Biomechanics of Physical Activity

Why Study Biomechanics of Physical Activity?

Biomechanics of physical activity is the study of the movements and the structure and function of human beings using the mechanical principles of physics and engineering. Through this knowledge, we can improve movement techniques, improve equipment, and prevent injury.

What Biomechanists Do

- Researcher
- Clinical biomechanist
- Performance enhancement specialist
- Ergonomist (industrial task analysis specialist)
- University professor

Biomechanics applies the mechanical principles of physics and engineering to the motion, structure, and functioning of all living systems. Biomechanists in the field of physical activity study how these principles affect human movement and the structure and function of the human body.
**Goals of Biomechanics of Physical Activity**

To Understand
- How laws of physics affect motion, structure, function
- Relationships between mechanical laws and movement techniques in order to improve performance
- Interaction between human user and the mechanics of equipment
- How to prevent injuries

**History of Biomechanics of Physical Activity**

Early Beginnings
- Aristotle
- Leonardo da Vinci
- Biomechanics applications begin late 1800s
- Posse and Skartrom: *kinesiology*
- Ruth Glassow
- World events shape biomechanics (WWI, WWII)
- 1950s: human factors design

**History of Biomechanics of Physical Activity**

Contemporary Biomechanics
- 1960s: conferences, organizations, graduate-level programs, Kinesiology Section (1965)
- 1970s: rapid expansion, sports med, dance “kinesiology” (biomechanics)
- Late 20th century: expansion, Americans familiar with biomechanics
- Research themes

**Research Methods: Movement Analysis Model**

State performance goal
- Consider influencing factors
- Understand motions and mechanics
- Determine relevant biomechanical principles and movement techniques
- Observe/measure
- Assess/evaluate
- Provide feedback
Applying Biomechanics Principles

- External forces: gravity, GRFs, friction, fluid resistance
- Internal forces
- Physical principles that shape movement
  - Law of Inertia
  - Law of Action–Reaction
  - Torque or moment
  - Propulsive forces and fluid forces

An important skill for a physical activity specialist, biomechanist, or allied-health rehabilitative specialist is to be able to choose the relevant mechanical principles that apply to the movement of interest or to a phenomenon occurring inside the body.

Biomechanical Instrumentation

- Motion measurement devices
- Instrumentation used to measure forces

Assessment and Evaluation

- Biomechanical profiles
- Profiling used for performance enhancement in sports
- Profiling used for rehabilitative and other purposes