

Spatial Ability Differences in Athletes and Non-Athletes

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Abstract

Background: Cognitive processes, specifically spatial abilities, are responsible for integration of daily activities. Many factors contribute to the plasticity of the brain which, furthermore, alter the spatial ability. Physical activity, which can be further grouped into sport and exercise, is a modifiable factor that enhances the cognitive processes through a divergent mechanism. This study aimed to gain further understanding on whether sport differs from exercise in altering spatial ability in athletes and non-athletes.

Methods: This observational study compared the spatial ability score of athletes of Indonesia National Sport Committee (*Komite Olahraga Nasional Indonesia*, KONI) in West Java (n= 21) and non-athletes (n= 21). Sampling were performed using stratified random technique and data were collected between August and October 2015 which included spatial scores and demographic of subjects.

Results: The difference in spatial scores between athletes and non-athletes were not significant (p=0.432).

Conclusions: This study suggests an insignificant difference in spatial ability in athletes performing sport and non-athletes performing exercise. Hence, the cognitive component skills in sport experience do not alter the spatial ability. [AMJ.2016;3(4):533-7]

Keywords: Athlete, cognitive, exercise, spatial, sport

Introduction

Spatial ability is a subcategory of cognitive processes which affects various aspects of human's life. It is not of a definite value since it is formed by persistent changes occurred in brain neurones and involves more than one part of the brains. Many factors take part in the morphological changes of the brain, among them are sport and exercise which are parts of physical activities.^{1,2} Although they may seem similar, they affect the spatial ability through different mechanisms.

Exercise which is performed by non-athletes has long been supported by a lot of scientific evidence to increase the physical fitness, hence spatial ability.³ The mechanisms proposed include transient increase of brain-derived neurotrophic factor (BDNF) that promotes the plasticity of brain, increased hippocampal volume, and increased cardiovascular health, which in turn increases the VO2 max in the brain.^{2,4,5} Athletes performing sports, in addition to having physical fitness, are hypothesized to

be superior in cognitive skills than those who are sedentary. Although athletes are known to have "expert performance" or "narrow transfer" which leads to cognition expertise within a particular field, i.e. sports, limited knowledge is available on whether the "broad transfer" or "cognitive component skills" also occur and contribute to increased spatial ability of athletes outside the sport field.^{6,7,8}

This study aimed to further the knowledge on how sport differs from exercise in altering the spatial ability in general setting between athletes and non-athletes through spatial ability score measurement.

Methods

This was an observational study involving athletes and non-athletes recruited during the period of August to October 2015. Ethical approval was given by the Health Research Ethics Committee, Faculty of Medicine, Universitas Padjadjaran and informed consent was signed prior to participation in this study.

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