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Editorial

Editorial "Biomechanical Spectrum of Human Sport Performance"

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Abstract: Several parameters can influence our health capital today and can have a negative impact on our performance, whether physiological or mechanical. Indeed, our health and wellbeing are influenced by a range of social, cultural, economic, psychological, and environmental factors across our lives. These change as we progress through the key transition points in life—from infancy and childhood through our teenage years to adulthood, working life, retirement and the end of life. Sport can be a vector that links many of these factors. Whether it is high-performance sport or sedentary practice, sport is very important for the improvement of psychological wellbeing and physical health. Our overarching aim was to increase quality of life. Sedentary practice can increase mobility and reduce the risk of disease, so changing adults' behavior through sedentary practice could reduce illness and decrease costs to society concerning health problems. Furthermore, a higher frequency of practice can lead to improvements in technique and optimized performance. Our objective is to summarize the latest research in sport science and to quantify the most important parameters influencing human performance related to the health sciences for all age groups, throughout their lives.

Keywords: modeling and simulation in sport science; strength and conditioning; mechanical analyses of sports; sport medicine; injury in sport; human behavior; quality of life; applied science in musculoskeletal disorders

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The organization of a movement is regulated by the nervous system, which is subdivided into a central nervous system (CNS), composed of the brain (brain, cerebellum and brain stem) and the spinal cord, and a peripheral nervous system (PNS), composed of nerves that extend throughout the body. During voluntary movement, the cortical areas interact with the lower areas of the brain and spinal cord through the cortico-spinal motor pathway. The command is, therefore, generated in the CNS and then routed via the SNP to the muscle that generates the movement. The execution of a voluntary movement requires the coordination of several muscle contractions so that the movement performed corresponds to the desired movement and is adapted to the environmental situation in which it is performed. Motor control refers to the processes responsible for the preparation, organization and execution of this movement and refers to the coordinated organization of the individual's sensory-motor functions analysis. The analysis of movement by scientists back to antiquity (Hippocrates, 460-377; Aristotle, 384-322. . .) but the three-dimensional analysis of movement only began at the end of the last century with the work of the anatomist Wilhelm Braune and the mathematician Otto Fisher. These first works were devoted to the study of the march of the infantryman then required 8 to 10 hours of measurements and days of manual calculations, for the analysis of a movement. With the considerable developments in electronics and computer science, today's systems only take a few minutes to obtain the same type of results using biomechanical analysis. Biomechanics is, by definition, the study of the structure and functioning of living beings. It is based on the laws of mechanics and on the methods of the mechanic with the aim of knowing and understanding in order to exploit, improve or restore the functional capacities of humans. In fact, the results carried can be modelized with the aim to decrease experimentations and to understand better the complexity of this system. The complexity of the model required aims to replace the complicated visible with the simpler invisible depends on the aims of the analysis but also on the nature of the approach: kinematic or kinetic. Kinematics concerns the analysis of motion, whereas kinetics studies the forces that cause or result from it (for example, the reaction of the ground when walking). Different models can be considered, ranging from the human body represented by its center of gravity, to a model integrating both motor control and a musculoskeletal model of the human body. All the methods and the latest knowledge's have the same objective improve the human health, well-being and performance. Health is defined as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' [1]. This definition links health clearly with wellbeing. Moreover, health is a human right requiring physical and social approaches to be reached and maintained. In addition, wellbeing is highly related to a positive rather than neutral state, leading the health in being a desired positive aspiration. Health and wellbeing are influenced by a range of social, economic, cultural, psychological and environmental conditions to be considered along of the life. Exercise is a responsible key factor in maintaining the functional autonomy of the body and can contribute to the protection against undesirable situations. There are strong scientific evidences that lifelong exercise is associated with a longer health span, favoring the delay to the onset of several chronic conditions/diseases [2,3]. The relevance of the exercise against age-related risks for commitment of the health and wellbeing that lead to disease and disability is unquestionable [4,5]. Furthermore, sedentarism is associated with an elevated incidence, in various stages of the life, in particular during aging, of chronic disease such as cardiovascular disease, chronic respiratory disease, cognitive decline, metabolic syndrome, type 2 diabetes, and cancer [6–14]. Regular exercise, additionally, improves health and decreases the incidence of oxidative-stress-related disease [6]. Sport, as an activity involving exercises, can be a vector that links many of these factors. Whether sport is high-performance sport or sedentary practice, it is very important for the improvement of psychological wellbeing and physical health. Indeed, our overarching aim was to increase quality of life. Sedentary practice can increase mobility and reduce the risk of disease, so changing adults' behavior through sedentary practice could reduce illness and decrease costs to society concerning health problems. Furthermore, a higher frequency of practice can lead to improvements in technique, and optimized performance. The objective of this Special Issue published by the Applied Sciences Journal is to summarize the most important biomechanical parameters influencing human performance related to the health sciences for all age groups, throughout their lives. The clinical and experimental studies presented here demonstrate the relevance of the exercises considering the Biomechanical Spectrum of Human Sport Performance.

In this Special Issue, 26 manuscripts [15–40] were published after the procedure of selection. Interesting manuscripts aimed on the quantification of human performance and his optimization. We will find studies permitting to determine the discriminate parameters of human performance as well as the latest technologies with the objective to analyze and understand the complexity of human mechanics and his performance in the different daily life tasks. This ranges from the improvement of sports performance to the rehabilitation of patients after injury.

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