



# The Need for a Dynamic Systems Approach in Kinesiology Research

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## Commentary

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## Abstract

**Objective:** This submission addresses the need for the use of Dynamic Systems Theory (DST) in Kinesiology research across the sub-disciplines.

**Materials and Methods:** Theoretical discussion

**Results:** there is a need for a shift in Kinesiology research paradigms.

**Keywords:** Dynamic Systems Theory; Musculoskeletal system; Central Nervous System; Kinesiology

**Abbreviations:** DST: Dynamic Systems Theory

## Introduction

Dynamic systems theory is an attempt to understand and explain complex, nonlinear change over time [1-5]. Dynamic systems theory views human motor development as behavior that arises from the collective dynamics of contributing subsystems, including the central nervous system and the musculoskeletal system, and predicts that change may result when one or more control parameters are altered [1,6-8]. For example, these systems are thought to be dynamic, relational, and multileveled in nature [9]. Systems theory proposes that any new organization, or reorganization, of a system can only come about from perturbations that disrupt the stability of an older system [3,10]. These perturbations may include properties of the environment or the organism [11-13]. Specifically, they may include environmental surfaces and objects, gravity, the central nervous system, the musculoskeletal system, and the masses and length of the limbs [12,14].

The study of development from a dynamic systems perspective is still relatively [1,2]. Although human growth and developmental achievements may not have changed significantly over recent years, further study of the factors influencing growth, development, and performance is needed [15-17]. Movement is made possible by the musculoskeletal system [18]. This system provides the strength and structural stability that allows the body to generate movement. These movements or patterns must be coordinated dynamically with a flow of environmental events, requiring coordination between action and environment [18]. These patterns are controlled by a complex interaction between the central nervous system and psychological processes [19,20]. These patterns are achieved by combining conceptual information with perceptions regarding the environmental dynamics and the movements or patterns themselves [18]. Traditional approaches, such as information processing and maturational theories, have not satisfactorily explained the mechanisms of change underlying human development or performance [21]. While development tends to follow a sequential order, the timing and rate of development varies among individuals

[16,22]. A systems approach should allow researchers to look at how the many subsystems involved act together to impact performance and at the same time identify the subsystems where small changes may influence larger development or performance [1,23].

### Conflicts of Interest

There are no conflicts of interest associated with this submission. This work is the intellectual property of the co-authors alone.

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### Moral Guidelines for the Use of Human and Non-Human Animals in Research

No human or non-human participants were utilized in this submission.

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