



UNIVERSITÀ
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DI PALERMO



SOME RELATIONSHIPS BETWEEN POSTURAL MEASURES AND COGNITIVE FUNCTIONS

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Introduction

Balance is a process determined by an integration of multiple afferent stimuli from visual, vestibular, stomatognathic and somatosensorial systems. These afferences produce a continuous response of the tonic postural system in order to control body stability during the spontaneous sway in standing position. The body's posture is also related with the plantar pressure and surface. Moreover, there are evidences of a link between body's posture and cognition.

The aim of the study was to explore the correlation between baropodometric and stabilometric measures and performance in cognitive tests.

Methods

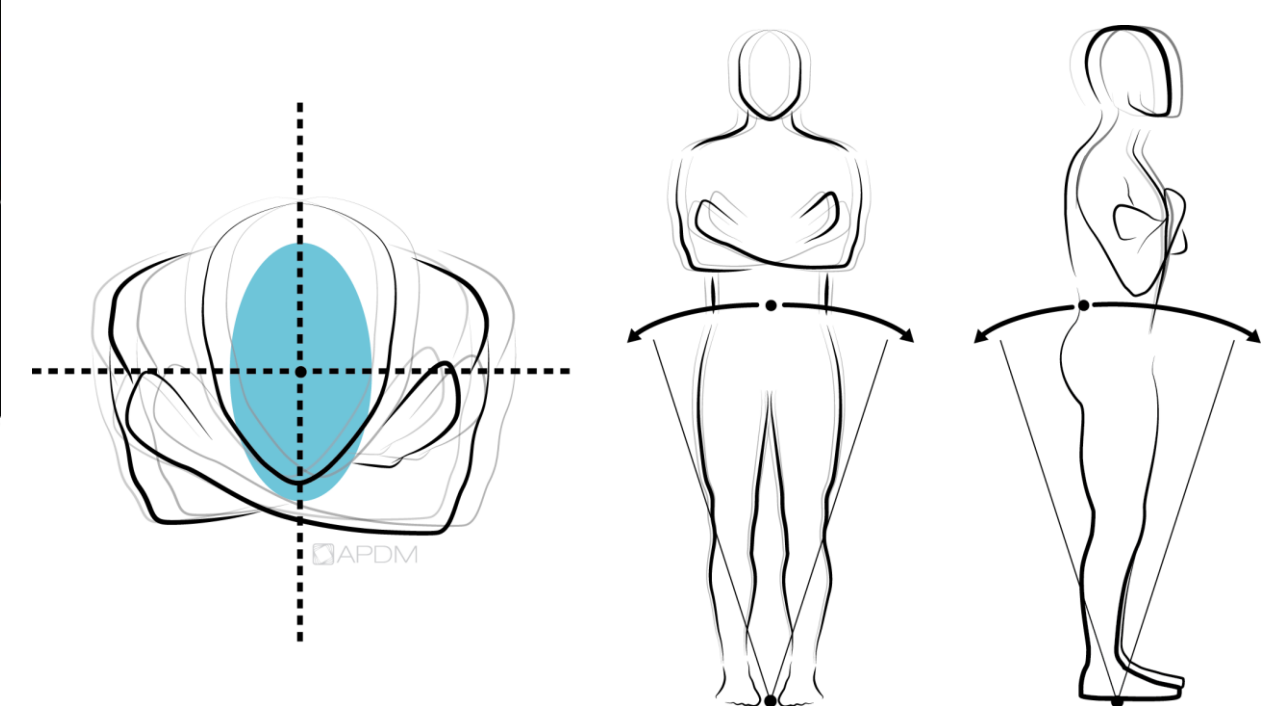
A sample of 42 healthy subjects (male: n=19; mean age: 25±3 years) took part in the study and were assigned in two groups according to their practice with sports: sedentary (SD, ≥3 consecutive years without sport activity) and sporty (SP, ≥3 consecutive years of sport activity). Subjects underwent to baropodometric and stabilometric assessments, with both Open Eyes (OE) and Closed Eyes (CE) conditions, as well as to a battery of cognitive tasks, including Corsi span, Digit span, Symbol Digit Modalities Test, Modified Five Point Test, phonemic and semantic fluency tests, Stroop test.

Results

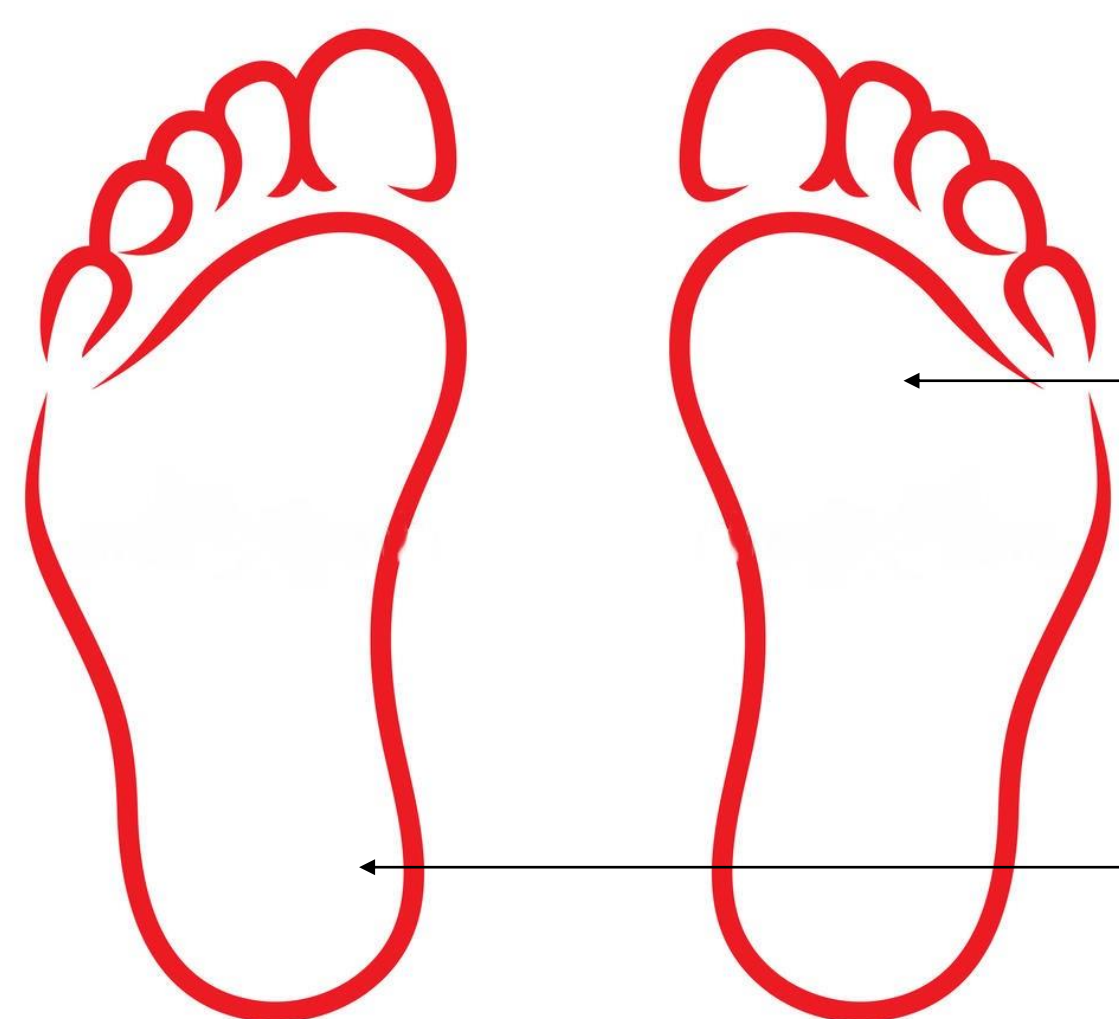
In SP subjects, mean sway Y (i.e. the mean distance between the extreme swings of the center of pressure in the sagittal plane; the lower its value, the more accurate the process of postural control) was negatively correlated with phonemic fluency test: $r = -.55$. In SD subjects, mean sway Y was negatively correlated with spatial span: $r = -.62$. On the other hand, significant positive correlations between plantar surface and performance in verbal working memory tasks were selectively found in SP subjects: both right and left forefoot surfaces were significantly correlated with scores at digit span task ($r = 0.57$ and $r = 0.60$ respectively).



Baropodometric platform and evaluation on software.

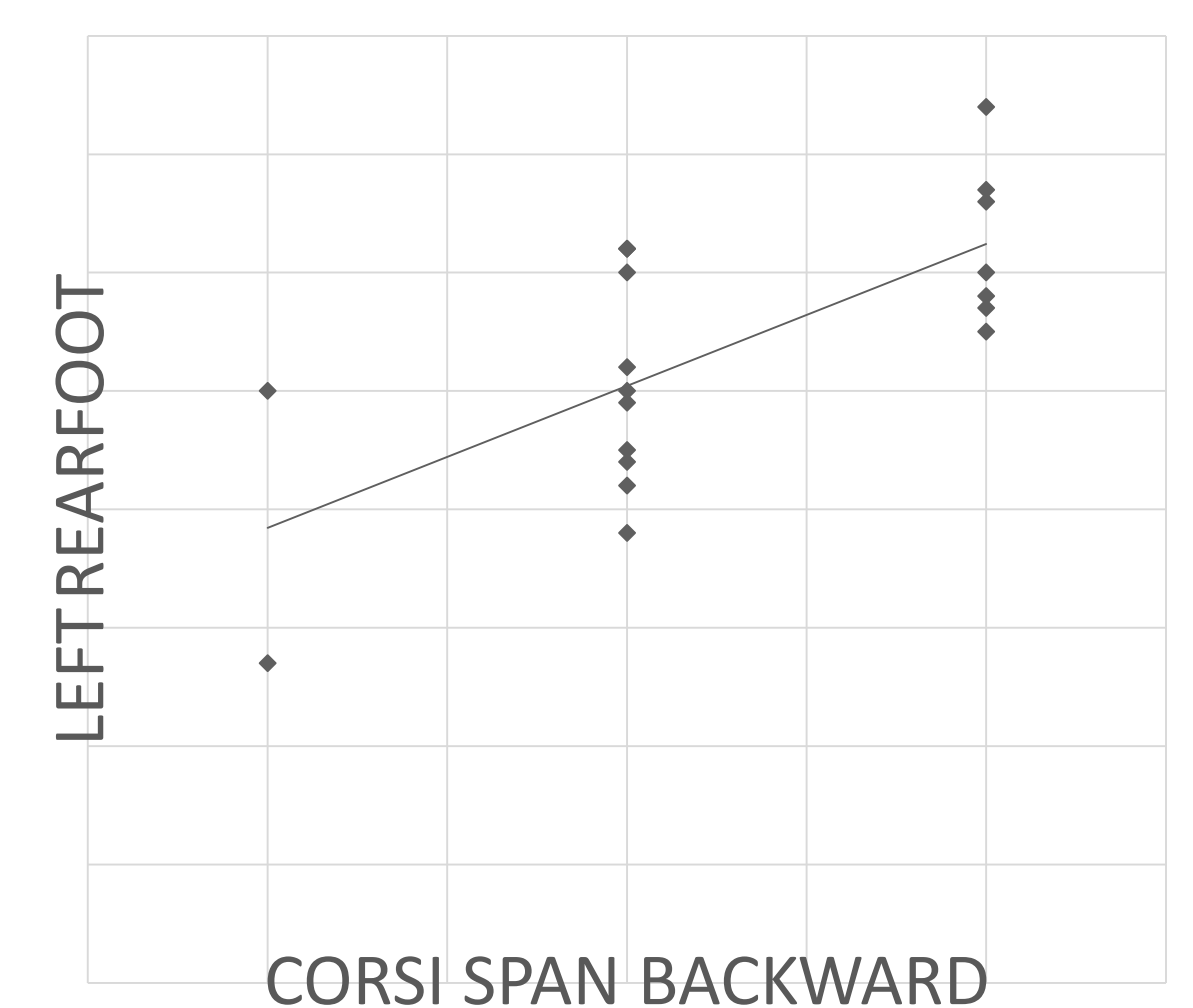
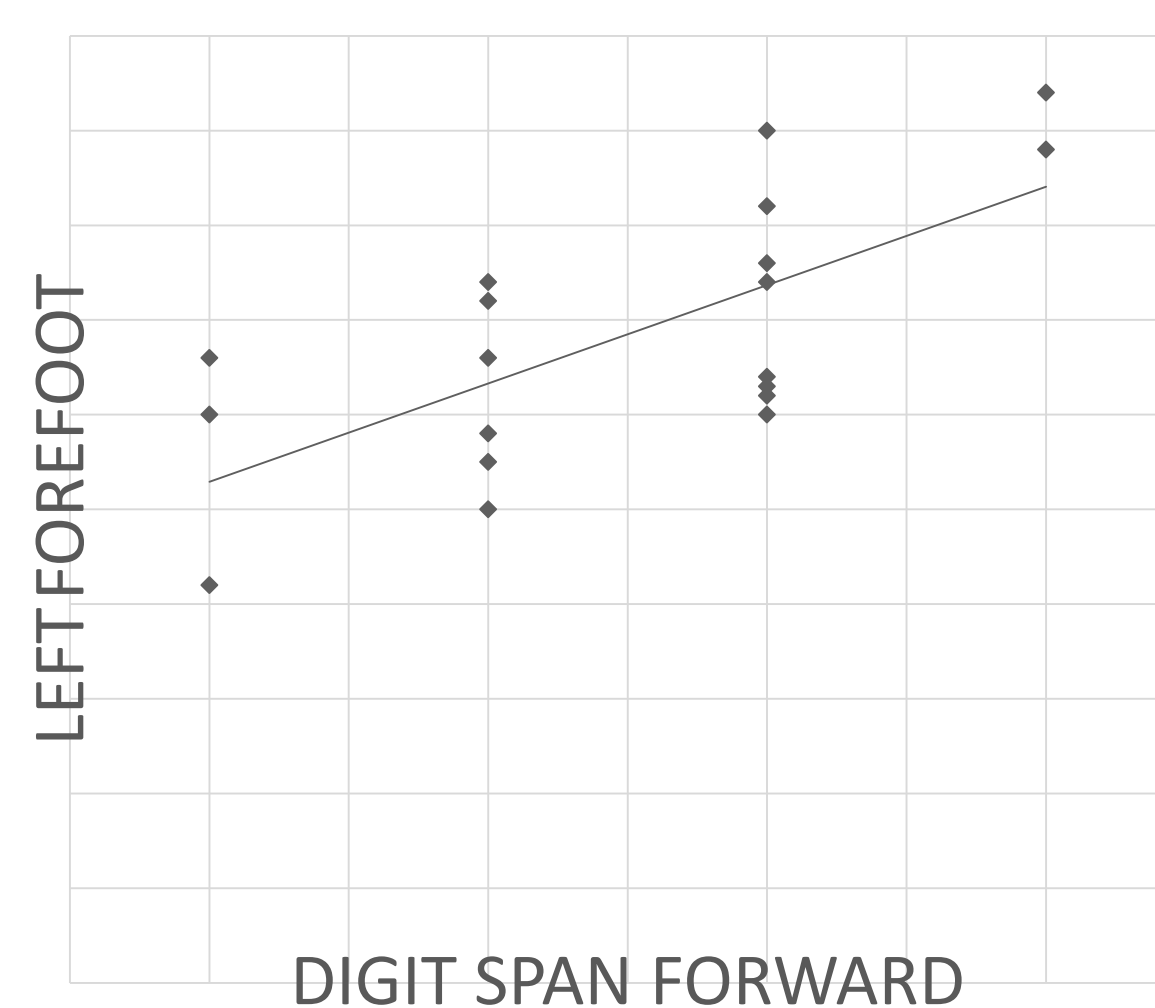


Stylized representation of human body sway.



Left and right forefoot are correlated to the score of Digit Span Forward

Left rearfoot is correlated to the score of Corsi Span Backward



Conclusions

These findings suggest that the more accurate the postural control is the greater is the performance in cognitive tasks measuring executive functions and verbal and spatial working memory. This suggests that executive functions contribute to postural control, with the two functions sharing partially overlapping neurofunctional networks centered in frontal cortices.