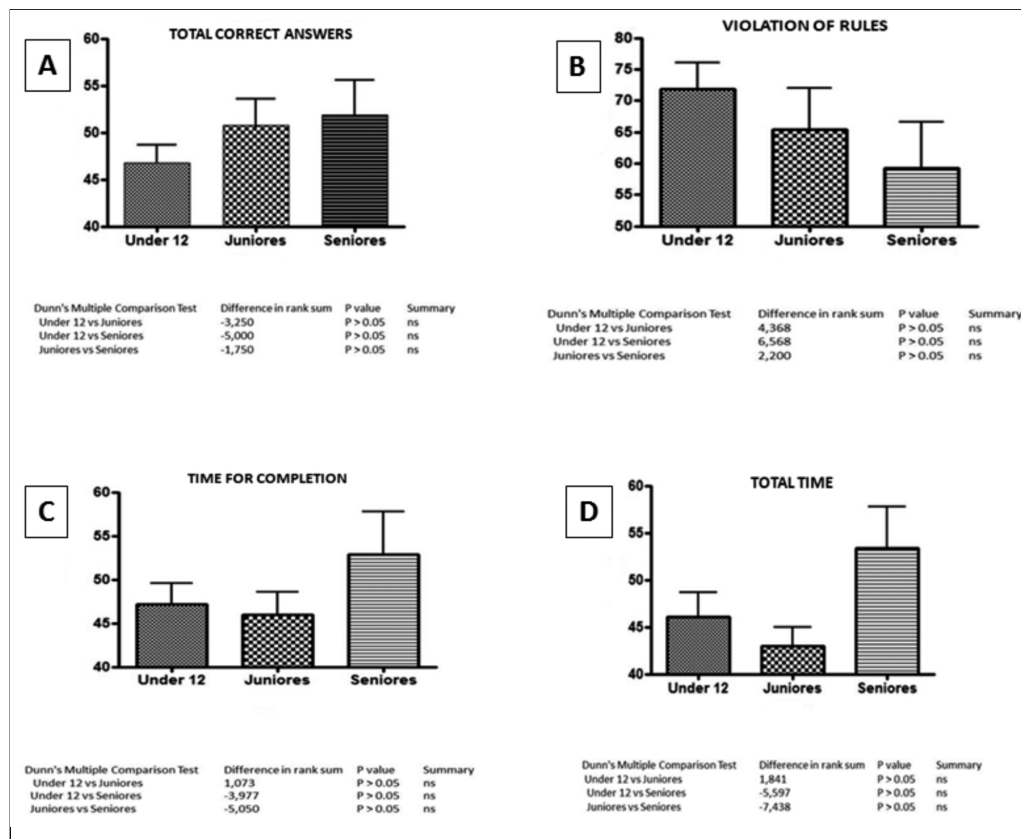


Fig. 2: Results of Tower of London

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