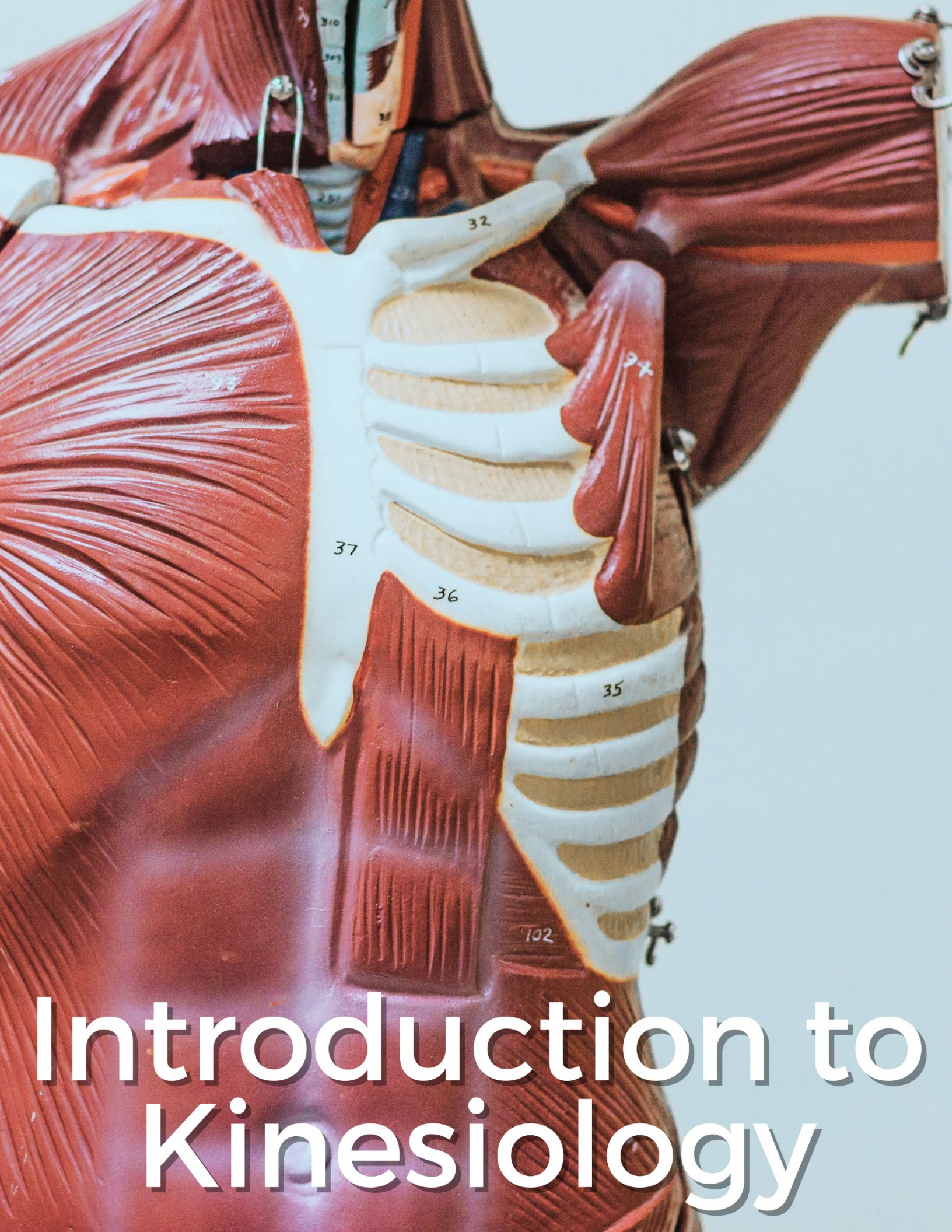

Introduction to Kinesiology

Introduction to Kinesiology

An Open Educational Resources Publication by College of the Canyons and Lemoore College

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Table of Contents

Chapter 1: Introduction to Kinesiology

OBJECTIVES

- Discuss the discipline of Kinesiology and its relationship to physical activity.
- Discuss Physical Activity and the impact it has on Kinesiology.
- Help you gain an understanding of what a profession and career pathways

Have you ever thought that kinesiology was solely about sports and exercise? Besides sports and exercise, do you know that there is a vast amount of career paths that benefit from knowledge gained through studying kinesiology? Options such as exercise physiologist, prosthetist, sports medicine, teaching, coaching, athletic trainers, and so many more jobs and opportunities are available in the field of kinesiology. Knowing what career path, you want to pursue will help guide you toward the education you need.

Kinesiology has many purposes in the future, especially how it involves the major that any person wishes to obtain. Making sure to stay up to date with methods, technology, software, and equipment, will help any professional stay motivated each day. Kinesiology encompasses not just a basic idea of how to teach or coach but an in-depth look into the reasons. From breaking down the movement of a throw to motivating a player to research, to management, kinesiology offers a variety of paths for the mind and body.

Kinesiology is the scientific study of human body movement. Kinesiology addresses physiological, biomechanical, and psychological principles and mechanisms of movement. Applications of kinesiology to human health include biomechanics and orthopedics; strength and conditioning; sport psychology; motor control; skill acquisition and motor learning; methods of rehabilitation, such as physical and occupational therapy; and sport and exercise physiology. Studies of human motion include measures from motion tracking systems, electrophysiology of muscle and brain activity, various methods for monitoring physiological function, and other behavioral and cognitive research techniques. The word comes from the Greek “kinesis”, movement, and “logos”, study.[1]

Kinesiology can connect to the major that you wish to obtain and help you to become a professional in your chosen field. Though the term “kinesiologist” is neither a licensed nor professional designation in the United States, nor most countries (except for Canada), individuals with training in this area can teach physical education, work as personal trainers and sports coaches, provide consulting services, conduct research and develop policies related to rehabilitation, human motor performance, ergonomics, and occupational health and safety.[2] Making sure to stay up to date with methods, technology, software, and equipment, will help

[1] Kinesiology. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Kinesiology
[2] Kinesiology. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Kinesiology

any professional stay motivated each day. Kinesiology encompasses not just a basic idea of how to teach or coach but an in-depth look into why. From breaking down the movement of a throw to motivating a player to research, to management, kinesiology offers a variety of paths for the mind and body. A bachelor's degree in kinesiology can provide strong preparation for graduate study in biomedical research, as well as in professional programs, such as medicine, dentistry, physical therapy, and occupational therapy.[3]

Continuing through this book will teach you all you need to know to get started in kinesiology and set you up for a successful future!

Figure 1.1: Disciplines of science and kinesiology focus on the topic of human physical activity[4]

[3] Kinesiology. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Kinesiology
[4] Image by College of the Canyons ZTC Team, references image by Angelina Lang

Physical Activity

Becoming physically fit and participating in physical activity are important, yet distinct, parts of achieving optimal health. Physical fitness is the ability to carry out daily tasks without getting too tired and with enough leftover energy to enjoy leisure-time pursuits. Physical activity is any muscle movement that increases energy expenditure including activity related to a person's job, transportation, leisure-time activity, and purposeful exercise. Participating in physical activity increases physical fitness.[5]

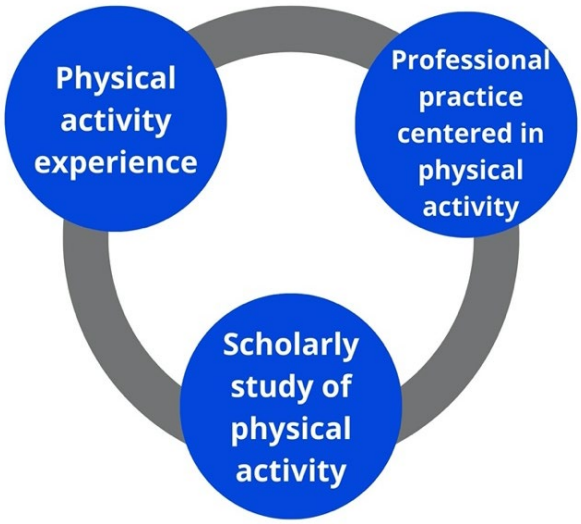

Figure 1.2: Interrelated sources of knowledge in Kinesiology[6]

Physical activity literacy begins with a clear understanding of the terminology utilized within the field. While some terms are used interchangeably, it is important to recognize the nuanced differences that exist in physical activity vocabulary.[7]

The term physical activity provides various definitions and offers a new and broader definition: "Physical activity involves people moving, acting, and performing within culturally specific spaces and contexts, and influenced by a unique array of interests, emotions, ideas, instructions, and relationships."[8] A simpler way to put this is that physical activity is any bodily movement that is produced by skeletal muscles and requires energy expenditure (calories "burned").

[5] Physical Fitness and Physical Activity. (2022, March 4). Retrieved from https://med.libretexts.org/@go/page/21171

[6] Image by College of the Canyons ZTC Team, references image by Piers Sullivan

[7] Kramer, E. (n.d.). 1.2 Physical Activity Terminology, in *A Guide to Physical Activity.* Retrieved from https://openpress.usask.ca/guidetophysicalactivity/chapter/1-2-physical-activity-terminology/

[8] Kramer, E. (n.d.). 1.2 Physical Activity Terminology, in *A Guide to Physical Activity.* Retrieved from https://openpress.usask.ca/guidetophysicalactivity/chapter/1-2-physical-activity-terminology/

Physical activity is often divided into four domains: Domestic/household, transportation, occupational, and leisure time.[9] Examples of the various domains of physical activity are as follows:

- **Domestic/household:** vacuuming, completing yard work, clearing the dishes
- **Transportation:** biking to work, walking to school, rollerblading to the store
- **Occupational:** lifting or hauling weights for work or engaging in exerting physical activity during a work-related task
- **Leisure-time:** physical activity that is completed in an individual's leisure time (i.e., swimming, jogging, hiking, dancing, participating in weight-training regimens, etc.)[10]

Factors Influencing the Kinds and Amounts of Performance Experiences

- Social environment
- Parents
- Peers
- Teachers and coaches
- Personal circumstances

Although we possess a unique facility for performing, planning, and implementing physical activity experiences, most of us are not inclined to explore this potential to the fullest. The people closest to you are major influences on the kind and amount of experience you have with a particular physical activity, especially when you are young. Often, our physical activity experiences-- and consequently, those in which we develop proficiency-- are determined by factors that lie outside our control, such as climate, regional culture, and economic considerations. After we have accounted for factors in our social and ecological environments that affect our decisions about physical activity, we are left to consider the indeterminable factors within us, such as our perceptions of ourselves, our competency in the activity, and the activity itself, that also may affect our decisions about physical activity.[11]

Experience Changes Our Capacity to Perform Physical Activity

The type of physical activity experience that brings about changes in skill is called practice. The relatively permanent effect of practice is learning. Physical activity experiences, known as

[9] Caspersen et al., 1985; Physical Activity Guidelines Advisory Committee, 2008
[10] Kramer, E. (n.d.). 1.2 Physical Activity Terminology, in *A Guide to Physical Activity.* Retrieved from https://openpress.usask.ca/guidetophysicalactivity/chapter/1-2-physical-activity-terminology/
[11] The Importance of Physical Activity Experiences. (n.d.). *Foundations of Kinesiology*. University of Alabama in Huntsville. Retrieved from https://sites.google.com/site/introductiontokinesiologyuah/the-importance-of-physical-activity-experiences

training, are employed to develop such performance qualities as muscle strength and endurance, cardiorespiratory endurance, or flexibility. The state of having developed these qualities is known as conditioning. Generally, practice without training, or training without practice, is an incomplete formula for developing excellence in sport. Training experiences that improve our general capacity for performing daily activities and preventing disease processes associated with low levels of physical activity are known as fitness activities.[12]

Exercise is defined as "a specific type of physical activity that is planned, structured, and repeatedly done to improve or maintain physical fitness."[13] Exercise is a subcategory of physical activity that is planned and structured. It involves repetitive bodily movement and is performed to improve or maintain one or more components of physical fitness (Caspersen, Powell, & Christenson, 1985; Centers for Disease Control and Prevention, 2015). Examples of this can be swimming, walking, jogging, aerobics, stationary machines, treadmills, or going for a bike ride. This can also include doing weightlifting at the gym using dumbbells or resistance bands.[14] Two broad categories of exercise include aerobic and anaerobic exercise which are discussed later in the book.

There is a long-standing perception that exercise is a strict activity that must meet a certain number of minutes or hours per day and must be performed in a gym setting. However, this is not the case. Exercise can be performed at any time of the day and not just at the gym. It is something you do when it is convenient for you, and many people now perform exercise during breaks, at lunch, after dinner, or whenever time permits.

Movement is defined as "the state of changing something's position —that is, changing where something is. A flying bird or a walking person is moving because they change where they are from one place to another."[15]

The variety of movements provided by the different synovial joints allows for a large range of body motions and gives you tremendous mobility. These movements allow you to flex or extend your body or limbs, medially rotate, and adduct your arms. Other movements include flexing your elbows to hold a heavy object against your chest, raising your arms above your head, rotating or shaking your head, and bending to touch the toes (with or without bending your knees). Examples of exercises include throwing, catching, walking, running, passing, and swinging.[16]

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[12] The Importance of Physical Activity Experiences. (n.d.). *Foundations of Kinesiology*. University of Alabama in Huntsville. Retrieved from https://sites.google.com/site/introductiontokinesiologyuah/the-importance-of-physical-activity-experiences

[13] Södergren, M., Sundquist, J., Johansson, SE. *et al.* Physical activity, exercise and self-rated health: a population-based study from Sweden. *BMC Public Health* 8, 352 (2008). https://doi.org/10.1186/1471-2458-8-352

[14] Kramer, E. (n.d.). 1.2 Physical Activity Terminology, in *A Guide to Physical Activity.* Retrieved from https://openpress.usask.ca/guidetophysicalactivity/chapter/1-2-physical-activity-terminology/

[15] Movement. (n.d.). In *Wikipedia.* Retrieved from https://simple.wikipedia.org/wiki/Movement

[16] Biga, L.M. et al. (n.d.). 9.5 Types of Body Movements, in *Anatomy & Physiology*. Retrieved from https://open.oregonstate.education/aandp/chapter/9-5-types-of-body-movements/

Dance is "a performing art… It is when people move to a musical rhythm. They may be alone or in a group." It can be performed at home, on a stage, with friends, or in a class. Dance has been performed in many cultures and goes back hundreds of years. Today, dance is used to express feelings and emotions and to promote and celebrate culture.[17]

Sport: Sport is defined as "a sort of game that requires physical activity and involves a degree of competition as, for example, baseball, soccer, bowling, or basketball."[18]

Sports are performed by all ages and at various levels from recreation to serious, professional competitions. A critical component of sports is being on a team. Kinesiology explores both the importance of sports and the impact of being on a competitive team, dealing with practice times, game schedules, knowledge of rules, sportsmanship, and working towards a goal with a group of people.

Vicarious participation in sports occurs when spectators imagine themselves performing the same activities as the athletes they are watching. Comprehensive knowledge of the players, rules, and competitive strategies adds to the enjoyment of watching sports, as do the feelings we harbor toward the participating teams. Enjoyment of activity is one of the greatest determinants of whether we continue to engage in that physical activity.

Academic Paths

As mentioned in the introduction of this chapter, knowing what career path you want to pursue will help guide you toward the education you need. In North America, kinesiologists may study to earn a Bachelor of Science, Master of Science, or Doctorate of Philosophy degree in Kinesiology or a Bachelor of Kinesiology degree. In Australia or New Zealand, kinesiology is often conferred as an Applied Science (Human Movement) degree (or higher). Many doctoral-level faculty in North American kinesiology programs received their doctoral training in related disciplines, such as neuroscience, mechanical engineering, psychology, and physiology.[19]

Associate's Degree Programs

A 2-year program may be appropriate preparation for an entry-level fitness or wellness job. Some, or all, of these credits, may be applied toward a bachelor's program. About half the course load covers general education courses, and the other half is major-related. Additionally, junior college students may have the opportunity to participate in an internship.

Bachelor's Degree Programs

Schools vary widely in their kinesiology programs depending upon the program's intent; some tracks are appropriate for aspiring secondary school fitness instructors, while others are geared toward aspiring research scientists. Teaching and internship opportunities may be available.

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[17] Dance. (n.d.). In Wikipedia. Retrieved from https://simple.wikipedia.org/wiki/Dance
[18] Sport. (n.d.). In Wikiversity. Retrieved from https://en.wikiversity.org/wiki/Sport
[19] Kinesiology. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Kinesiology

Graduate Programs

Advanced studies in kinesiology are appropriate for aspiring scientists, therapists, and sports professionals. Studies move past the mechanical and into the body's neurological, biochemical, and physiological sciences. Psychological factors and behavior related to sports and exercise are also explored. Master's degree students may choose from thesis and non-thesis program options, while Ph.D. students typically need to participate in research projects and complete a dissertation.

Kinesiology is a broad field of study, and many programs may offer specific areas of focus. It is important to consider long-term career goals, opportunities for specialization, and whether graduate studies are an option when selecting a kinesiology program.[20]

[20] Kinesiology Colleges, Universities and Schools in the U.S. (2021). *Best Accredited Colleges*. Retrieved from https://bestaccreditedcolleges.org/articles/kinesiology-colleges.html

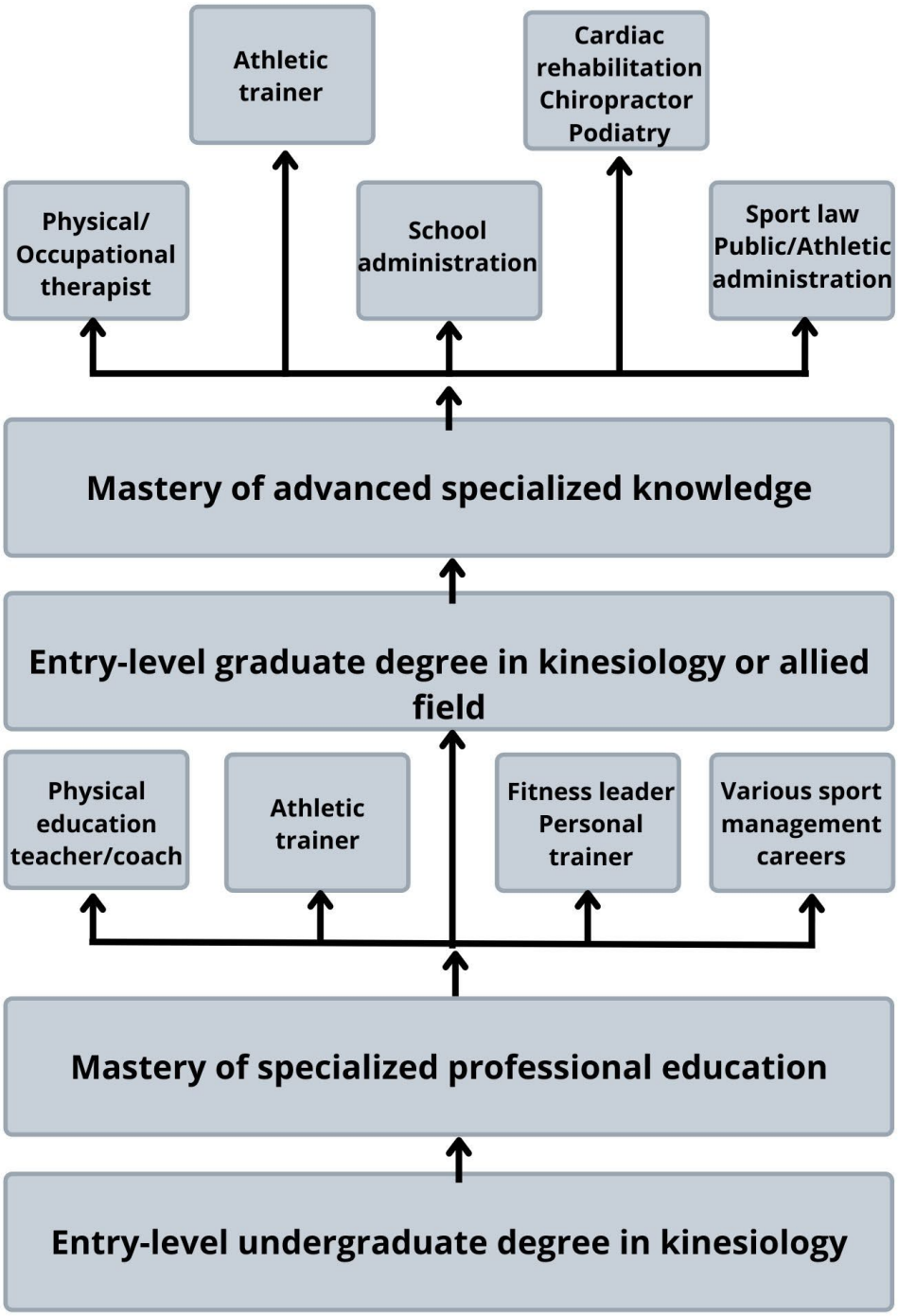

Figure 1.3: Pathways of kinesiology[21]

[21] Image by College of the Canyons ZTC Team, references image

Various Kinesiology Websites to Know[22]

- American Kinesiology Association: https://www.americankinesiology.org/
- Kinesiology Network: https://www.kinesiology.com/kinesiology/
- International College of Applied Kinesiology: https://www.icak.com/
- Academy of Systematic Kinesiology: www.kinesiology.co.uk
- Physical Activity, Division of Nutrition, Physical Activity and Obesity of the Centers for
- Disease Control and Prevention: www.cdc.gov/physicalactivity
- Physical Activity and Health: A Report of the Surgeon General: www.cdc.gov/nccdphp/sgr/pdf/execsumm.pdf
- SHAPE America: www.shapeamerica.org
- National Association for Kinesiology in Higher Education: www.nakhe.org
- Medical Career Training: www.medical-career-training.com/kinesiologist.htm
- American Heart Association Physical Activity: www.heart.org/HEARTORG/GettingHealthy/PhysicalActivity/StartWalking/American-Heart-Association-Guidelines_UCM_307976_Article.jsp
- American College of Sports Medicine: https://www.acsm.org/
- Centers for Disease Control and Prevention: https://www.cdc.gov/

Introduction: eSport

eSports has been defined as "an organized and competitive approach to playing computer games." The scale of esports competitions can range from small competitions organized between friends to international events with millions of dollars in prize money at stake. In 2020, the esports industry reached a value of more than USD 1 billion and was projected to grow 15.7% per year.

All esports are video games, but not all video games are esports. The defining feature of esports is the competitive nature of the video game. eSports are video games specifically designed with competition in mind. Video games, on the other hand, are leisure activities designed to entertain. eSports competitions at the highest level often have live events, cash prizes, and online/in-person viewership. Although extensive research into video games' health and physical activity has been conducted, limited studies have examined this relationship in eSports.[23]

Hundreds of millions of players are engaged daily in virtual and competitive electronic gaming—eSports. Whether playing these games or just being a fan, eSports enthusiasts have proliferated worldwide. According to Newzoo, a market tracking company, 427 million people will be watching eSports by 2019 and will reach a global audience of 1.1 billion by 2021. Player

[22] Web sites: Recommended: Kinesiology/PE. (2022). *Anderson University*. Retrieved from https://andersonuniversity.libguides.com/c.php?g=118933&p=775825

[23] Trotter, M. G., Coulter, T. J., Davis, P. A., Poulus, D. R., & Polman, R. (2020). The Association between Esports Participation, Health and Physical Activity Behaviour. *International Journal of Environmental Research and Public Health*, *17*(19), 7329. MDPI AG. Retrieved from http://dx.doi.org/10.3390/ijerph17197329

earnings from sponsorships and prizes exceed $1.5 billion. In recent months, competitive gaming (eSports) has received a large amount of social media and public attention. 90% of children in the USA play electronic video games regularly. The IOC on 28 October 2017 in Lausanne, Switzerland, accepted that eSport was an official sporting activity. Viewership is so high for certain games (such as League of Legends) that it has bypassed the Major League World Series. These competitions are aired on YouTube or streaming sites. The most widely known is 'Twitch.com' which accounts for >40% of esports streaming volume. Twitch was purchased by Amazon in 2014 for $970 million.[24]

Colleges, universities, and high schools are adding eSports teams at a rapid pace. It is appealing for a school because it attracts a different type of student than the prototypical athlete image. In South Korea, universities classify eSports competitors as traditional athletes. In the US, over 50 colleges have varsity eSports teams under the National Association of Collegiate Esports (NACE). Twenty-two colleges in the US currently offer scholarships for gaming. In the fall of 2018, high schools across the United States launched a competitive varsity. Undergraduate programs have been created and offered in the industry of esports. The NCAA is currently investigating esports as a recognized sport. In 2018, the National Basketball Association developed the NBA's 2K League which consists of a group of 17 franchises affiliated with NBA teams that play electronic basketball. This league gets aired on ESPN sports channels and has drafts like professional basketball.[25]

[24] DiFrancisco-Donoghue J, Balentine J, Schmidt G, et al. (2019). Managing the health of the eSport athlete: an integrated health management model

[25] DiFrancisco-Donoghue J, Balentine J, Schmidt G, et al. (2019). Managing the health of the eSport athlete: an integrated health management model

Chapter 1 Resources

Biga, L.M. et al. (n.d.). 9.5 Types of Body Movements, in *Anatomy & Physiology*. Retrieved from https://open.oregonstate.education/aandp/chapter/9-5-types-of-body-movements/

Dance. (n.d.). In Wikipedia. Retrieved from https://simple.wikipedia.org/wiki/Dance

DiFrancisco-Donoghue J, Balentine J, Schmidt G, et al. (2019). Managing the health of the eSport athlete: an integrated health management model. BMJ Open Sport & Exercise Medicine;5:e000467. doi: 10.1136/bmjsem-2018-000467

Kinesiology Colleges, Universities and Schools in the U.S. (2021). *Best Accredited Colleges*. Retrieved from https://bestaccreditedcolleges.org/articles/kinesiology-colleges.html

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Södergren, M., Sundquist, J., Johansson, SE. *et al.* Physical activity, exercise and self-rated health: a population-based study from Sweden. *BMC Public Health* 8, 352 (2008). https://doi.org/10.1186/1471-2458-8-352

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Trotter, M. G., Coulter, T. J., Davis, P. A., Poulus, D. R., & Polman, R. (2020). The Association between Esports Participation, Health and Physical Activity Behaviour. *International Journal of Environmental Research and Public Health*, *17*(19), 7329. MDPI AG. Retrieved from http://dx.doi.org/10.3390/ijerph17197329

Websites: Recommended: Kinesiology/PE. (2022). *Anderson University*. Retrieved from https://andersonuniversity.libguides.com/c.php?g=118933&p=775825

Chapter 2: Philosophy of Physical Activity

OBJECTIVES

- Learn about how philosophy ties into Kinesiology

Overview

Before we can begin exploring the concepts in this chapter, we must first understand the meaning of philosophy. What is philosophy? Many possible definitions have been offered to answer this question, and most are angling at something similar. The definition that will be utilized throughout this text is that philosophy is all rational inquiry except science. Philosophy commonly explores concepts such as existence, reality, and knowledge and asks questions about the limits of human inquiry. The scientist who neglects philosophy runs the same risk of ignorance as the philosopher who neglects science.[26]

Pedagogy, the method by which teachers or coaches teach theories, concepts, and movements is included in college-level physical education curricula. It is important to understand the method of how things are explained and why that method is used. It is the development of how to become a good teacher or coach. An Olympic heptathlete may be a phenomenal athlete but without pedagogical education, they may not be a good coach to upcoming athletes because they cannot accurately or efficiently transfer knowledge to their students. Content knowledge and usually experience playing the sport are also critical for the ability of a teacher to teach. In upper-division college pedagogy classes, much of the class time is spent actively playing sports to allow future teachers the experience to understand and adjust drills or sports rules to allow for learning in their classes. If a person has never played lacrosse, it will be hard for them to design a lesson to teach a student how to throw a lacrosse ball using a lacrosse stick. This activity content knowledge becomes even more important when a teacher needs to adjust or modify standard drills quickly to account for students struggling with the concept or picking up the skills quickly.

Physical Education was first deemed an academic discipline in 1964 by Franklin Henry for collegiate study, but the inclusion of physical activity and education in an academic school setting dates back to at least 386 BC. Plato included physical lessons on wrestling and boxing at his school Akademia starting at age 7.[27]

[26] Skuster, M. (2020). An Introduction to Philosophy, Second Edition. *OER Commons*. Retrieved from https://www.oercommons.org/authoring/60912-an-introduction-to-philosophy-second-edition/2/view
[27] Titus, W (2024). Physical Education and Pedagogy. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/98751

There are many different types of philosophies; for example, Metaphysicians are in the business of exploring the realm of possibility and the nature of reality. They are explorers of logical space and attempt to better understand how various claims about reality logically hang together or conflict.[28] While Epistemologists are concerned with the nature of knowledge and justified belief. Even if we lack absolute and certain knowledge of many things, our beliefs about those things might still be reasonable or more or less likely to be true given the limited evidence we have. Another form of philosophy is ethics. Ethics is concerned with what we ought to do, how we ought to live, and how we ought to organize our communities. So, we might think of metaphysics as concerned with "What is it?" questions, epistemology as concerned with "How do we know?" questions, and ethics as concerned with "What should we do about it?" questions.

Philosophical issues are as diverse and far-ranging as those we find in the sciences. However, they can also be smaller, more intimate, and personal.[29] A personal philosophy is a guiding principle that is embedded into one's belief system and helps influence the outcomes of reality. To better understand your philosophies, consider what motivates you and what thoughts influence the actions that you take.

In the field of kinesiology, having a personal philosophy will help you share your values and areas of emphasis. Consider the following questions:

- What is important to you about your career choice?
- What value does it hold for you?

Keep in mind that your philosophies are usually guided by your present values that have been derived, in part, from what you believe about reality.

Notable Philosophies in Kinesiology

Materialism

In philosophy, **materialism** holds that all things are composed of material, and intangible phenomena, such as consciousness, are the result of material properties and interactions. The term *materialism* can also refer to concern over material possessions, wealth, and regard for worldly concerns.[30]

[28] Skuster, M. (2020). An Introduction to Philosophy, Second Edition. *OER Commons*. Retrieved from https://www.oercommons.org/authoring/60912-an-introduction-to-philosophy-second-edition/2/view
[29] Skuster, M. (2020). An Introduction to Philosophy, Second Edition. *OER Commons*. Retrieved from https://www.oercommons.org/authoring/60912-an-introduction-to-philosophy-second-edition/2/view
[30] Materialism. (n.d.). In Wikiquote. Retrieved from https://en.wikiquote.org/wiki/Materialism

Dualism

This philosophy covers many different aspects of dualism, but a dualism concept that is crucial for kinesiology is the supposed opposition of body and mind.[31]

Since ancient times, the body and the mind have been looked at as opposing entities. However, at the beginning of the 20th century, this idea was subject to increasing criticism and was claimed to be a fatal separation in education by Dewey. “I do not know of anything so disastrously affected by the tradition of separation and isolation as is this particular theme of body-mind” (Dewey, 1928, p. 5). In Dewey’s view, mind-body dualism is a central misunderstanding of learning. It is less of a theoretical problem than grounded in the educational practice itself because, for Dewey, ideas are not statements of what is or was but statements of what can be put into practice. Furthermore, the mind-body dualism also contradicts current concepts, for example, the capability of acting and, in terms of physical education, the emphasis on competencies. Ideas and thoughts are basically without value if they do not turn into action. These, however, only originate from “being in the world” and, for this reason, demand a physical presence.

Thinking of the mind and body as separate entities indicates that mental processes happen before one acts physically. However, this concept excludes creative and reflective activity from the performed action itself. Applying the idea that the mind and body are mutually exclusive better explains certain phenomena commonly seen in sports and physical activity, such as split-second decisions that require simultaneous cognitive and physical action (Csikszentmihalyi & Csikszentmihalyi, 1975).

Holism

Holism (from Greek ὅλος *holos* "all, whole, entire") is the idea that various systems (e.g. physical, biological, social) should be viewed as wholes, not merely as a collection of parts. The term “holism” was coined by Jan Smuts in his 1926 book *Holism and Evolution*.[32]

The exact meaning of “holism” depends on context. Smuts originally used “holism” to refer to the tendency in nature to produce wholes from the ordered grouping of unit structures. However, in common usage, “holism” usually refers to the idea that a whole is greater than the sum of its parts. One example of holism is in the context of holistic nursing, where “holism” refers to an assessment of a person's health, including psychological and societal factors, rather than only their physical conditions or symptoms. Some religious institutions practice a holistic dietary and health approach, such as Hinduism and the Seventh-day Adventist Church. In “Philosophy of Science,” logical holism is the concept that a theory can only be understood in its entirety.

[31] Messmer, R. (2018). What is the subject matter of physical education?. *Ger J Exerc Sport Res* **48,** 508–515 https://doi.org/10.1007/s12662-018-0531-2

[32] Holism. (n.d.). In Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Holism

Axiology

Axiology, or the study of values, examines the ethical dimensions of physical activity. Movement is often guided by values such as fairness, respect, and perseverance, which shape how individuals approach physical activity and interact with others. While we discuss these values in the context of sport, it is important to recognize that ethical concerns also arise in broader physical activity settings. For example, high-profile cases of unethical conduct, such as the misuse of performance-enhancing substances, highlight the tension between success and integrity. Ethical questions also emerge in physical education and fitness programs: How do we balance the pressure to achieve goals with the need to foster enjoyment and inclusivity? Professionals must reflect on these values to create environments that prioritize personal growth, well-being, and ethical behavior. Programs like Girls on the Run and adaptive sports initiatives illustrate how ethical principles, such as fairness and accessibility, can shape real-world efforts to promote physical activity equitably.[33]

Research Methods

Pragmatic philosophy deals with experiences and how personal values are created. There are two prominent ways in which beliefs about reality and one's values are established: Inductive and deductive reasoning.

Inductive reasoning is reasoning in which the premises seek to supply strong evidence for (not absolute proof of) the truth of the conclusion. In this type of reasoning, the truth of the conclusion of an inductive argument is probable, based upon the evidence given, and assumes the uniformity, lawfulness, or repeatability of the course of nature. The premises of an inductive logical argument indicate some degree of support (inductive probability) for the conclusion but do not entail it; that is, they suggest truth but do not ensure it. An example within the subject of physical activity would be that lifting weights can improve a football player's performance.[34]

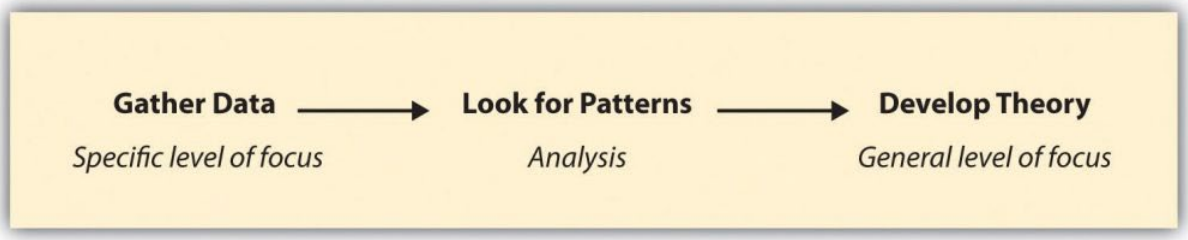

Figure 2.2: Inductive approach[35]

Researchers taking a **deductive approach** will start with a compelling social theory and then test its implications with data. In other words, they utilize the same steps as inductive research,

[33] Runk, L (2024). Philosophy and Activity. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99870
[34] Inductive Reasoning. (n.d.). In Wikiquote. Retrieved from https://en.wikiquote.org/wiki/Inductive_reasoning
[35] Image from Scientific Inquiry in Social Work by Matthew DeCarlo is licensed under CC BY-NC-SA 4.0

but they will reverse the order, moving from general to more specific levels. The deductive research approach is most associated with scientific investigation. The researcher studies what others have accomplished or published existing theories of whatever phenomenon they are studying, and then tests hypotheses that emerge from those theories. For example, one might imagine soccer through altered forms and, through a deductive approach, determine if it constitutes the same game.[36]

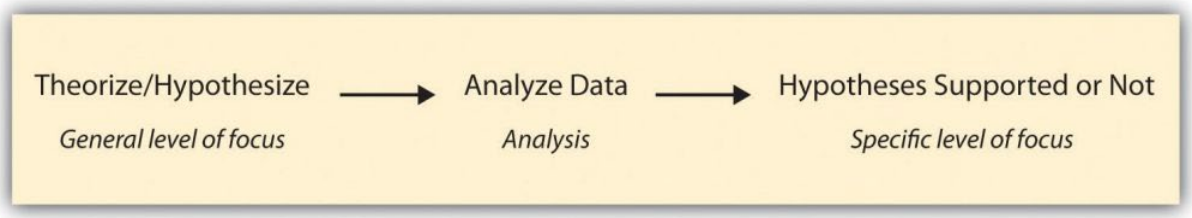

Figure 2.3: Deductive approach[37]

Incorporating Philosophy in Physical Education

The role of public education is to develop well-rounded, knowledgeable individuals by providing young students with common knowledge, appropriate social and emotional skills, and life survival skills. Common knowledge is progressively built up through the complete k-12 curriculum, and social and emotional skills are learned through proper behavior and conformity to the established norms and rules within public education. Public education aims to teach students about respect for themselves, their bodies, and other people. Additionally, with many students not matriculating to college programs, it is essential to prepare each student by equipping them with the necessary life survival skills to succeed, whether they go to college or start working directly out of high school.

A physical educator's philosophy, about their profession, is not only important but also vital. A philosophy is supposed to be a blueprint for the way a person is to conduct themselves. If a philosophy is not supported by action, then it is worthless. For example, in coaching, it is important to facilitate a fun and safe learning environment that encourages both hard work and enjoyment. If students are bored their brains start to wonder and lose focus on what they are being taught.

Here are some broad examples of philosophies in teaching physical education:

- In physical education, individuals will learn to complete a variety of movements.
- Taking into consideration all developmental capabilities and disabilities, physical education should teach everyone how to find success in their movement forms.
- This may encourage the continuation of lifelong and safe physical activities.

[36] DeCarlo, M. (n.d.). 6.3 Inductive and Deductive Reasoning. In *Scientific Inquiry in Social Work*. Retrieved from https://scientificinquiryinsocialwork.pressbooks.com/chapter/6-3-inductive-and-deductive-reasoning/

[37] Image from Scientific Inquiry in Social Work by Matthew DeCarlo is licensed under a CC BY-NC-SA 4.0

- Physical education will teach core concepts that will benefit students throughout their entire lives.
- These concepts should be taught at the student's level of understanding matching age and body developmental milestones.
- Physical education is not just for school, it is a way of life.
- Teaches that an active lifestyle outside of the classroom setting is important to overall health.
- Students need to know the health benefits of prolonged physical fitness.
- Fitness and staying healthy coincide with each other.
- Social and teamwork skills are also taught through physical education.
- Tolerance, cooperation, and respect for rules are all taught through physical activities and sports.
- Respect for one's differences and others' differences.
- Cultural competence
- Self-advocacy and self-esteem are important life lessons taught through physical education.
- Students develop the awareness that physical activity will challenge both the mind and the body.
- Learn to trust themselves and their teammates.
- Physical education can help to teach about self-fulfillment and self-expression.
- Physical education encourages well-rounded lifestyle choices and the enjoyment of physical activities.
-

Ethical Obligations

Philosophers such as Thomas Hurka emphasize the ethical obligations of promoting healthy lifestyles, particularly in addressing barriers to participation. Ethical considerations in physical activity center on principles of equity, autonomy, and inclusivity. Socioeconomic status, gender, disability, and cultural background often influence individuals' access to movement opportunities, highlighting the need for fairness in physical education and health promotion. Programs like Play Streets exemplify efforts to address these barriers by transforming urban roadways into safe spaces for free play and community-based activities. These initiatives remove obstacles related to cost, safety, and accessibility, empowering underserved populations to engage in physical activity. Similarly, adaptive programs such as the Paralympic Games and initiatives like the Girls in the Game program in Chicago ensure that individuals with disabilities or from marginalized backgrounds have equitable opportunities to participate. Such programs reflect the philosophical commitment to fairness, demonstrating how ethical principles can guide practical solutions for promoting inclusive movement experiences. Programs like LIVESTRONG at the YMCA further illustrate the importance of ethical practice by tailoring physical activity to meet the needs of cancer survivors. These initiatives address physical and emotional challenges while respecting individual limitations, ensuring that participants can engage in movement safely and meaningfully.

Professionals must advocate for equitable treatment, ensure diverse representation in research and practice, and maintain professional integrity by providing evidence-based recommendations that prioritize participants' needs over commercial interests. Addressing issues such as overtraining, body shaming, and unethical marketing of fitness products ensures that physical activity environments remain safe, respectful, and inclusive. [38]

[38] Runk, L (2024). Philosophy and Activity. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99870

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Chapter 3: History of Physical Activity

OBJECTIVES

- Review the History from various eras

Background of Physical Activity

The benefits of physical activity and exercise are universally recognized and have been for far longer than one might think. Our Paleolithic ancestors regularly engaged in physical activity to survive. However, rather than chasing after a soccer ball to win a game or taking a stroll down a tree-lined path, they "worked out" by chasing after their next meal. For them, no exercise meant no food. How's that for a health benefit?[39]

With the advent of sedentary agriculture some 10,000 years ago, survival-level peak performance was no longer necessary. Physical activity declined as our ancestors continued to devise more advanced food acquisition methods. It wasn't until the fourth century BCE that the Greek physician Herodicus recognized the importance of being physically active outside of a hunter-gatherer society. He practiced gymnastic medicine, a branch of Greek medicine that relied on vigorous exercise as a treatment. During that same time, Hippocrates, often referred to as the Father of Modern Medicine, asserted, "If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health."[40]

Beyond the physical health benefits, there are affective benefits associated with group games and activities. Ancient Mayans organized the first team game called The Ball Game. It consisted of two teams trying to get a ball through a hoop mounted approximately 23 feet on a wall. The rules were to get the ball through the hoop using certain parts of the body. In some cases, the captain of the losing team gave himself as a human sacrifice to the winning team, an act that the Mayans believed to be a vital part of prosperity.[41]

American Indians are thought to have founded the modern game of lacrosse and other stick games. Lacrosse, which received its name from French settlers, was more than a form of

[39] Exercise- Not a Passing Fad. (2021, June 16). Georgia Highlands College. https://med.libretexts.org/@go/page/11126
[40] Exercise- Not a Passing Fad. (2021, June 16). Georgia Highlands College. https://med.libretexts.org/@go/page/11126
[41] Exercise- Not a Passing Fad. (2021, June 16). Georgia Highlands College. https://med.libretexts.org/@go/page/11126

recreation. It was a cultural event used to settle disputes between tribes.[42] The outcome of the game and the choosing of teams were thought to be controlled supernaturally. As such, game venues and equipment were prepared ritualistically.[43]

From Ancient History to Modern Times

In retrospect, the perceived benefits of exercise have changed very little since Herodicus or the American Indians. Mounting research supports historical assertions that exercise is vital to sustaining health and quality of life. Culturally, sports play a huge role in the growth and development of youth and adults. Physically, there is indisputable evidence that regular exercise promotes healthy functioning of the brain, heart, skeletal, and muscular systems. Exercise also reduces the risk of chronic diseases like cancer, diabetes, and obesity. Regular exercise can even improve emotional health and overall well-being.[44]

Years: 1st to 16th Century

Aristotle (384-322 B.C.) is usually considered the "father of kinesiology" by being the first known author to describe animal (humans included) movement of walking by converting rotary movement into forward movement. Aristotle was also the first to describe the actions of muscles.[45]

For the young men of ancient Greece, visiting the gymnasium was not a simple leisurely pursuit but an integral part of their education. Indeed, Anacharsis – a Scythian philosopher and traveler who visited Greece – reportedly said, "In every city of the Greeks there is a designated place where they go mad daily. I mean the gymnasium." Although the idea seemed unorthodox to the other ancient cultures, the Greeks believed that exercise was crucial for what we would now call well-being. The ancient Greek historian Diodorus spoke of gymnasia and temples as things that "…contribute to making happy the life of man."[46] Additionally, to be visibly fit and healthy was a moral virtue in Greece. This concept is depicted in Grecian art, where the athletes are commonly portrayed as naked. To be naked was to be in the most heroic of states.

In the fifth century BCE, the father of medicine, Hippocrates, warned that "…eating healthily by itself will not keep a man well; he must also have physical exercise." Hippocrates built the foundations of Greek medicine, and the Roman Galen, a prominent physician, writer, and philosopher, took his ideas further. Galen used Hippocrates' teaching to systemize knowledge

[42] Exercise- Not a Passing Fad. (2021, June 16). Georgia Highlands College. https://med.libretexts.org/@go/page/11126
[43] Exercise- Not a Passing Fad. (2021, June 16). Georgia Highlands College. https://med.libretexts.org/@go/page/11126
[44] Exercise- Not a Passing Fad. (2021, June 16). Georgia Highlands College. https://med.libretexts.org/@go/page/11126
[45] Titus, W (2024). History of Kinesiology. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/98745
[46] Carter, K. (2020). A short history of wellbeing through exercise. *Wellcome Collection*. Retrieved from https://wellcomecollection.org/articles/XocGzxAAACEACDhG.

of the human body, including the body's function during exercise. He observed, "To me, it does not seem that all [bodily] movement is exercise, but only when it is vigorous; but since vigor is relative, the same movement might be exercise for one and not for another." He even noted that while exercise cannot stop the aging process, it can certainly delay it.

In the 12 century CE, the Jewish philosopher and physician Moses ben Maimon stated," Anyone who lives a sedentary life and does not exercise, even if he eats good foods and takes care of himself according to proper medical principles, all his days will be painful ones, and his strength will wane."[47]

Leonardo da Vinci made notable contributions to the field of kinesiology through his keen observations and anatomical studies during the Renaissance. He conducted meticulous dissections of human cadavers, documenting detailed anatomical structures and their functions. Da Vinci's early work in kinesiology focused on understanding the mechanics of human movement, including the musculoskeletal system and the interactions between bones, muscles, and joints. His anatomical drawings and sketches, such as the famous Vitruvian Man, provided valuable insights into the principles of biomechanics and human kinetics. His interdisciplinary approach, combining art and science, laid the foundation for future advancements in kinesiology and our understanding of human physiology and movement.[48]

The Renaissance saw a rebirth, a renewed interest in both concepts of the mind, like the arts and literature, and the body's health. As early as 1420, Vittorino da Feltre, an Italian humanist, opened a school with a special emphasis on physical education, and in 1569, the Italian physician Mercuriale published *De Arte Gymnastics* – one of the earliest books to explicitly discuss the therapeutic benefits of gymnastics and many other sports.[49]

In the 15th century, theologian and scholar Robert Burton went so far as to declare that not exercising, or "idleness" as he referred to it, was the "bane of body and mind." Psychologically, he warned that lack of exercise could cause melancholy (the name given to depression at the time) and, "many other maladies." Religiously, Burton decided that exercise was not only essential for good health but a means of avoiding eternal damnation. For example, he saw idleness as one of the seven deadly sins, serving only to deliver chaos.

By the 16th century, the benefits of exercise were widely accepted, at least among the wealthy and the educated, who had access to leisure. During this period, H. Mercuralis defined exercise as "the deliberate and planned movement of the human frame, accompanied by breathlessness, and undertaken for the sake of health or fitness." This definition is still widely used today.

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[47] Exercise- Not a Passing Fad. (2021, June 16). Georgia Highlands College. https://med.libretexts.org/@go/page/11126

[48] Runk, L (2024). Kinesiology and its Subddisaplines. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99861

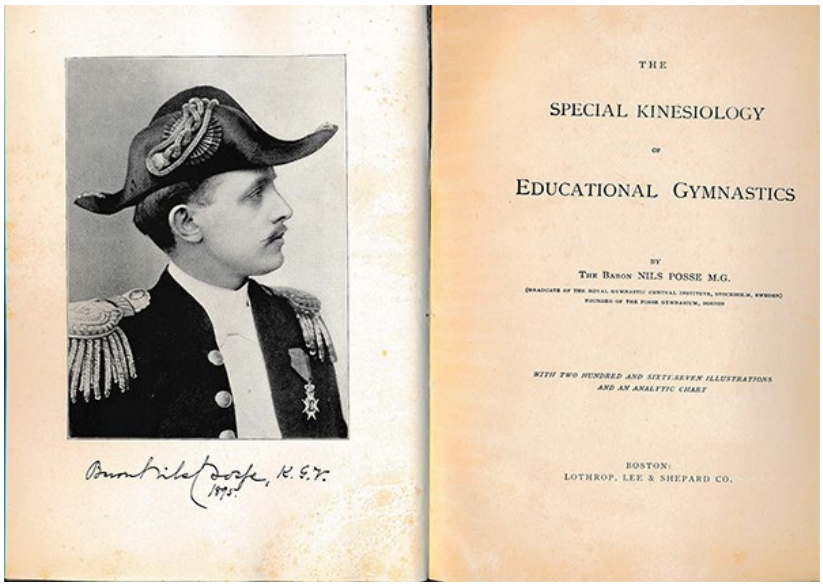
[49] Carter, K. (2020). A short history of wellbeing through exercise. *Wellcome Collection*. Retrieved from https://wellcomecollection.org/articles/XocGzxAAACEACDhG.

Years: 17th to Present Day

Royal Central Institute of Gymnastics G.C.I. was founded in 1813 in Stockholm, Sweden, by Pehr Henrik Ling. It was the first Physiotherapy school in the world, training hundreds of medical gymnasts who spread the benefits of Swedish physical therapy around the entire world. In 1887, Sweden was the first country in the world to give a national state license to physiotherapists/physical therapists.[50]

Accomplished Swedish medical gymnast and professor at GCI, Carl August Georgii, was the first person to create the new international word **Kinesiology**. The term was coined in 1854 and is a literal translation from the original Swedish word *Rörelselära*, meaning "Movement Science," which was the foundation, mission, and vision for GCI's development. At this time, kinesiology consisted of nearly 2,000 physical movements and 50 different types of massage therapy techniques. They were all used to affect various dysfunctions and even illnesses, not only in the movement apparatus but also in the internal physiology of man. Thus, the original, classical, and traditional kinesiology was not only a system of rehabilitation for the body or biomechanics (as it still is now) but also a new therapy for relieving and curing diseases by affecting the autonomic nervous system, organs, and glands in the body.[51]

In 1886, the Swedish Medical Gymnast Nils Posse was the first person to introduce the term Kinesiology to the United States. Nils Posse graduated from GCI and founded the Posse Gymnasium in Boston, MA while teaching at Boston Normal School of Gymnastics (BNSG). He then published The Special Kinesiology of Educational Gymnastics in 1895. This publication was the first book ever written in the world with the word “Kinesiology” in the title of the book.[52]



[50] Kinesiology. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Kinesiology
[51] Kinesiology. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Kinesiology
[52] Kinesiology. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Kinesiology

Figure 3.1: Nils Posse/Special Kinesiology of Educational Gymnastic[53]

The emergence of kinesiology as a distinct field can be linked to the early 20th century, where key figures like Dudley Sargent played an instrumental role. Sargent, a physical education professor at Harvard University, emphasized a scientific approach to physical education and fitness. He developed physical fitness programs that integrated anatomy, physiology, and biomechanics to improve overall human movement and performance. Sargent's contribution marked the early integration of science into physical education, a cornerstone in the development of kinesiology as a profession.[54]

Until the 19th century, having the opportunity to pursue sports was a privilege for those with money and leisure time. However, with the Industrial Revolution came a desire to promote physical exercise to counteract sedentary factory work and inventions to facilitate it – most prominently the bicycle. German civil servant Baron Karl von Drais takes the credit for the first two-wheeled steerable and human-propelled machine in 1817, but it was the 'safety bicycle' of the 1880s and 1890s that transformed their use from a hobby for sporting young men to a mass transport tool for men and women of all ages.[55]

19th-century ideas of nationalism and Charles Darwin's theory of Natural Selection led to the idea of physical fitness as embodying both personal and national health. To be fit and healthy was, once again, in an echo of ancient Greece, to be an upstanding citizen. Additionally, for the first time, women became part of this movement and were able to start representing their countries at the Olympic Games.[56]

Physical education for children became increasingly important in the 20th century and nowhere more than in Germany. However, the Nazis embraced the darker side of the idea of 'fitness,' and in 1937, a new state PE curriculum was introduced for boys to begin training future Aryan soldiers.[57]

Fitness has been an integral facet rooted in health and wellness culture since ancient times, and the historical development of the modern gym influenced the emergence of what is now a multi-billion-dollar phenomenon. Modern understandings and technological advancements have transformed fitness into a thriving industry through marketing products and the widespread use of exercise equipment. Fitness centers are highly efficient in their use of time and space, both in architecture and fitness technologies. Users have learned to monitor their bodies according to the standards of being 'fit.' The unification and standardization of fitness

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[53] Photo by Macpw is licensed under CC BY-SA 4.0

[54] Runk, L (2024). Kinesiology and its Subddisaplines. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99861

[55] Carter, K. (2020). A short history of wellbeing through exercise. *Wellcome Collection*. Retrieved from https://wellcomecollection.org/articles/XocGzxAAACEACDhG.

[56] Carter, K. (2020). A short history of wellbeing through exercise. *Wellcome Collection*. Retrieved from https://wellcomecollection.org/articles/XocGzxAAACEACDhG.

[57] Carter, K. (2020). A short history of wellbeing through exercise. *Wellcome Collection*. Retrieved from https://wellcomecollection.org/articles/XocGzxAAACEACDhG.

equipment and practices have been crucial for the globalization of the fitness industry. The globalization of modern fitness culture can be considered an illuminating example of the more embracing momentum toward a global monoculture, and it is a recognizable and adaptable phenomenon worldwide.[58]

USA: How it Got Started

The United States was a little slower in accepting physical activity as a necessary component of everyday life; however, the beginnings of organized physical activity in the USA can be traced to the mid-1800s. Though America ended up creating its unique system of physical education, it had many influences, including German and Swedish gymnastic groups, the publications of Catharine Beecher who advocated for and provided exercises that could be implemented in the classrooms for both girl and boy students, other physical activity programs from around the globe, and religious beliefs (Stillwell & Willgoose, 2006; Siedentop, 2006).

The Young Men's Christian Association, or YMCA, played a critical role in the development of PE in America. The YMCA began in London in 1844. The Young Women's Christian Association, or YWCA, was founded in 1894. As originally conceptualized, the YMCA and YWCA encouraged Bible studies rather than exercise. However, when the organizations started opening chapters in the United States and Canada, its leaders found that Bible study classes did not attract as many young men and women as the gymnasiums of the Swiss and German gymnastic clubs. Consequently, many YMCA and YWCA buildings built after 1880 included weight rooms, gymnasiums, and swimming pools. As a result of the popularity of the YMCA and YWCA, the philosophy of pragmatism and the modern Olympic movement, games, sports, and dance increasingly replaced formal gymnastic/calisthenic systems at the beginning of the 20th century (Brettschneider, Brandl-Bredenbeck, & Rees, 1997).

Surprisingly, many Americans were not physically fit for military service during World War I, and many post-war efforts tried to implement physical education at all levels of schooling (Massengale, John, & Swanson, 1997). During World War II, physical fitness was again required of soldiers and civilians (including women) since the war effort required manual labor. However, soldiers once again lacked sufficient physical fitness to fulfill the requirements. After the war, schools instituted more rigorous PE requirements as America adopted a greater interest in teaching physical education (Kelly & Melograno, 2004).[59]

By the 1950s, there were over 400 colleges and universities in the USA offering majors in physical education, and there was increasing recognition of the scientific foundation of PE. Despite the progress, the American army's fitness in the Korean War fell short of expectations

[58] Addolorato, S., García-Fernández, J., Gallardo, L., & García-Unanue, J. (2020). An Overview of the Origins and Effectiveness of Commercial Fitness Equipment and Sectoral Corporate Settings: A Critical Review of Literature. *Applied Sciences*, *10*(4), 1534. MDPI AG. Retrieved from http://dx.doi.org/10.3390/app10041534

[59] Vlček, P. (2011). A comparison of Physical Education (PE) Development in the Czech Republic, Germany, and the USA--A Historical Perspective. *Acta Universitatis Palackianae Olomucensis, Gymnica, vol 40, issue 1.* Retrieved from https://www.gymnica.upol.cz/pdfs/gym/2011/01/06.pdf

again (Kelly & Melograno, 2004). Hence, the federal government attempted to set up the President's Council on Physical Fitness, which was supposed to raise fitness standards in schools across the country. Unfortunately, the series of recessions in the 1970s and the 1980s brought about cutbacks in many school programs, including physical education (Lumpkin, 2004). By the end of the 1970s, interest in the President's Council had waned, and physical education courses began to emphasize lifetime sports (Zeigler, 2005).

School programs were dominated by curricular innovations such as movement education, adventure education, cooperative games, and activities for girls and persons with disabilities. One of the most significant shifts of the 1970's was the Title IX amendment to the Federal Education Act, which stipulated that all federally funded education programs could not discriminate based on gender (Lumpkin, 2004). Enforcement of Title IX opened many opportunities for women in competitive athletics at high school and collegiate levels. However, American physical education took another step back in the '80s and '90s as the education system underwent a period of educational reforms (Kelly & Melograno, 2004; Hendl & Vindušková, 2004; Jelínková, 1993). Due to the poor quality of curriculum standards, school districts started limiting the time students spent in physical education classes or even dropping the programs altogether. One promising step concerning the future of physical education was the publication of the National Standards for Physical Education (NASPE, 2004). This document establishes content standards for physical education school programs, concentrates on "movement" education, and emphasizes the lifelong physical activity of the population (Dobrý & Hendl, 2006; Kelly & Melograno, 2004).[60]

Over time, the movie industry showed people playing sports during different historical periods. Many of the movies listed below are documentaries on certain sports or people within that sport. Below is a list of examples:

Movies: Different Historic Periods[61]

- Brian's Song (1971), is about the friendship between two Chicago Bears teammates
- Chariots of Fire (1981), set around the 1924 Summer Olympics
- Eight Men Out (1988), based on the 1919 World Series and the Black Sox Scandal
- Friday Night Lights (2004), is about a Texas high school football team
- Hoosiers (1986), Milan High School's David-vs-Goliath upset of Muncie Central in the 1954 state basketball championship.
- Miracle (2004), When the United States Men's Olympic hockey team knocked off the Soviet Union's highly favored squad, the upset transcended sports

[60] Vlček, P. (2011). A comparison of Physical Education (PE) Development in the Czech Republic, Germany, and the USA--A Historical Perspective. *Acta Universitatis Palackianae Olomucensis, Gymnica, vol 40, issue 1.* Retrieved from https://www.gymnica.upol.cz/pdfs/gym/2011/01/06.pdf

[61] 25 greatest sports movies based on a true story. (2017). *YARDBARKER*. Retrieved from https://www.yardbarker.com/entertainment/articles/25_greatest_sports_movies_based_on_a_true_story/s1__24635056

- Moneyball (2009), Athletics general manager Billy Beane revolutionized MLB scouting by adopting sabermetrics (i.e. advanced statistics) to measure a player's potential and value
- Radio (2003), is about the friendship between a high school football coach and a mentally disabled man.
- Remember the Titans (2000), The film leaves no sports movie cliché unused as it depicts Boone's efforts to integrate the T.C. Williams High School, football team.
- Seabiscuit (2003), As Seabiscuit wins race after race, the horse becomes a symbol of hope for people devastated by the Great Depression
- The Blind Side (2009), is the story of Michael Oher, a homeless youth who makes it to the NFL
- Rudy (1993), Rudy Ruettiger's tenacious efforts to play for his favorite college football team, the Notre Dame Fighting Irish

Chapter 3 Resources

25 greatest sports movies based on a true story. (2017). *YARDBARKER*. Retrieved from https://www.yardbarker.com/entertainment/articles/25_greatest_sports_movies_based_on_a_true_story/s1__24635056

Addolorato, S., García-Fernández, J., Gallardo, L., & García-Unanue, J. (2020). An Overview of the Origins and Effectiveness of Commercial Fitness Equipment and Sectoral Corporate Settings: A Critical Review of Literature. *Applied Sciences*, *10*(4), 1534. MDPI AG. Retrieved from http://dx.doi.org/10.3390/app10041534

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Chapter 4: Sociology of Physical Activity and Sport

OBJECTIVES

- Identify key elements of the sociological aspects of physical activity and sport.
- Examine how the study of the sociology of physical activity is useful and how it relates to Kinesiology.
- Investigate the historical significance of the sociological aspects of sport and physical activity.

The Use of Sociology in Physical Activity and Sport

Sociology is the study of actions and relationships in terms of the social contexts in which people live.[62] Physical activity and sports are dynamic social and cultural activities that attract attention from sociologists and others who study society. Studying sports as a social phenomenon helps us understand how social class, gender, race and ethnicity, and physical ability influence our everyday lives.[63] In a particular society, it may seem that sport participation, exercise, or recreation is available to all its members, however, access and the opportunity to participate are dramatically influenced by a variety of social conditions.

Sports in society recognize that people organize, perform, and give meaning to sports in many ways and that sports are sites at which ideas, beliefs, and approaches to social relationships are created, maintained, and changed.[64] Sports, physical activity, and recreation are sociologically important because they can impact society and the course of history. As a kinesiology professional, it is vital to understand the far-reaching impacts our field can have on the local, national, and global levels of society.

Sports, as cultural phenomena, play a crucial role in shaping and reflecting societal structures. To understand the sociological impact of sports on society, it is essential to explore the multifaceted relationships between sports, culture, identity, and societal dynamics. By doing so, we can demonstrate how sports both reflect and shape societal values, norms, and structures. The connection between sports and society is profound and intricate, serving as mirrors that reflect and influence each other. On one hand, sports often embody societal values, acting as a platform where cultural norms, beliefs, and aspirations are showcased. Athletes, as prominent figures in the sporting world, become influential symbols and role

[62] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1
[63] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1
[64] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2

models, shaping societal perceptions and ideals. Conversely, societal factors such as politics, economics, and cultural shifts significantly impact the landscape of sports. Issues like gender equality, racial justice, and socioeconomic disparities are mirrored in the sports arena, prompting important discussions and catalyzing change.[65]

History of Sociology in Physical Activity and Sport

"Sport has the power to change the world. It has the power to inspire. It has the power to unite people in a way that little else does. It speaks to youth in a language they understand. Sport can create hope where once there was only despair. It is more powerful than governments in breaking down racial barriers. It laughs in the face of all types of discrimination." – Nelson Mandela

Figure 4.1: Nelson Mandela.[66]

Sports are historically produced and socially constructed, and there are variations in the meaning, purpose, and organization of sports from place to place and over time.[67] The most prominent forms of sport in any society generally reinforce dominant beliefs, meanings, and practices in society.[68] People worldwide have always engaged in playful physical activities and incorporated human movement into their rituals and daily routines. Play and countless physical games have been key components of family and community life from ancient times to the present.[69]

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[65] Runk, L (2024). Shaping Culture and Driving Change. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99878

[66] Image by John Matthew Smith is licensed CC BY-SA 2.0.

[67] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1

[68] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1

[69] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1

Since the mid-1900s, people have conducted research on socialization and sport. The roots of this research are grounded in three sources:

1. Theories of play and child development
2. Beliefs that team sports are sites at which valuable lessons can be learned.
3. The assumption that playing sports is an inherently character-building experience.[70]

Before 1980, very few people studied sports in society, this was because physical activities and sports were considered to be unrelated to issues in society.[71] As the popularity of sports expanded, sociologists recognized the importance of studying the impact these physical activities were having on the societies that were embracing them.

During the last two decades of the twentieth century, the sociology of sports gradually came to be recognized as a legitimate subfield in sociology and physical education, kinesiology, and sports science.[72] Interest has continued to grow and promote significantly more research in recent years. This can be attributed to the expansion of the profession and the establishment of professional associations like *The International Sociology of Sport Association*, *The North American Society for the Sociology of Sport*, and the *European Association for the Sociology of Sport*.[73]

Understanding the Significance of Sociology in Physical Activity and Sport

Sports and physical activity are considered to be direct reflections of society and have empowered people to challenge or change the status quo of what is accepted in society. Physical activity and sports are social practices that actively influence what people do and how particular societies are organized.[74] For example, many sports in the United States are organized in ways that perpetuate very limited ideas and beliefs about race, skin color, and race relations.[75] Sociology of sport, alternately referred to as sports sociology, is a sub-discipline of sociology that focuses on sports as social phenomena. It is an area of study concerned with the relationship between sociology and sports, and also various socio-cultural structures, patterns, and organizations or groups involved with sports. This area of study discusses the positive impact sports have on individual people and society as a whole economically, financially, and socially. Sociology of sport attempts to view the actions and behavior of sports teams and their players through the eyes of a sociologist.[76]

[70] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 3
[71] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1
[72] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1
[73] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 1
[74] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[75] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[76] https://en.wikipedia.org/wiki/Sociology_of_sport

Race and Ethnicity

The sociology of race and ethnic relations is the study of social, political, and economic relations between races and ethnicities at all levels of society. This area encompasses the study of systemic racism and other complex social processes between different racial and ethnic groups.[77] This subdiscipline looks at how sport and physical activity are influenced by and the impact they have on society. Areas of sociology related to sport, exercise, and physical activity that are examined include inequality in sports regarding opportunities and representation, common racial or ethnic stereotypes, socialization, and social interaction, plus affirmative action in sports.

Gender

In 1972, the United States Congress decided to update the 1964 Civil Rights Act, which prohibited discrimination based on "race, color, religion, or national origin" in public education, public facilities, publicly funded programs, and private companies engaged in interstate commerce.[78] Senator Birch Bayh wrote the 37 words of Title IX.[79] The passing of Title IX provided females access to training programs to advance their education, use of facilities at educational institutions, and most visibly the opportunity to participate in sports and athletics at schools and universities.

Figure 4.2: Senator Bayh exercises with Title IX athletes at Purdue University in the 1970s.[80]

Gender dynamics in sports and physical activity can vary across the world and throughout different cultures based on society's view of gender. There are a variety of challenges and adversity faced by participants of different genders. The wide range of topic areas that are related to sports sociology and gender include inequality in sports through participation disparities and the representation of women's athletes and competitions in the media, the inclusion of LGBTQ+ athletes and their experiences in sports culture. Sports culture means a combination of expecting beliefs and assumptions in sports; and behaving in ways in accord with favored social values and norms.

[77] https://en.wikipedia.org/wiki/Sociology_of_race_and_ethnic_relations
[78] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 6
[79] https://en.wikipedia.org/wiki/Title_IX
[80] https://en.wikipedia.org/wiki/Title_IX

Title IX

The transformative power of sports in challenging and reshaping societal values is evident in the realm of gender equality. Title IX in the United States, enacted in 1972, has had a profound impact on the cultural landscape by prohibiting sex-based discrimination in educational programs, including sports. Acosta and Carpenter (2014) provide insights into the significant increase in female participation in sports as a result of Title IX, highlighting how sports legislation can be a driving force for social change. Female athletes like Serena Williams and Simone Biles have not only excelled in their respective sports but also become cultural icons, challenging traditional gender norms and influencing societal perceptions (Scraton & Flintoff, 2002). The graphic below demonstrates the impact Title IX also had in educational achievement over the last 50 years. This interplay between sports and cultural values illustrates how sports can be a dynamic force in shaping and reflecting societal norms and traditions.

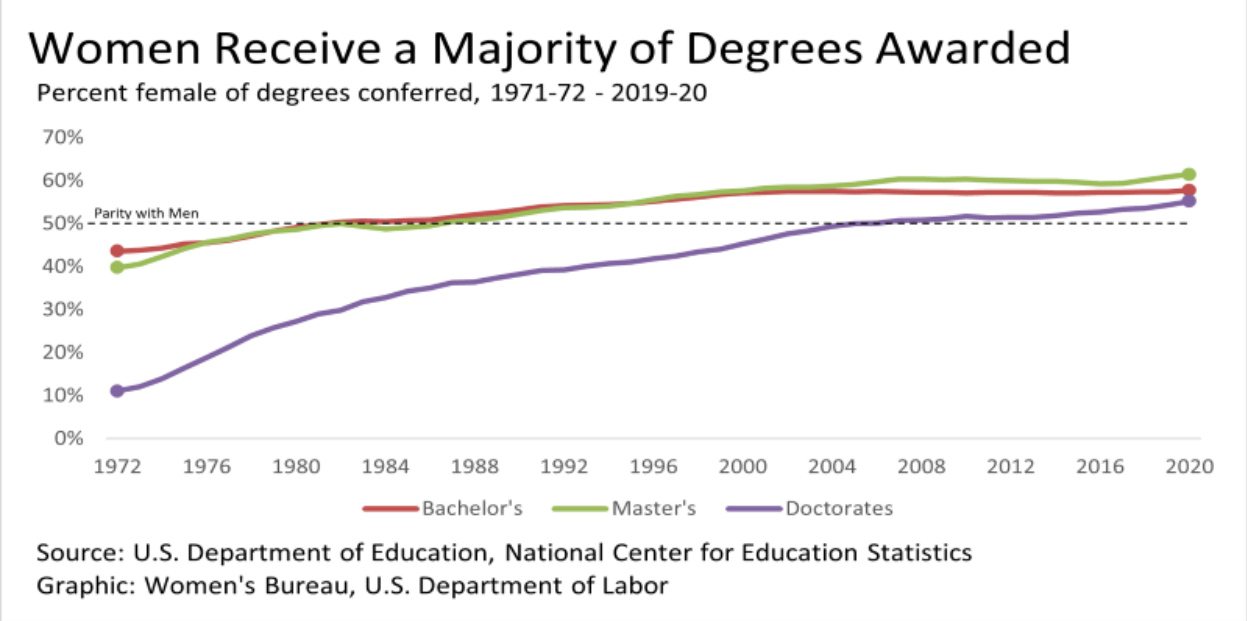

Image: Graph showing the impact of Title IX on educational achievement by gender.
In 1972 only 44% of bachelor's, 40% of master's, and 11% of doctorate degrees were awarded to women. Just 10 years later in 1982, women reached parity with men in obtaining undergraduate degrees. By the 2019-2020 school year, women far outpaced men at every level of educational attainment. Women earned 58% of bachelor's, 61% of master's, and 55% of doctorate degrees awarded that year. (Copyright; author via source)

However, challenges persist in achieving diversity and representation in various sports (Houlihan, 2008). Certain sports, particularly those with historical associations with privilege, may struggle to diversify. The lack of representation of racial and ethnic minorities in some sports remains a concern. For instance, in winter sports like skiing or snowboarding, there is often an underrepresentation of athletes from diverse backgrounds. This lack of diversity can perpetuate societal inequalities by limiting opportunities and reinforcing stereotypes. The study by Cunningham and Melton (2019) delves into the barriers faced by minority athletes in accessing and participating in certain sports, highlighting the need for increased inclusivity.

Additionally, issues of representation extend beyond athletes to coaching staff, management, and sports governance. Lack of diversity in leadership positions can perpetuate inequalities by limiting the perspectives and experiences that shape decision-making processes. Research by Knoppers et al. (2009) highlights the challenges faced by minority coaches in breaking through structural barriers within sports organizations. Addressing these issues requires intentional efforts to create more inclusive environments and opportunities for underrepresented groups, challenging the status quo and fostering true equality in sports and society. To shed light on inequalities in hiring, researcher of sport and social issues, Richard Lapchick, founded the Institute for Diversity and Ethics in Sport which produces The Racial and Gender Report Card (RGRC) to use as an assessment of hiring practices of women and people of color in most of the leading professional and amateur sports and sporting organizations in the United States. [81]

Research Methods in Sociology

Theories enable us to see things from various angles and perspectives, understand more fully the relationship between sports and social life, and make informed decisions about sports and sports participation in our lives, families, communities, and societies.[82]

Studies conducted over the past half-century have included one or more of a combination of the following five theories:

- Functionalist theory: examines how sport fits into and maintains the social order, and illustrates important norms in society.
- Conflict theory**:** focuses on the ways that sports are shaped by economic forces and used by economically powerful people to increase their wealth and influence.
- Critical theory: is how sports can be used to create or reinforce social hierarchies.
- Feminist theory: feminists focus on the issue of fair and equal access for women to participate and share in the rewards available in sports.
- Interactionist theory[83]: how individuals shape society and are shaped by society through meaning that arises in interactions through participating in sport.

There are key differences between the five theories, and each provides different perspectives for understanding the impact of sports in society.[84]

Functionalist Theory

The functionalist theory, or the structural-functional theory, views society as a complex system that has a variety of interconnected parts with separate functionalities working together to achieve balance within society.

[81] Runk, L (2024). Shaping Culture and Driving Change. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99878
[82] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[83] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[84] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2

The most important social arrangements in any society are social institutions such as the family, education, the economy, the media, politics, religion, the law, and sports. If these social institutions are organized around a core set of values, functionalists assume that society will operate smoothly and efficiently.[85]

An example of this theory is the National Football League (NFL). The NFL provides a sense of community and belonging. The NFL can provide a sense of community and belonging for people from all walks of life.

Conflict Theory

This theory is based on the foundational ideas of Karl Marx and the belief that every society consists of a system of relationships and social arrangements that are determined by economic status.[86] The conflict theory assumes that all aspects of social life revolve around economic interests, and about society and sport, focusing on how sports are shaped by the economy and used to increase the wealth and influence of powerful people.[87]

An example of this theory is the sport of golf. In golf, the need to buy experience equipment and or be part of a golf club or membership, tends to lead those who are in a certain socioeconomic group.

Critical Theory

The critical theory primarily focuses on the topics listed below:

1. The processes through which culture is produced, reproduced, and changed.
2. The ways that power and social inequalities are involved in processes of cultural production, reproduction, and change.
3. The ideologies that people use as they make sense of the world, form identities, interact with others, and transform the conditions of their lives.[88]

Critical theory comes in a variety of forms, and it offers a useful alternative to functionalist and conflict theories.[89] Critical theory was developed when some sociologists realized that societies and cultures were too messy, complex, and fluid to be described as "systems," and that it wasn't possible to create a grand theory of social life that explained all social life under all conditions.[90]

[85] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[86] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[87] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[88] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[89] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[90] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2

An example of this theory is one in which certain athletes from racial or ethnic groups, are likely to get more media coverage and or endorsement deals that from other groups.

Feminist Theory

The feminist theory assumes that knowledge about social life requires an understanding of gender and gender relations.[91] This theory is the extension of feminism into theoretical, fictional, or philosophical discourse. It aims to understand the nature of gender inequality.[92] Critical feminist theory explains that sports are *gendered activities*, in that their meaning, purpose, and organization are grounded in the values and experiences of men and celebrate attributes associated with dominant forms of masculinity in society.[93]

An example of this theory is a female becoming the first to do something in a sport where in the past it was prohibited that women could compete in that sport.

Interactionist Theory

The interactionist theory focuses on issues related to meaning, identity, social relationships, and subcultures in sports.[94] This is supported by the idea that when humans interact with each other, it provides them with meaning, gives meaning to others, and meaning to the world around them. Sports provide a foundation for people to interact with one another, and the culture and society are developed through these individual interactions.

An example of this theory is a soccer player who is quick-tempered, should recognize that after a tackle from another player they need to maintain control in that situation.

Wrap Up

As a professional in kinesiology, it is imperative to study sociology and identify how sports have the power to alter perceptions, promote change, and even change policy for the benefit of its current and future participants. Understanding the sociological dimensions of sport, physical activity, and exercise and its impact worldwide can create an inclusive environment and empower the sporting experience for everyone, regardless of race, ethnicity, gender, sexuality, or socioeconomic status.

Issues such as the commercialization of sports, the impact of corruption, and the potential for sports to reinforce negative social norms call for a critical examination of the sociological implications of sports on society. The commercialization of sports has become a pervasive aspect of the modern sporting landscape, with economic interests often taking precedence over the spirit of the game. Major sporting events, leagues, and athletes attract lucrative sponsorship deals and endorsements, contributing to the commercialization of sports. While

[91] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[92] https://en.wikipedia.org/wiki/Feminist_theory
[93] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2
[94] https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264. Chapter 2

this influx of revenue can enhance the quality and reach of sports, it also raises concerns about the prioritization of profit over fair competition and the exploitation of athletes. The commodification of sports can lead to inequalities, where financial considerations outweigh the principles of fairness and sportsmanship (Borland & MacDonald, 2003).

Corruption within sports organizations poses a significant threat to the integrity of the sporting world. Examples such as the FIFA corruption scandal in 2015 revealed widespread bribery and corruption at the highest levels of international football governance. The scandal implicated top officials in accepting bribes for awarding tournament hosting rights, casting a shadow over the credibility of the sport. Corruption undermines the principles of fairness, accountability, and transparency that are essential for the legitimacy of sports organizations and their role in society. Moreover, sports have the potential to reinforce negative social norms, perpetuating stereotypes and discrimination. The lack of representation and opportunities for certain groups, such as women or LGBTQ+ individuals, can reflect and perpetuate societal inequalities. As touched on previously, gender disparities in pay and media coverage in sports persist, which potentially reinforce harmful norms about the role and value of women in sports (Kane & Maxwell, 2011). Addressing these challenges necessitates a commitment to ethical principles, transparency, and inclusivity within sports organizations and the broader sporting culture. The duality of sports' institutional impact highlights the complexities of its role in shaping and reflecting broader social dynamics.[95]

[95] Runk, L (2024). Shaping Culture and Driving Change. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99878

Chapter 4 Resources

Hitzeman, J., & Jellum, L. (2022). Introduction to the sociology of sport. In *Sociology of Sport.* Georgia Highlands College. https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264

Hitzeman, J., & Jellum, L. (2022). Producing knowledge. In *Sociology of Sport.* Georgia Highlands College. https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264

Hitzeman, J., & Jellum, L. (2022). Socialization. In *Sociology of Sport.* Georgia Highlands College. https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264

Hitzeman, J., & Jellum, L. (2022). Gender. In *Sociology of Sport.* Georgia Highlands College. https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264

Hitzeman, J., & Jellum, L. (2022). Race/ethnicity. In *Sociology of Sport.* Georgia Highlands College. https://getlibraryhelp.highlands.edu/c.php?g=1203630&p=8803264

Feminist theory. (2024, February 15). *Wikipedia.* https://en.wikipedia.org/wiki/Feminist_theory

Runk, L (2024). Shaping Culture and Driving Change. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99878

Sociology of race and ethnic relations. (2024, February 15). *Wikipedia.* https://en.wikipedia.org/wiki/Sociology_of_race_and_ethnic_relations

Title IX. (2024, March 18). *Wikipedia.* https://en.wikipedia.org/wiki/Title_IX

Chapter 5: Psychology of Physical Activity and Sport

OBJECTIVES

- Identify key elements of sport and exercise psychology.
- Examine how the study of sport and exercise psychology relates to kinesiology.
- Investigate the historical significance of sport and exercise psychology.

The Use of Psychology in Physical Activity and Sport

Sport, exercise, and physical activity all involve the engagement of the body. The subdiscipline of sport and exercise psychology focuses on the involvement of the mind in addition to human movement. In the field of kinesiology, the emphasis of sport and exercise psychology is on understanding how human thoughts, emotions, and behaviors influence physical activity. This kinesiology-psychology connection specifically explores the mental components of athletic performance, such as motivation, performance anxiety, and the impact of sports on mental and emotional health.[96]

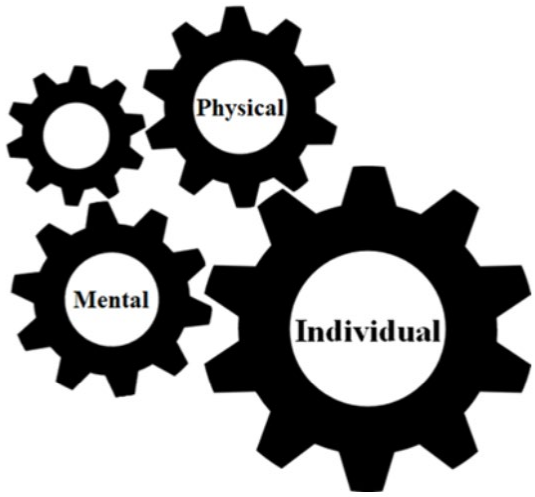

Figure 5.1: Gear Train. Interlocked gears are dependent on the successful movement of all of the connected gears. One gear can impact the movement of the entire train, and in comparison, a single mental or physical component can influence the entire person.[97]

[96] https://socialsci.libretexts.org/Bookshelves/Psychology/Introductory_Psychology/General_Psychology_for_Honors_Students_(Votaw)/02%3A_Contemporary_Psychology/2.10%3A_Sport_And_Exercise_Psychology

[97] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1

Exercise and sports psychology are two distinct areas of study. Exercise psychology is concerned with the antecedents and consequences of physical activity behavior, which is not limited to exercise.[98] In comparison sports psychology, focuses on psychological principles as they relate to athletes and athletic performance.[99] Both disciplines focus on intertwined concepts, theories, and knowledge that range across various scientific disciplines including psychology, sociology, neuroscience, physical science, and health science.[100] Professionals working within sport or exercise science have occupations working with amateur or professional athletes or teams, consulting for stressful occupations like firefighters or surgeons, or working for a large corporation developing wellness plans for employees.

History of Psychology in Physical Activity and Sport

In 1898, Norman Triplett performed the first experiment in sports psychology and identified the social facilitation phenomenon.[101] Triplett demonstrated that bicyclists were more likely to cycle faster with a pacemaker or a competitor. He wrote about his findings in what was regarded as the first scientific paper on sports psychology, titled "The Dynamogenic Factors in Pacemaking and Competition", which was published in 1898, in the *American Journal of Psychology*.[102]

Figure 5.2: Norman Triplett[103]

[98] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[99] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[100] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[101] https://en.wikipedia.org/wiki/Sport_psychology
[102] https://en.wikipedia.org/wiki/Sport_psychology
[103] https://en.wikipedia.org/wiki/Norman_Triplett

Coleman Griffith was an American sports psychologist who conducted his research at the University of Illinois in the 1920s and 1930s. Griffith's research and publications are considered the foundation of the field of sports psychology and continue to be examined today. [104] The most significant contributions from his time at the Athletic Research Laboratory at the University of Illinois were *The Psychology of Coaching* (1926) and *The Psychology of Athletics* (1928).[105] The focus of his research included attributes and the knowledge a coach must have in athletics, physiology, and psychology to be a successful sports leader.[106]

The subdisciplines of sport and exercise psychology were not recognized until the 1960s. The formation of the International Society of Sport Psychology (1965,) the North American Society for the Psychology of Sport and Physical Activity (1967), and the Canadian Society for Psychomotor Learning and Sport Psychology (1969)[107] assisted in bringing more notoriety and credibility to the evolving discipline of kinesiology. In 1986 the American Psychological Association recognized sports psychology as a branch of psychology and in 1993 British Psychology Society formed a sport and exercise psychology section.[108]

Understanding the Significance of Psychology in Sport and Exercise

The psychology of sport and exercise can influence a participant's performance by focusing on the relationship between physical and mental components to assist in achieving desired outcomes or goals. For athletes, mastering psychological skills and strategies can lead to improved performance and a more positive psychological experience of exercise.[109]

Mental skills training in physical activity includes self-talk, imagery, and mindfulness. Other topics within the discipline of sport and exercise psychology include motivation, arousal, anxiety, and social or group processes.

One of the most detrimental mental aspects of sports and competition is stress. The worry of not performing at one's best and losing out on those external rewards can be a major cause of stress for athletes. Being tasked with taking the game-winning shot. Understanding that if you do not win the next game the college scouts are not coming to watch you play. Helping athletes find healthy coping mechanisms for this level of stress and anxiety is a key part of sports psychology. Highly stressed or anxious athletes typically perform worse than with their mental health is better balanced. Stress and anxiety chronically affecting athletes can spiral downward as continued lower performance reinforces more and more stress about their performance.

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[104] https://en.wikipedia.org/wiki/Coleman_Griffith
[105] https://en.wikipedia.org/wiki/Coleman_Griffith
[106] https://en.wikipedia.org/wiki/Coleman_Griffith
[107] https://en.wikipedia.org/wiki/Sport_psychology
[108] https://en.wikipedia.org/wiki/Sport_psychology
[109] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1

A sports psychologist will work with athletes on their mental "game" including drills and exercises for improving concentration, visualization practices, and overcoming mental barriers like the "yips". In one study researchers looked at if visualization could improve basketball free throw shooting accuracy. The results showed a similar improvement to physically shooting free throws daily.[110]

Basic Mental Skills

Self- Talk

Self-talk can benefit the cognitive, motivational, behavioral, and affective mechanisms in sports and can be beneficial for sports performance whenever it is positive, instructional, and motivational in nature. [111] With the right techniques, self-talk can enhance the processing of information to the most relevant parts of a skill or performance. This is done by focusing on identified keywords or phrases that the athlete or performer can use to direct their attention during the most relevant part of the performance.[112]

Imagery

Imagery is a detailed mental experience individually created by athletes or participants. This technique utilizes a combination of memories, senses, thoughts, and emotions to help athletes plan their movements, predict outcomes, and determine the logistics they need to succeed in their goals.[113]

Mindfulness

Mindfulness refers to being fully present in the moment, considering all senses, thoughts, and sensations as they come and go.[114] Incorporating mindfulness practice may support positive mental health and increase engagement in healthy behaviors. Using the proper techniques to practice mindfulness is linked with overall satisfaction, and autonomous forms of motivation, and has been proven to be an effective strategy for increasing physical activity behavior.[115]

Motivation

The two types of motivation related to sport and exercise are extrinsic and intrinsic motivation. Extrinsic motivation is when you are motivated by external factors not related to the activity or the sport itself.[116] Examples of external motivators include winning a competition, receiving forms of praise or a reward, and participating for money or financial gain. Intrinsic motivation is when a person is motivated by internal factors like personal growth or enjoyment of a sport,

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[110] Titus, W (2024). Psychology and Sociology of Sport. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/98762
[111] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[112] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[113] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[114] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[115] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[116] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1

exercise, or physical activity. [117] This type of motivation represents the purest form of motivation because it is completely self-regulated (autonomous) and derived from the activity itself.[118]

Mental Skills Training (MST)

Mental Skills Training (MST) is a foundational component of sports psychology, equipping athletes with techniques to manage arousal, anxiety, and stress in order to optimize performance and well-being. MST encompasses methods such as imagery, focus training, goal setting, and self-talk, all of which can be adapted and personalized to align with athletes' individual backgrounds, cultural identities, and values. In an inclusive MST approach, it is crucial to respect and integrate diverse cultural perspectives, acknowledging that athletes may interpret and use these techniques differently based on their unique experiences and beliefs. Some important considerations for applying MST techniques include:

1. Encourage athletes to personalize MST techniques: Allowing athletes to incorporate symbols, values, or practices from their culture into MST techniques can create a sense of ownership and deepen engagement. For instance, athletes might incorporate culturally significant imagery or affirmations into their self-talk routines.
2. Adapt language and examples to reflect diversity: Using diverse examples, metaphors, and culturally specific role models during MST instruction helps athletes feel seen and understood. Coaches and practitioners should be mindful of references that align with athletes' backgrounds, as this can improve relatability and enhance the effectiveness of MST.
3. Involve families and communities: For athletes who prioritize community or family values, incorporating family members or community leaders in goal-setting or progress discussions can provide additional support. This can create a sense of accountability and motivation, making MST practices more impactful.
4. Offer MST in culturally familiar environments: Providing MST in spaces that feel safe and comfortable for athletes—whether it's a dedicated relaxation room, a natural outdoor setting, or a community-based space—can improve outcomes and foster more consistent use of these techniques.[119]

[117] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[118] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[119] Runk, L (2024). Exercise Psychology vs Sport Psychology. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/107028

Approaches to Research in Sport and Exercise Psychology

To gain a better understanding of the various psychological phenomena of physical activity, researchers within the field of exercise psychology utilize several perspectives including affective, biological, cognitive, personality, and sociological perspectives.[120]

By using the respective approaches and applying different methodologies and measures, researchers can provide a more complete understanding of why and how we engage in physical activity. Also by not limiting the knowledge gained through the different perspectives, researchers have the potential to explain why and how physical activity can influence our thoughts, feelings, social interactions, and behavior.[121] Each of these perspectives adds a particular level of value to the research however, one perspective does not provide enough context to stand alone and adequately explain the antecedents and consequences of the psychology of physical behavior.

Affective Perspective

Affect, in psychology, refers to the foundational experience of feelings, emotions, attachments, or moods. It is a fundamental aspect of human experience and plays a central role in many psychological theories and studies.[122] Affective science is the broad study of feeling states.[123] As humans, we pursue pleasure and aim to avoid discomfort or pain. To sport or exercise, a person can be motivated to engage, or not engage, in physical activity because of their current and expected feeling states.[124] This affective perspective is intertwined with other perspectives to explain the reasoning behind physical activity behavior. For example, feeling states are linked with physical (biological) states, and cognition (thoughts or reason) and can influence a person's identity (personality) in relation to physical activity, sport, and exercise.[125]

Biological Perspective

The biological perspective considers many areas of study, including biochemistry, endocrinology, neuroscience, and electrophysiology.[126] In the study of exercise psychology, the biological perspective focuses on aspects of the mind-body connection, or how physical states relate to mental states, and assessing these states in relation to psychological phenomena within the context of physical activity.[127] The biological perspective does not provide a full

[120] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[121] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[122] https://en.wikipedia.org/wiki/Affect_(psychology)
[123] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[124] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[125] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[126] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[127] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1

understanding of the antecedents or consequences of physical activity behavior by itself and should not stand alone.[128]

Cognitive Perspective

The study of the cognitive perspective focuses on understanding the mind and its processes, including concepts of intelligence, language, memory, and perception.[129] It examines the mind-body connection while investigating higher-order psychological processing that occurs between stimulus and the response to a given behavior. [130]The cognitive perspective provides invaluable information on human thought and reason in the context of physical activity behavior.[131]

Personality Perspective

The personality perspective examines the pattern of thoughts, feelings, and behaviors that have a strong influence on a person's expectations, self-perceptions, values, and attitudes. [132] The difference in personality traits can affect exercise behaviors and outcomes. The personality perspective about exercise psychology aims to understand aspects like participation motivation, adherence to physical activity or programs, and the interaction between an individual's personality and exercise or physical activity. [133]

Social Perspective

Social science explores social interaction and the function of societies. This field investigates how humans develop, behave, and adapt within the context of a particular group, institution, culture, or society.[134] The social perspective within exercise or sports psychology is interested in how social factors can influence a person's behavior, attitude, and experience when it comes to physical activity or sport and can assist with learning how to promote continued participation.

Wrap Up

Sport and exercise psychology is a relatively new field of study and continues to increase the understanding of thoughts, feelings, and behaviors as they relate to physical activity. Experts in kinesiology who study sports and exercise psychology conduct research to construct an approach to enhance performance in sports, exercise, and physical activity. As a kinesiology professional, you may use some of the skills, strategies, or perspectives from this chapter to evaluate and promote the continued participation of physical activity for the specific populations you will be working with during your career.

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[128] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[129] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[130] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[131] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[132] https://en.wikipedia.org/wiki/Personality_psychology
[133] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1
[134] https://kinesiologybooks.org/index.php/stork/catalog/view/10/1/167-1

The objective of sports psychology is to understand how being an active participant in sports might affect an individual's psychological well-being or health (Weinberg & Gould, 2019). Researchers who study this objective could be concerned with issues like how sports participation might influence character development in athletes. Researchers could also be interested in examining if high levels of sports participation lead to burnout in athletes. In this case, sports participation is the antecedent, and the various psychological consequences can be viewed as the outcomes. Many subfields have developed in sports psychology over the decades the field has been in existence. Overall, the subfields still fit the guiding definition of sports psychology but are more refined in the research questions that might be studied. We present the subfields below not as exclusive categories but as general guiding groupings.[135]

[135] Runk, L (2024). Exercise Psychology vs Sport Psychology. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/107027

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Chapter 6: Motor Behavior

OBJECTIVES

- Examine the elements of motor behavior and how they relate to kinesiology.
- Historical significance of motor behavior
- Identify the principles of motor development

The Use of Motor Behavior

Motor behavior is the study of how people learn to control and develop movement skills. Motor behavior and development is a dynamic interdisciplinary field within kinesiology that examines how people acquire, refine, and maintain motor skills across their lifespans. This field combines insights from biology, psychology, and biomechanics to understand the processes behind human movement. Knowledge of motor behavior is essential in a variety of kinesiology professions such as physical therapy, occupational therapy, physical education, coaching, and working with children through community organizations.

By studying motor behavior, researchers and practitioners from a variety of fields gain tools to guide best practices. In sports, insights from motor learning and control help athletes achieve peak performance while understanding motor development enables coaches to tailor training to age-specific abilities. In healthcare, motor behavior principles guide rehabilitation, aiding patients in skill recovery or compensating for limitations due to injury or illness. In education, motor development knowledge informs age-appropriate physical activities to support skill growth in children. As we age, our everyday movements progressively become more complex, from learning how to walk to kicking a ball on the 4th-grade playground to running a wide receiver's route in a football game. [136]

The Study of Motor Behavior

Motor behavior studies how skills are learned and controlled. With kinesiology and the study of movement, motor behavior focuses on the best practices for how individuals learn skills and how movement develops and changes throughout our lifetime. Studies into motor behavior also analyze the relationship with other sub-areas in kinesiology including biomechanics, sports sociology, and sports psychology. The investigation into the function of motor behavior includes a deeper dive into its subdisciplines motor learning, motor control, and motor development.

The concept of motor development was derived from studies related to child development, or developmental psychology.[137] Motor learning and motor control put a large emphasis on the

[136] Runk, L (2024). Motor Behavior and Development. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99881

[137] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

structure and function of the neuromuscular system and how we can control this system so that physical actions can be performed faster, more efficiently, and with greater consistency.[138]

Motor learning is defined as the acquisition of skilled movements as the result of practice. Practice is a critical component when it comes to motor skill acquisition, in general, short periods of intense practice will result in more learning than longer, massed practice sessions. By contrast, motor control is understanding the neural, physical, and behavioral aspects of movement.[139] Additionally, motor control involves recognizing how to coordinate muscles and joints during movement, how to control a sequence of movements, and how to adapt environmental information to plan and adjust movements.

The acquisition of rudimentary and fundamental motor skills allows children to explore their environment, exert their expanding independence, and socialize through the sharing of physical activity experiences. Over time, increasingly specialized skills allow children to participate in activities with their families and friends, and, ultimately, to engage in both recreational activities and competitive games.[140]

History of Motor Behavior

Other subdisciplines that investigate motor behavior include Biology and Psychology. Biology centers around the functioning and structure of the body. Studying the connection between physical activity and heredity, aging, and growth is a prominent concept in this discipline. In addition, Psychology is interested in studying motor behavior to evaluate the relationship between movement, physical activity, cognition, cognitive development, and social development. Additionally, motor behavior encompasses elements of biology because movement and physical activity can be affected or influenced by heredity, aging, and growth.[141]

The foundation of modern motor behavior research owes much to the groundbreaking work of Franklin M. Henry, who is often regarded as the "father of motor behavior." During the mid-20th century, Henry introduced experimental methods that allowed researchers to systematically study how people acquire, retain, and control motor skills. His research laid the groundwork for the scientific study of motor behavior by establishing standardized methodologies and theoretical frameworks.

Henry's work was revolutionary because it moved beyond simple observation and began to quantify and analyze the factors involved in skill acquisition and motor performance. His theories and experiments demonstrated that motor skills are not merely a result of physical

[138] Mark G. Fischman (2007) Motor Learning and Control Foundations of Kinesiology: Defining the Academic Core, Quest, 59:1, 67-76, DOI: 10.1080/00336297.2007.10483537
[139] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.
[140] Thomas, Katherine & Thomas, Jerry. (2008). Principles of Motor Development for Elementary School Physical Education. Elementary School Journal. 108. 10.1086/529101.
[141] Thomas, Katherine & Thomas, Jerry. (2008). Principles of Motor Development for Elementary School Physical Education. Elementary School Journal. 108. 10.1086/529101.

ability but are deeply connected to cognitive processes, such as decision-making, perception, and reaction time. This interdisciplinary approach bridged the gap between psychology and kinesiology, influencing how motor behavior is studied and applied in various fields, from athletic training to rehabilitation therapy. Franklin M. Henry's contributions continue to influence modern research and practices. His insights into motor control and learning have helped shape everything from the design of effective training programs for athletes to therapeutic approaches for individuals recovering from injuries or managing chronic conditions. Henry's legacy is evident in the widespread use of motor behavior principles across disciplines, underscoring the importance of a comprehensive approach to understanding and improving human movement.[142]

The study of motor skills and behavior started to gain traction in the early 1900s to better understand the mind and examine elements of cognition. During this time of early exploration into the connection, the following five major themes were discovered and currently make up the foundation of the study of motor behavior: An example is used on a shortstop in baseball: Figure 6.1:

- **Knowledge of Results**
  - There is feedback provided, and information about the outcome of the performance is shared with the participant.
- **Knowledge of Performance**
  - Focuses on the information about how the action was performed.
- **Distribution of Practice**
  - Technique aimed to increase learning capacity where practice occurs in short sessions over a long time.
- **Transfer of Training**
  - Participants or learners can transfer the training and apply learned skills and movements to improve their performance.
- **Retention**
  - Refers to the ability of the participant to perform a learned motor skill or movement over short and long periods.
- **Individual differences[143]**
  - Individual differences can have an impact on an individual's motor skill acquisition. We process information and learn differently based on age, experiences, prior knowledge, or learning styles.

[142] Runk, L (2024). Motor Behavior and Development. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99881

[143] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

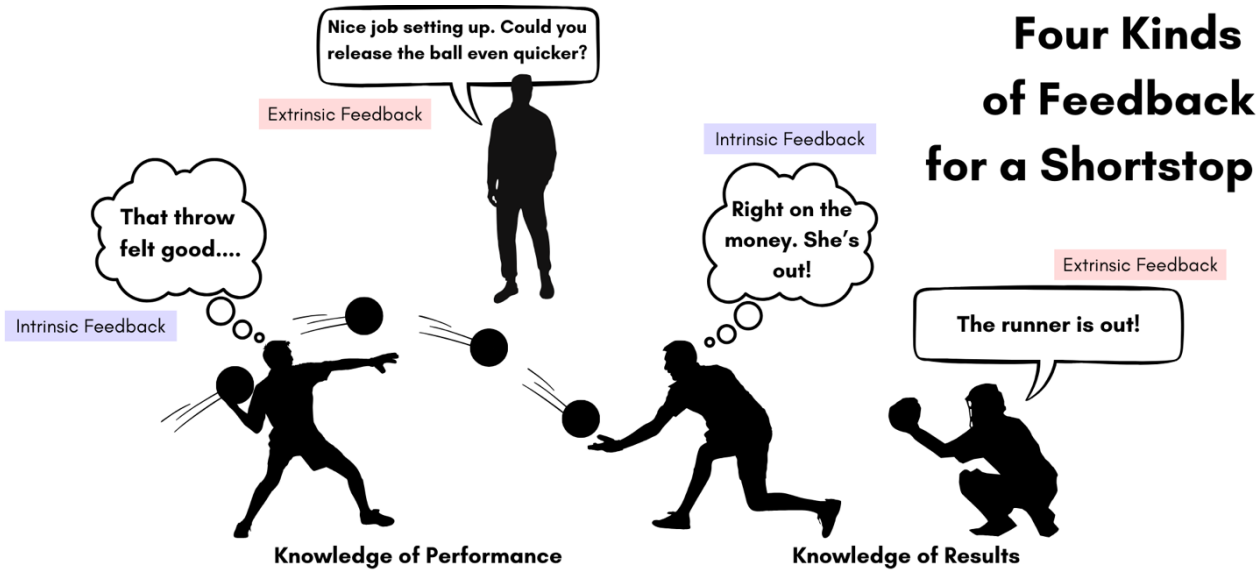

Figure 6.1: Four kinds of feedback during a practice game.[144]

Motor behavior has since evolved into its discipline as a scholarly topic under the kinesiology umbrella and utilizes a biopsychological approach as a basis for its teachings. Motor behavior, as a discipline, focuses on how the neuromuscular system controls and repeats movements leading to advanced knowledge of how the neuromotor coordination system works. It is through the knowledge gained from this discipline that researchers can develop treatments for conditions or spinal cord injuries and learn to improve the function of physical activity and performance in sports.

Studies and additional research have evolved from the foundation of Henry's memory drum theory and research has continued to be focused on how the neuromuscular system controls and repeats movements. By developing advanced knowledge of how this system works, we can develop treatments for spinal cord injuries and learn how to maximize human performance in sports.

Understanding Motor Development, Motor Control, and Motor Learning

Motor Development

Motor development explores how movement skills evolve over the lifespan, shaped by genetic, environmental, and experiential factors. Unlike motor learning and control, which focus on specific skills, motor development considers the broader trajectory of motor abilities from infancy through adulthood and into older age. The transition from crawling to walking in young children is driven by physical growth, neural maturation, and environmental interaction. As

[144] Image created by College of the Canyons. Adapted from Figure 6.3 by Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

individuals age, motor skills continue to develop and are either maintained or adapted in adulthood. Motor development is crucial in fields like child development, geriatrics, and adaptive physical education. By understanding typical and atypical development patterns, practitioners can design interventions that promote healthy growth in children and help older adults maintain mobility and independence.[145]

Motor Control

The study of motor control is an effort to understand how the nervous and muscular systems interact to initiate and carry out direct movements. The brain initiates the planning of a movement, and then neurons and nerves relay the signals from the brain, down the spinal cord, and to the muscles involved in carrying out the movement.[146]

There are two fundamental principles of motor control. The first principle of motor control is that the central nervous system (brain and spinal cord) initiates and sends the motor commands that activate the muscles responsible for the desired movement. The second principle of motor control is to rely on the decision-making center of the brain.

Five Areas in the Study of Motor Control

1. Degree of freedom - coordination
2. Motor equivalency
3. Serial order of movements - coarticulation
4. Perceptual integration during movement
5. Skill acquisition

Figure 6.2: Juggling.[147]

[145] Runk, L (2024). Motor Behavior and Development. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99881

[146] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

[147] Image by James Heilman, MD is licensed under CC BY-SA 3.0.

A motor program generates a series of movements from your muscles, is an abstract metaphor for the central organization of movement and control of the many degrees of freedom involved in acting may be implemented as a proposed memory mechanism that allows us to control movements. As programs develop, they become more automatic, allowing us to concentrate on using movement in performance situations. An example of a proposed memory mechanism could be swinging a baseball bat to hit a baseball. When you continue to develop the memory mechanism, for example, contact between the bat and ball, the motor program becomes more automatic, and the learned behavior can be showcased in performance situations.

Developing a Motor Program

- Specify the muscles involved in the action.
- Select the order of muscle involvement.
- Determine the force of the muscle contractions.
- Specify the relative timing and sequences of contractions.
- Determine the duration of contractions.[148]

The goal of practice is to learn and affect long-term change in the performance of motor behavior. Practice is defined as performance in retention and transfer to other skills, in which the performer performs a different version of the task.[149] For skill acquisition, it accentuates the relationship between motor learning and motor control.

Motor Learning

Motor learning is the process through which people acquire new motor skills through practice and experience. It involves cognitive and neural changes that facilitate mastery of specific movements. Practice is key, as repeated attempts at a skill refine coordination, improve accuracy, and enhance efficiency. For instance, shooting a basketball involves coordinating hand-eye movements, refining grip, aligning stance, and perfecting release technique. Over time, these adjustments become more automatic due to muscle memory, where the body "remembers" tasks through neural adaptations. Understanding motor learning is essential for fields like sports coaching, physical education, and rehabilitation. Effective training and practice schedules influence the speed and quality of skill acquisition, benefiting not only athletes but also patients relearning movements or developing compensatory strategies after injury.[150]

[148] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

[149] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

[150] Runk, L (2024). Motor Behavior and Development. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99881

Effective Motor Learning Techniques

- Practice Improves Performance: Practicing a movement or skill may improve performance within the context of how that skill is used. For example, soccer players can use an agility ladder (incorporate reference to the added picture) during practice to help improve their agility on the field.

- Intrinsic and Extrinsic Feedback: Information about a movement is provided to a learner, either during or after a movement has been completed. The feedback could be from an external source (extrinsic feedback) like video footage or verbal feedback from an instructor or coach. Feedback may also be intrinsic, or from an internal source such as one's thoughts on how they performed a skill or even direct physiological feedback from proprioceptors or pain receptors.

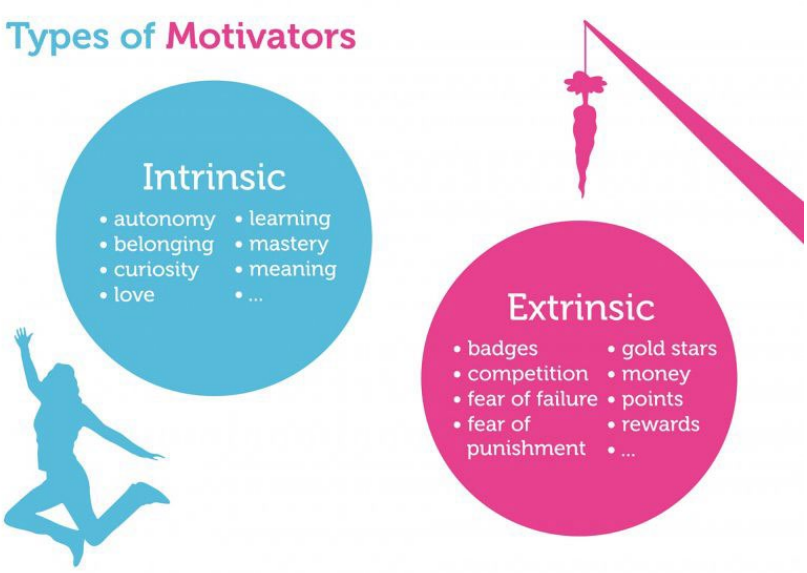

Figure 6.3: Extrinsic and intrinsic motivation.[151]

- Practice: Type of physical activity experience that involves cognitive processing and leads to improvement of skill (learning); repetition of a task, often with an instructor's guidance or feedback, to promote learning.

- Feedback: Feedback is provided to the participant to provide knowledge or insight of results and performance of performed movement or skill.

- Knowledge of performance is about the process of movement. This is especially important for beginners to understand what to do, how to do it, and what the goal or desired outcome of the movement or skill is.

[151] Image by Eric delcroix on flickr is licensed under CC BY-NC-SA 2.0.

- Knowledge of results is about the outcome of the movement.[152] The participant needs direct feedback to confirm the correct function of the task or movement.

The techniques listed above, and various factors related to motor control or motor development can affect motor learning development in physical education classes and performance-based sports and activity. One of the essential factors that may affect motor learning is feedback.[153] The motor skill learning process focuses on exploring and practicing actions and patterns of movements. Students need information on their motor skill performance to correct errors and improve, as well as to motivate them to continue learning.[154] Providing regular and effective feedback is necessary for continued motor learning development.

Wrap Up

Increasing our knowledge of motor behavior by understanding how skills are required and developed will allow people to utilize these skills more effectively and efficiently. The insight gained through the study of motor behavior is important to many areas of our society and will continue to help athletes advance performance skills in sports, infants learn how to eat with a spoon, pilots learn to fly a plane, or an elderly person who is working to remain independent.[155] Knowledge about motor behavior is essential across a variety of kinesiology professions including physical or occupational therapy, coaching, physical education, and working with children through community sports organizations.

[152] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

[153] Zhou Y, Shao WD, Wang L. Effects of Feedback on Students' Motor Skill Learning in Physical Education: A Systematic Review. *International Journal of Environmental Research and Public Health*. 2021; 18(12):6281. https://doi.org/10.3390/ijerph18126281

[154] Zhou Y, Shao WD, Wang L. Effects of Feedback on Students' Motor Skill Learning in Physical Education: A Systematic Review. International Journal of Environmental Research and Public Health. 2021; 18(12):6281. https://doi.org/10.3390/ijerph18126281

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Chapter 7: Biomechanics of Physical Activity

OBJECTIVES

- Describe the elements of biomechanics.
- Investigate the basic analysis of movement.
- Examine how biomechanics is useful and how it relates to the field of kinesiology.
- Identify key aspects of biomechanics in physical activity.

The Use of Biomechanics

Mechanics is a branch of physical science that deals with energy and forces and their effect on bodies. When researchers apply the principles of mechanics to living organisms and systems, it creates the discipline of biomechanics. Biomechanics takes the general principles of mechanics and applies them to living systems.[156] The basis of this discipline is to investigate why people move the way they do, and the techniques that are considered the best, or most efficient, when performing a specific movement. The goal of biomechanics, as it relates to human movement, is to enhance physical performance through 1) improved training techniques, 2) equipment, 3) injury prevention, and 4) more effective rehabilitation strategies.[157]

Biomechanics provides kinesiologists with a better understanding of the following areas:

- How forces affect the human body.
    - Example: The application of forces from different angles to the knee joint and the corresponding impacts on joint integrity.
- How to accurately describe human movement.
    - Example: Gait analysis for a marathon runner with the intent of selecting the ideal running shoes.
- How forces produced by muscles lead to movement.
    - Example: Analyzing angles of the glenohumeral joint during the throwing phase in baseball to inform efficient strength training techniques.[158]

As a kinesiology professional, it is important to understand how the human body interacts with the physical world. We combine the knowledge of biomechanics with other core areas of kinesiology, such as exercise physiology, anatomy, physiology, and motor control.[159]

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[156] https://pressbooks.openedmb.ca/introtobiomechanics/chapter/1-introduction/
[157] BIOMECHANICS OF HUMAN MOVEMENT
[158] https://pressbooks.openedmb.ca/introtobiomechanics/chapter/1-introduction/
[159] https://pressbooks.openedmb.ca/introtobiomechanics/chapter/1-introduction/

History of Biomechanics

During the scientific renaissance (1450-1640), professionals in the fields of science, math, and medicine expressed interest in how the body was structured and how the movement was influenced. Giovanni Alfonso Borelli, the father of biomechanics, understood that muscles use leverage to create movement within the body.[160] Borelli compared the movement of the human body to pulley systems by using principles of mechanics and statics.

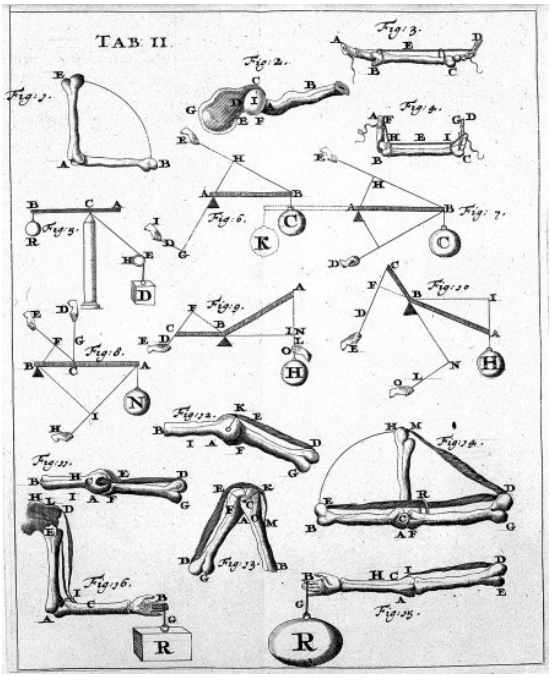

Figure 7.1: The drawing by Giovanni Alfonso Borelli comparing the movement of human appendages to pulley systems using principles of mechanics and statics.[161]

Ruth Glassow, from the University of Wisconsin, conducted research that helped create the foundation for biomechanics and develop learning objectives for the future in teaching physical education and preparing professors on how to teach biomechanical principles.[162] The research applied fundamental principles of mechanics to understand and classify activities like locomotion, throwing, striking, and balance into categories.[163] This revolutionizing categorization built the foundation for biomechanical knowledge of human movements.

In the 1960s, there was an expansion in the amount of national and international organizations and university programs in biomechanics. It became established as a subdiscipline in the university curriculum under kinesiology with courses and graduate-level university programs created for students and professionals to learn about biomechanics and become a biomechanist.

[160] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics
[161] Image by Giovanni Alfonso Borelli from *De Montu Animalium* is in the public domain.
[162] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics
[163] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics

Understanding Biomechanics

Two important subdisciplines in the field of biomechanics are kinematics and kinetics. Kinematics is the branch of classical mechanics that describes the motion of points, objects, and systems of groups of objects, without reference to the causes of motion (i.e., forces)." Instead of studying the forces acting on objects, kinematics focuses on variables such as acceleration, velocities, and trajectories[164].

Kinetics is the study of motion and its causes, particularly forces, and is focused on the explanation of motions (the forces that cause or tend to cause changes in motion). While both kinematics and kinetics describe motion, the key distinguishing feature is that kinetics is concerned with forces, whereas kinematics simply describes motion. [165]

Kinematic Analysis

Kinematic analysis is often used to study the motion of the body, limbs, and joints that occurs during various human movements, as well as the motion of external objects associated with human motion.[166] There are five kinematic variables used when completing kinematic analysis: Time, position, displacement, velocity, and acceleration. Any or all of these five variables can be used in the analysis and description of movement.

Time and position are the most basic variables, which means they do not depend on the other three variables and can be measured independently. Displacement, velocity, and acceleration are complex and are built upon the foundation of the time and position variables.[167]

Kinetics Analysis

The study of kinetics is the study of motion, specifically examining what causes motion, also known as force. Force is described as all motion in the world; we are usually unaware of important forces in the body, for example pushing the pedals on a bike, using a paddle when you row or canoe, or the force that is used when using a racket in various sports.

When force is applied to an object it can:

- Change the shape of the object.
    - Example: Pushing on a spring causes it to compress[168]

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[164] https://phys.libretexts.org/Bookshelves/University_Physics/Physics_(Boundless)/2%3A_Kinematics/2.1%3A_Basics_of_Kinematics

[165] https://courses.fortlewis.edu/courses/17334/pages/introduction-to-biomechanics?module_item_id=491714

[166] https://courses.fortlewis.edu/courses/17334/pages/kinematic-variables?module_item_id=491715

[167] https://courses.fortlewis.edu/courses/17334/pages/kinematic-variables?module_item_id=491715

[168] https://courses.fortlewis.edu/courses/17334/pages/kinetics?module_item_id=491744

- Change the degree of acceleration and direction the object is moving.
    - Example: Throwing a shotput.

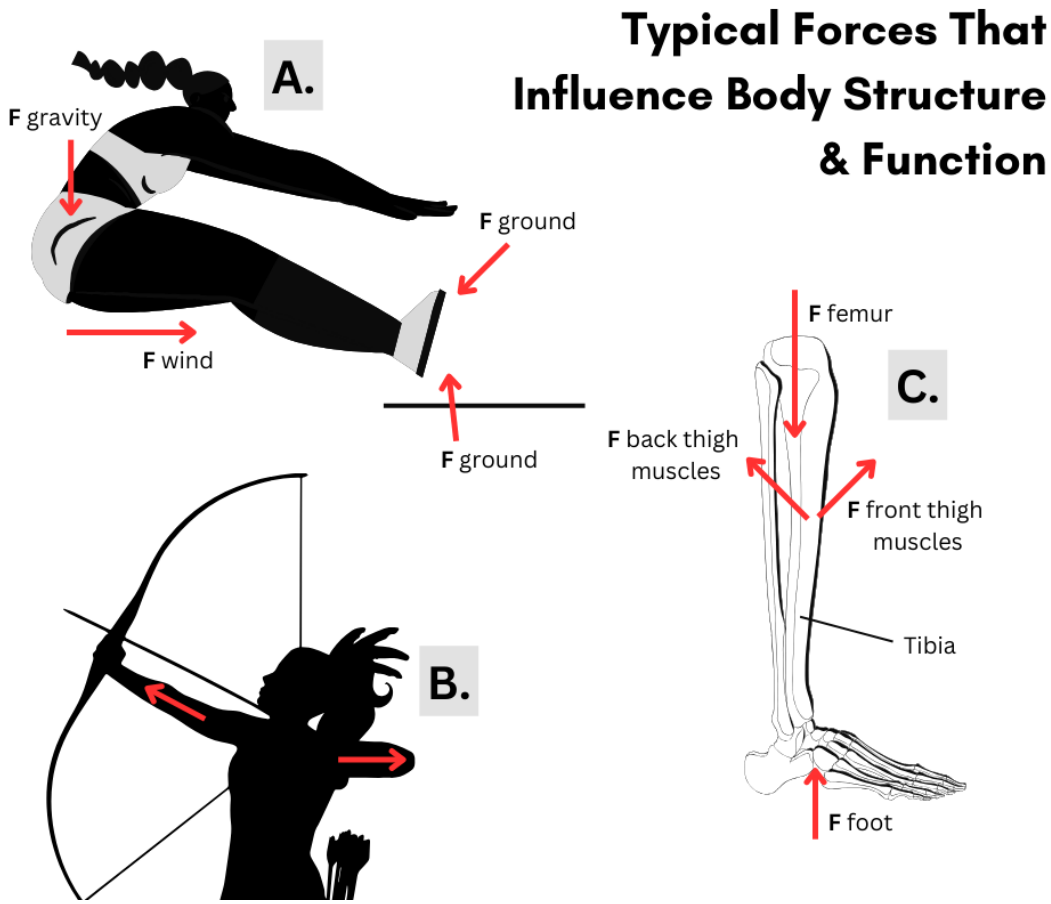

Figure 7.2: Some typical forces that influence body structure and function (including movement): (A) Forces applied to us by another object; (B) Forces that we apply to another object to manipulate its motion; and (C) Forces acting on a bone (the tibia).[169]

The application of mechanical principles using kinematic and kinetics analysis about living systems helps us better understand the efficiency of human movement during exercise, sport, and activities of daily living.

[169] Image by College of the Canyons ZTC is licensed under CC BY-SA 4.0. References material from Biomechanical Principles.

Explain How Biomechanics is Useful in Careers in Kinesiology and Related Areas

Newton's Laws: Principles of Biomechanics

Biomechanics is the study of forces that are applied to the outside and inside of the body and the body's reaction to those forces. In the seventeenth century, Sir Isaac Newton observed that forces were related to mass and motion in a very predictable way. His Philosophiae Naturalis Principia Mathematica (1687) provided the basic laws and principles of mechanics that form the cornerstone for understanding human movement. These laws, referred to as the law of inertia, the law of acceleration, and the law of action-reaction, are collectively known as the laws of motion and form the framework from which advanced motion analysis techniques are derived.

Newton's Laws: Motion

Newton's laws of motion introduce techniques for analysis of the relationship between the forces applied to the body and the consequences of those forces on human motion and posture. The term *body* is used when elaborating on the concepts related to the laws of motion and the methods of quantitative analysis. Be aware that the term body could also be used interchangeably with the entire human body; an object, such as a weight that is being lifted; or the system under consideration, such as the foot-floor interface. Newton's laws are described for both linear and rotational (angular) motion.

Newton's Laws: Linear and Rotational Applications

Table 7.1: Linear & Rotational Applications[170]

Law	Linear Application	Rotational Application
First Law of Inertia	A body remains at rest or at a constant linear velocity except when compelled by an external force to change its state.	A body remains at rest or a constant angular velocity around an axis of rotation unless compelled by an external torque to change its state.
Second Law of Acceleration	The linear acceleration of a body is directly proportional to the force causing it, takes place in the same direction in which the force acts, and is inversely proportional to the mass of the body.	The angular acceleration of a body is directly proportional to the torque causing it, takes place in the same rotary direction in which the torque acts, and is inversely proportional to the mass

[170] References Table 4-1 from Biomechanical Principles.

Law	Linear Application	Rotational Application
		movement of inertia of the body.
Third Law of Action-Reaction	For every force, there is an equal and opposite directed force.	For every torque, there is an equal and opposite directed torque.

Mechanics

Newton's first law is also called the law of inertia. *Inertia* is related to the amount of energy required to alter the velocity of a body. The inertia of a body is directly proportional to its *mass* (*i.e*., the amount of matter constituting the body). For example, more energy is required to speed up or slow down the movement of a 15-pound dumbbell compared to a 10-pound dumbbell.

Each body has a point, called the *center of mass,* where the body's mass is distributed evenly in all directions. When subjected to gravity, the center of mass of a body closely coincides with its *center of gravity.* The center of gravity is the point where the effects of gravity are completely balanced. The center of mass of the human body in anatomical position lies just anterior to the second sacral vertebra, but the exact position of the center of mass will change as a person changes his or her body position.

In addition to the human having an overall center of mass, each segment, such as the arm or trunk, has its own defined center of mass. In the lower extremity, for example, the major segments include the thigh, lower leg, and foot, and each has its center of mass. The center of mass of these segments for the lower extremities of a sprinter is, indicated by black circles in the picture below. The location of the center of mass within each segment remains fixed, approximately at its midpoint. In contrast, however, the location of the center of mass of the *entire* lower extremity changes with a change in the spatial configuration of the segments (compare red circles). As shown for the left (flexed) lower extremity, the specific configuration of the segments can displace the center of mass of the lower limb *outside* the body.

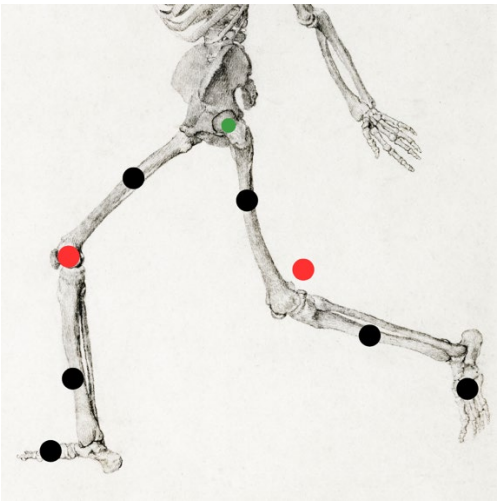

Figure 7.3: The lower extremities of a sprinter are illustrated, showing the centers of mass for the thigh, shank (lower leg), and foot segments as black circles. The center of mass for each lower extremity is shown as a red circle. The center of mass of the sprinter's left lower extremity exists outside of the body. The axis of rotation of the right hip is indicated by the smaller green circle.[171]

The mass moment of inertia of a body is a quantity that indicates its resistance to a change in angular velocity. Unlike inertia, its linear counterpart, the mass moment of inertia depends not only on the body's mass but, perhaps more importantly, on the distribution of its mass concerning an axis of rotation. (Inertia or moment of inertia, is often indicated by I and is expressed in units of kilograms-meters squared [kg-m^2]) and because most human motion is angular rather than linear, the concept of mass moment of inertia is very relevant and important.

Consider again the two positions of the lower extremities of the sprinter in the picture on the previous page. Within each segment, the individual's centers of mass of the thigh, lower leg, and foot are in the same location in both lower extremities; however, because of the different degrees of knee flexion, the distances of the centers of mass of the lower leg and foot segments have changed relative to the hip joint. Consequently, the mass moment of inertia of each entire limb changes; the right extended (and "longer") lower extremity has a greater mass moment of inertia than the left. Another way of conceptualizing the increase is to note that as the knee extends, the center of mass of the entire right lower extremity, (depicted by the red circle), moves farther from the hip, thereby increasing its mass moment of inertia.

The ability to actively change an entire limb's mass moment of inertia can profoundly affect the muscle forces and joint torques necessary for movement. For example, during the swing phase of running, the entire lower limb functionally shortens by the combined movements of knee flexion and ankle dorsiflexion (as in the left lower extremity). The lower limb's reduced mass moment of inertia reduces the torque required by the hip muscles to accelerate and decelerate the limb during the swing phase. This concept can be readily appreciated during the swing

[171] Image by College of the Canyons ZTC is licensed under CC BY-SA 4.0. References work from Biomechanical Principles.

phase while running with the knees held nearly extended (increased I), or almost fully flexed (decreased I).

Study of Forces

Kinetics focuses on the forces that cause movement. These forces include internal forces, such as muscle contractions, and external forces, such as gravity and friction. Understanding how forces are generated and transmitted through the body is essential for optimizing performance, preventing injury, and improving rehabilitation strategies. **Muscle forces** are the forces generated by muscles that are the primary contributors to movement. The strength of these forces affects both the efficiency and safety of movement. **Joint loading** takes into consideration the forces placed on the joints during movement and is critical for understanding potential areas of stress and strain that could lead to injury. Finally, **external forces,** including gravity, friction, and external resistance (e.g., weights or the ground surface) all play a role in how the body moves and interacts with its environment.

To understand how these kinematic factors apply, let's consider the squat exercise. Squats are a fundamental exercise in strength training, and analyzing the forces involved can provide insights into muscle strength, joint loading, and injury prevention. During a squat, the quadriceps, hamstrings, and gluteal muscles work to generate force to lower and raise the body. The force produced by these muscles can be measured to assess strength and identify muscular imbalances. Concerning joint loading, the forces on the knee and hip joints are particularly high during deep squats. Analyzing the load on these joints can help prevent overuse injuries and guide proper technique, such as ensuring proper knee alignment to avoid excessive stress on the ligaments.

Tissues and functions in the human body

Bones

Due to the mechanical properties of bone tissue, bones will be directly affected by the physical forces placed upon them. Thus, the bone will show different strengths depending on whether forces of compression, traction, or shearing are applied. Compression tests are often used for trabecular or cortical bone samples or vertebral bodies. The long bones such as the femur or tibia are usually subjected to traction, torsion, or bending tests. In these, there is a combination of compression forces on the side to which the force is applied and of traction forces on the opposite side. The relationship between structural properties, material properties, and the mechanical behavior of bone is complicated, which is a challenge. An understanding of this relationship is of great importance to kinesiology, since it helps us to understand the behavior of bone subjected to constant physiological loads, identifies the area’s most susceptible to fracture, and allows the prediction of different pathologies about bone strength, and their treatment.

Muscles

Muscles are the driving force behind every movement we make, transforming neural signals and chemical energy (ATP) into coordinated actions that power daily activities and elite athletic performance. The study of how muscles produce force and coordinate with one another helps us understand everything from simple motions, like walking, to complex athletic feats, like a high jump or a tennis serve. The mechanics of muscle function, including the relationships between force, length, and velocity, provide insights into how muscles adapt and perform under different conditions. Muscle force production is not constant—it varies with muscle length and contraction speed. The **force-length relationship** describes how muscles produce their greatest force at an optimal length, which aligns with their resting state where cross-bridge formation (the direct contact between actin and myosin) is maximized. For instance, consider a biceps curl: at mid-flexion, the biceps generate maximum force, whereas, at full extension or contraction, the force diminishes. The **force-velocity relationship** reveals that muscles generate more force during slower contractions. This principle is evident in weightlifting: when lifting heavy loads (slow movement), muscles produce maximum force, but when lifting light loads quickly, force production decreases. Sprinters and powerlifters use this understanding to fine-tune their training, balancing speed and resistance to optimize performance.

Muscles rarely work alone—they operate in pairs or groups to create smooth and controlled movements. **Agonist muscles** are the primary movers during an action, while **antagonists** oppose the motion to maintain balance and control. For example, during a squat, the quadriceps (agonists) extend the knee while the hamstrings (antagonists) provide stability and prevent hyperextension. The interaction between the muscles in each of these roles (with some assistance from stabilizing muscles) ensures precision and reduces injury risk. A practical demonstration of this coordination is evident in throwing a ball where the triceps act as the agonist, extending the elbow, while the biceps lengthen (antagonist) to control the motion and avoid hyperextension.

Understanding the different types of muscle fibers is essential for biomechanics and effective training strategies. Slow-twitch oxidative fibers, or **Type I fibers**, are designed for endurance activities. These fibers contract slowly, resist fatigue, and rely on aerobic metabolism to sustain energy production. For example, marathon runners heavily depend on Type I fibers to maintain a steady energy output over long distances. On the other hand, fast-twitch fibers, or **Type II fibers**, are specialized for quick, powerful contractions but fatigue rapidly. These fibers are further divided into *Type IIa* (fast-twitch oxidative) and *Type IIb (fast-twitch glycolytic)*. Type IIa fibers, often called intermediate fibers, blend endurance and power characteristics. They use both aerobic and anaerobic metabolism, making them versatile for activities like middle-distance running. Type IIb fibers, in contrast, are highly explosive, relying on anaerobic metabolism to generate maximal force in the shortest amount of time, such as during sprinting or heavy lifting. All individuals possess a mix of all three fiber types, but targeted training can influence their functional capacities. Endurance training enhances the efficiency of Type 1 fibers and shifts some Type IIa fibers toward showing Type I characteristics, increasing their

endurance potential. Conversely, resistance and explosive training primarily enhance the recruitment and performance of Type IIb fibers, while also bolstering the power output of Type IIa fibers.

The properties of muscle tissue—*elasticity, extensibility, contractility,* and *excitability*—are fundamental to understanding biomechanics and movement. **Elasticity** enables muscles to return to their original length after being stretched, a property that is crucial in activities like jumping or sprinting, where repeated cycles of stretch and recoil are involved. **Extensibility**, the ability of muscles to stretch without sustaining damage, is vital for maintaining flexibility and preventing injuries during dynamic movements. **Contractility**, the unique capability of muscle fibers to generate force, works in tandem with **excitability**, which ensures that muscles respond efficiently to neural signals. These properties play varying roles depending on the activity. For instance, in yoga, extensibility and elasticity are essential as muscles stretch and rebound through controlled, fluid motions. In contrast, sprinting relies heavily on contractility and excitability, where the nervous system rapidly activates fast-twitch fibers to generate explosive force and propel the body forward.

Knowledge of muscle mechanics and fiber types informs training and rehabilitation programs. For athletes, understanding their fiber composition can guide targeted training. A sprinter may focus on explosive drills like plyometrics to enhance fast-twitch fiber function, while an endurance athlete emphasizes long-distance runs to optimize slow-twitch capabilities. In rehabilitation, therapists use principles of muscle mechanics to restore strength and function. After an ACL injury, for example, rehabilitation focuses on retraining agonist and antagonist muscle groups (e.g., quadriceps and hamstrings) to regain balance and control. Incorporating both isometric (static) and dynamic exercises aligns with the force-length and force-velocity relationships to rebuild strength and prevent re-injury.[172]

Wrap Up

As a kinesiology professional, knowledge of biomechanics can assist you with improving performance, preventing and rehabilitating injuries, improving the health of joints or tissues, and modifying physical activity or sports equipment to improve the safety of participants. Applying mechanical principles to understand how forces can affect a human's ability to carry out functions or perform and pursue goals in sport or physical activity, allows kinesiology professionals the opportunity to assist their clients or athletes. When we gain an in-depth understanding of how mechanical principles can influence the movement and functioning of our bodies, it better prepares future professionals for a career within kinesiology and increases their ability to assist the populations they serve to achieve performance goals, avoid injuries, and improve the function of daily physical activities.

[172] Runk, L (2024). Biomechanics. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99882

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Chapter 8: Exercise Physiology

OBJECTIVES

- Examine the elements of exercise physiology and how they relate to kinesiology.
- Historical significance and development of the physiology of physical activity.
- Identify key principles of the physiology of physical activity.

What Is Exercise Physiology?

Exercise physiology refers to applying principles of biology and chemistry to understand metabolic energy sources and the acute or chronic responses to physical activity. [173] The primary focus is on the exercise components of physical activity, which includes training, detraining, and how participation in physical activity can improve health and decrease various health risks and mortality.[174]

Evidence supports the positive relationship between physical activity and a person's health and well-being. It has been demonstrated that physical activity can reduce the risk of coronary heart disease, hypertension, and diabetes.[175]

History of Exercise Physiology

Like biomechanics, the roots of Exercise Physiology can be traced back to ancient Greece, where physicians like Hippocrates and Galen recognized the health benefits of physical activity. However, it was not until the 20th century that the field began to take shape as a distinct scientific discipline. The development of Exercise Physiology as a scientific discipline began in the early 1900s.[176]

Two of the most notable contributors to the study of exercise physiology were August Krogh, of the University of Copenhagen and A.V. Hill from the University of London. Krogh designed the first cycle ergometers, or exercise bikes, to study and measure the physiological responses to exercise. Krogh's research on the regulation of microcirculation earned a Nobel Prize in 1920. Hill focused his attention on energy metabolism and experimental skills to investigate the

[173] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.
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[176] Runk, L (2024). Exercise Physiology. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99883

relationships among muscle mechanics, biochemistry, and heat production and earned a Nobel Prize for his research in 1921.[177]

The knowledge and understanding of exercise physiology were expanded through extensive research conducted in laboratories from the 1920s-1940s. Laboratories were established throughout physical education departments, like the exercise physiology laboratory at Springfield College in Massachusetts, which was established by Dr. Peter V. Karpovich. Karpovich focused his research on the effects of ergogenic aids on physical performance and was one of the founders of the American College of Sports Medicine (ACSM).

Shift in Perspective

In the 1990s, United States government agencies reported on and supported the use of regular physical activity and the prevention of chronic diseases. In 1996, the U.S. Department of Health and Human Services published, in the Surgeon's General report on physical activity, that physical activity can reduce the risk of heart disease, diabetes, hypertension, and colon cancer, and help maintain a healthy body weight,

Current Trends in Physiology

The recommendations from the American College of Sports Medicine (ACSM) and the American Heart Association (AHA) regarding guidelines for physical activity suggest that all healthy adults between the age group of 18-65 need moderate-intensity aerobic exercise for a minimum of 30 minutes a day for 5 days per week.[178] When the body engages in this type of physical activity more frequently, factors such as muscular strength and endurance, cardiorespiratory endurance, body composition, and one's self-confidence can all be improved. [179]

Exercise Physiology and Physical Activity

Key Areas in the Study of Exercise Physiology

- Enhancing sport performance and training
- Improving physical fitness
- Promoting health and reducing the risk of disease

[177] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.
[178] American college of sports medicine ACSM's Guidelines for exercise testing and prescription 8th edition.
[179] Kanvinde, M. R., & Nalgirkar, V. V. (2022). A study showing a correlation between the effect of treadmill and ergometer on VOmax in athlete. *Indian Journal of Clinical Anatomy and Physiology*, *9*(1), 50–53. https://doi.org/10.18231/j.ijcap.2022.012

Research In Exercise Physiology

VO2 Max

VO2 max, or maximal oxygen consumption, refers to the maximum amount of oxygen that an individual can utilize during intense or maximal exercise. This measurement is generally considered the best indicator of cardiovascular fitness and aerobic endurance. The more oxygen a person can use during high-level exercise, the more energy a person can produce. This test is the gold standard for determining cardio-respiratory fitness because the muscles need oxygen for prolonged aerobic exercise, and the heart must pump adequate amounts of blood through circulation to meet the demands of aerobic exercise.172

VO2 max is a vital indicator of aerobic capacity and overall fitness. By studying how different training methods can enhance VO2 max, exercise physiologists can develop strategies to boost endurance and athletic performance. Lastly, the mechanics of breathing, or ventilation, adapt to meet the increased physical demands during exercise. This adaptation involves changes in the rate and depth of breaths to ensure that sufficient oxygen is taken in and carbon dioxide is expelled. Understanding these respiratory responses helps in optimizing performance and maintaining health during exercise. Together, these insights into cardiovascular and respiratory demands inform the creation of training programs that enhance both health and athletic ability.[180]

Figure 8.1: VO2 Max.[181]

[180] Runk, L (2024). Exercise Physiology. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99883

[181] Image by Fort Carson is licensed under CC BY 2.0.

Ergometers

The Merriam-Webster dictionary defines an ergometer as "An apparatus for measuring the work performed (as by a person exercising)." [174] Ergometers can vary in type but may include treadmills, upright bikes, recumbent bikes, rowing machines, and arm bikes. Equipment of this nature is generally used for improving one's overall fitness but can also be used in the clinical setting for physical therapy and exercise research. Through their use, therapists, clinicians, and/or coaches can assess different components of a person's fitness and then use that knowledge to customize an exercise program to fit the person's individual needs or goals. As with any type of fitness-related equipment, it is important to learn how to properly use it to avoid serious injury.

Body Composition

This assessment is used to determine a person's percentage of body fat, or ratio of lean tissue to adipose tissue. Methods of assessment may include hydrostatic weighing, or underwater weighing, where the subject is weighed while submerged in water. Another device used to measure body composition is called the BOD POD and it is an alternative method that uses air displacement instead of water displacement to obtain the subject's body fat percentage.[182]

Exercise physiologists study these adaptations to better understand their effects on health and performance. Aerobic exercises, such as running or cycling, primarily target fat stores, promoting fat loss and improving overall body composition. In contrast, resistance training increases lean mass by stimulating muscle hypertrophy. Weight-bearing and resistance exercises also enhance bone density by stimulating osteoblast activity, which helps reduce the risk of osteoporosis. Activities like running, jumping, or weightlifting are particularly effective in promoting bone health. For example, gymnasts often display high bone density due to the repetitive impact forces experienced during their routines. Additionally, different sports and activities require specific body composition profiles to optimize performance. Swimmers, for example, may benefit from slightly higher fat levels for buoyancy, while gymnasts need low body fat and high muscle mass for strength and agility. Exercise physiologists design training programs that align with these specific demands.[183]

[182] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.
[183] Runk, L (2024). Exercise Physiology. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99883

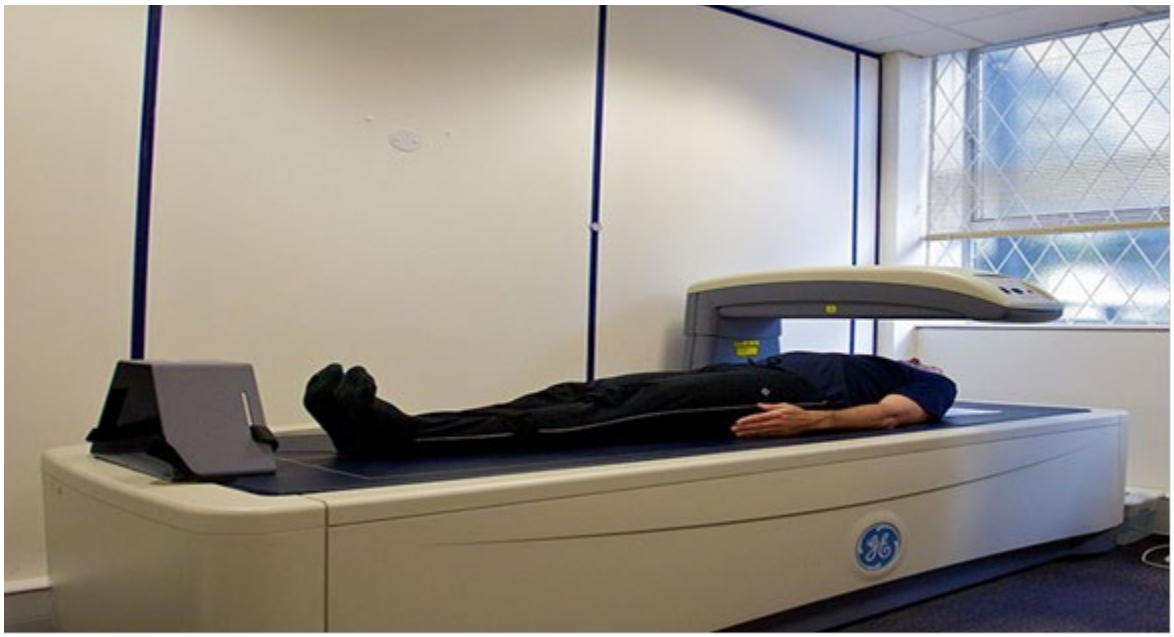

Figure 8.2: Dual-energy X-ray absorptiometry scan.[184]

Understanding Physiology

Primary Body Systems Affected by Physical Activity

The physiological response to exercise is dependent on the environmental conditions, intensity, duration, and frequency of the exercise. During physical exercise, our skeletal muscles experience an increased demand for both oxygen and glucose, as well as a need for metabolic waste like carbon dioxide to be removed.[185]

Skeletal Muscles

Movement in the body is produced by muscle tissue. Human beings have three types of muscle tissue: skeletal, cardiac, and smooth. Anatomically, they are all different yet are still involved with the movement. For example, cardiac muscle pumps blood and smooth muscle moves food through our GI tract. Skeletal muscle, however, is responsible for our ability to move in the space around us. Skeletal muscles are made up of muscle cells, also called muscle fibers. Inside the muscle cells, there are microscopic myofibrils that run the length of the muscle fiber. There are three primary types of muscle fibers found in skeletal muscles that are named according to 1) how quickly they contract, and 2) how they manufacture ATP. They are slow-twitch oxidative (Type I), fast-twitch oxidative (Type IIa), and fast-twitch glycolytic (Type IIb).

For a basic explanation of their characteristics, we will focus on the Type I vs the Type IIb fibers. Type I fibers are generally smaller in diameter, are fatigue-resistant and have a slower

[184] Image by Nick Smith photography is licensed under CC BY-SA 3.0

[185] Burton, D. A., Stokes, K., & Hall, G. M. (2004). Physiological effects of exercise. *Continuing Education in Anaesthesia Critical Care & Pain*, *4*(6), 185–188. https://doi.org/10.1093/bjaceaccp/mkh050

contractile velocity. Contrastingly, Type IIb fibers are larger in diameter, fatigue-prone, and have a faster contractile velocity. In an athletic context, Type I fibers are better suited for activities of low to moderate intensity and of longer duration (i.e. distance events in track and field), whereas Type IIb fibers are better suited for short, powerful activities of moderate to high intensity (i.e. sprinting or power lifting).

Cardiovascular System

The cardiovascular system, whose is composed of the heart and blood vessels and its primary function is to transport oxygenated blood throughout the body to deliver oxygen to our tissues and then transport carbon dioxide to the lungs for elimination from the body. During physical activity, our skeletal muscles experience an increased demand for the exchange of these two key blood gases if they are to function optimally. When a muscle contracts, blood flow is restricted briefly until the muscle relaxes and normal blood flow is reestablished.[181]

Four common terms used when discussing cardiovascular fitness are 1) heart rate (HR), 2) stroke volume (SV), 3) cardiac output (CO), and 4) blood pressure (BP). Heart rate is defined as the number of times the heart beats per minute, and stroke volume is defined as the amount of blood pumped out of the heart's ventricles per contraction. Cardiac output is a combination of those two variables and is literally the amount of blood pumped out of the heart per minute. In equation form, cardiac output can be expressed as CO = HR x SV. Blood pressure is generally defined as the force exerted against the walls of a blood vessel and is usually measured in millimeters of mercury (mm Hg).

During physical activity, cardiac output increases as the muscles use more oxygen. Oxygen uptake continues to increase in direct proportion to the intensity of exercise until maximal oxygen uptake (VO2 Max) is reached.

Respiratory System

The respiratory system regulates the exchange of our key blood gases (oxygen and carbon dioxide) gases between the external environment (air) and the internal environment (lungs).[186] When engaging in high-intensity exercise, there is an increased volume of air moving into and out of the lungs. As the work rate is increased, oxygen uptake increases linearly. However, there is an upper limit to oxygen uptake and, therefore, above a certain work rate oxygen consumption reaches a plateau (VO2max).[187]

Movements require neuromuscular activation and control, and the cardiovascular and respiratory systems provide the ability to sustain these movements over extended periods.

[186] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.
[187] Burton, D. A., Stokes, K., & Hall, G. M. (2004). Physiological effects of exercise. *Continuing Education in Anaesthesia Critical Care & Pain*, *4*(6), 185–188. https://doi.org/10.1093/bjaceaccp/mkh050

When the body engages in regular physical activity, each of these physiological systems undergoes specific adaptations that increase the body's metabolic efficiency and capacity.[188]

Wrap Up

This subdisciplines of kinesiology center on the acute and chronic changes that occur within the human body in response to physical activity.[189] Exercise physiologists can work in a variety of areas, including but not limited to, cardiac rehab centers, physical therapy clinics, gyms and fitness centers, or professional sports teams. When working in the private sector, they can focus not just on muscular fitness and human performance, but on basic health issues such as improving body composition and managing diabetes. [190]

[188] Kanvinde, M. R., & Nalgirkar, V. V. (2022). A study showing a correlation between the effect of treadmill and ergometer on VOmax in athlete. *Indian Journal of Clinical Anatomy and Physiology*, *9*(1), 50–53. https://doi.org/10.18231/j.ijcap.2022.012

[189] Knudson, D. V., & Brusseau, T. A. (2022). *Introduction to Kinesiology* (6th ed.). Human Kinetics.

[190] Matheson GO, Klügl M, Dvorak J, et al. *Responsibility of sport and exercise medicine in preventing and managing chronic disease: applying our knowledge and skill is overdue*. Br J Sports Med. 2011;45(16):1272–1282.

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Chapter 9: Becoming a Physical Activity Professional

OBJECTIVES

- What do you need to become a professional in this field?

A **profession** is a job at which someone works and for which they have had training. It is what people do to get money or make a living. People often study for years to do their job. Examples of a profession are a teacher or a lawyer. These are called "learned professions."[191] Someone who gets paid to work in a profession is called a professional. A **professional** is any person who earns a living from a specified professional activity. The term also describes the standards of education and training that prepare people for the knowledge and skills necessary to perform their specific roles within that profession.[192] Some common traits of any professional are being respectful, honest, fair, good communication, and handling stressful situations. Kinesiology provides knowledge that contributes to successful careers in various professions by connecting professionals through organizations. Kinesiology has many organizations that connect experts from around the world, encouraging communication, helping people grow as professionals, and keeping their members up to date with relevant information and changes in state or federal policies.

Figure 9.1: Professional expertise[193]

[191] Profession. (n.d.). In *Wikipedia*. Retrieved from https://simple.wikipedia.org/wiki/Profession
[192] Professional. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Professional
[193] Image by College of the Canyons ZTC Team, references image

Professional Development

In education, the term **professional development** means providing a variety of specialized training, formal education, or advanced learning intended to help administrators, teachers, and other educators improve their professional knowledge, competence, skill, and effectiveness. Professional development for educators encompasses an extensive range of topics and formats. For example, professional development experiences may be funded by the district, school, or state budgets and programs, or they may be supported by a foundation grant or other private funding sources. They may range from a one-day conference to a two-week workshop to a multi-year advanced-degree program. They may be delivered in person or online, during the school day or outside of regular school hours, and through one-on-one interactions or in group situations.[194]

Complex Skills

Knowledge of Kinesiology positively enhances and contributes to many types of professions, and the different types of professions require proficiency in different types of skills. Movement concepts are the cognitive, perceptual, and interpersonal components of movement. As people engage in physical activities and practice, they learn how the body can move in various ways. For example, they learn to move at different speeds and degrees of force, in various pathways, around different obstacles, and with an awareness of other people. Movement skills enable people to problem-solve how the body should move during certain activities and provide critical foundations for learning how to move in novel situations (e.g. when playing a new sport). To become proficient movers and Kinesiology professionals, people need to acquire both movement skills and the knowledge of movement concepts underlying those skills.[195]

Cognitive skills, also called **cognitive functions**, **cognitive abilities,** or **cognitive capacities**, are brain-based skills that are needed in the acquisition of knowledge, manipulation of information, and reasoning. They have more to do with the mechanisms of how people learn, remember, problem-solve, and pay attention, rather than with actual knowledge. Cognitive skills or functions encompass the domains of perception, attention, memory, learning, decision-making, and language abilities.[196]

Perceptual-motor skills are essential to all facets of physical activity. Strong perceptual-motor skills allow a person to effectively receive, interpret, and use information from all of the body's senses. Perceptual-motor development requires an integration of sensory and motor abilities to

[194] Professional Development. (2013). *Glossary of Educational Reform*. Retrieved from https://www.edglossary.org/professional-development/

[195] Supporting Perceptual-Motor Skills and Movement Concepts. (2021, January 4). *College of the Canyons*. https://socialsci.libretexts.org/@go/page/39413

[196] Cognitive Skill. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Cognitive_skill#cite_note-Kiely_2014-1

carry out physical activities. All voluntary movement involves an element of perception, and perceptual-motor coordination plays a vital role in all movement skills.[197]

Interpersonal or communication skills allow people to give and receive information effectively. Using, improving, and showcasing communication skills can help career advancement and the competition when searching for new jobs. Kinesiology is like any other profession in which a person needs to communicate to others and explain rules, curriculum, techniques, drills, etc.

Important Skills You Need to Succeed at Work (General)

Whether you are a new graduate trying to figure out how to get a leg up in your career, or you're a mid-career professional looking to secure your next promotion, you might be wondering what the most important skills you need to help you get where you want to go. While it's, of course, important to develop your industry-specific hard skills, what's just as critical to your success are your soft skills. Soft skills are how you function in the workplace and interact with others. And while they're not easily taught in a classroom or measured, they are key skills that we all need to have. Additionally, in our more globalized, fast-changing work environment, there is now a premium on the kinds of soft skills that allow you to keep pace with the future of work. So, if you're looking to accelerate your career, here are the 12 soft skills that you need to succeed ……

1. Learnability: That's because, in an environment where new skills emerge as fast as others fade, success is less about what you already know and more about adapting your skills by growing and expanding your knowledge base, so you can use new information and skills to respond to whatever is happening.
2. Resilience: Resilience is the ability to bounce back in the face of obstacles and failures.
3. Agility: As the work landscape shifts, learning to be agile is a critical skill, as yesterday's solutions do not solve tomorrow's problems.
4. Collaboration: In our increasingly hyper-connected world, we're no longer expected to work just as individuals or only in silos.
5. Verbal communication: There's a good chance that at some point in your career, you'll have to use strong verbal communication skills so you can sell others your ideas, products, or services.
6. Written communication: We live in an era of tweets and sound bites, but good written communication skills still matter when it comes to your career.
7. Empathy: The ability to empathize with others or see things from their perspective by understanding their emotions and reactions, is a fundamental part of how we interact with one another.
8. Creativity: Creativity is a crucial skill we all need because, in our fast-changing times, employers value employees who can look beyond the present and imagine future possibilities for their company.

[197] Supporting Perceptual-Motor Skills and Movement Concepts. (2021, January 4). *College of the Canyons*. https://socialsci.libretexts.org/@go/page/39413

9. Problem-solving: Being a good problem solver is essential because employers value people who can work through challenges on their own or as effective members of a team by defining the issues, brainstorming alternatives, sharing thoughts, and then making sound decisions.
10. Leadership: The importance of building the right culture at companies cannot be overstated, so having the skills to be able to coach and empower others, and to motivate those around you to do their best work, is highly valued for success.
11. Negotiation: Whether you're in salary discussions, finalizing a deal with a client, or trying to find common ground with your teammates during a project, having strong and effective negotiation skills is extremely important.
12. Technology: Technology is changing at an unprecedented pace, so even beyond the technical skills you need to master for your job, keeping up with technology is essential because of the tools that help you manage your career, differentiate yourself in the market, brand yourself, and build the critical relationships that you need to be successful.[198]

Regardless of your chosen career path, building your soft skills is critical so you can set yourself apart from others in a competitive landscape.

Ethical Principles of Standards

A professional in Kinesiology must be dedicated to ensuring individual, family, organizational, and community health. One way to do this is by taking on the responsibility for upholding the integrity and ethics of the profession when faced with the daily challenges of making decisions. Another way to ensure the spreading of health and positivity through the profession is by acknowledging the value of diversity in society and embracing a cross-cultural approach that supports the worth, dignity, potential, and uniqueness of all people. A person in the Kinesiology field should protect people's rights.[199]

In Kinesiology, the Code of Ethics provides a framework of shared values. The Code of Ethics is grounded in fundamental ethical principles that underlie all services:

1. Respect for autonomy.
2. Promotion of social justice.
3. Active promotion of good.
4. Avoidance of harm.

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[198] Peart, N. (2019, September 10) The 12 Most Important Skills You Need to Succeed at Work. Forbes. https://www.forbes.com/sites/nataliapeart/2019/09/10/the-12-most-important-skills-you-need-to-succeed-at-work/?sh=2873bf61c6ab

[199] Academic Integrity and Ethics Across the Disciplines. (n.d.). *Rhode Island College Library*. Retrieved from https://library.ric.edu/c.php?g=62216&p=400365#:~:text=The%20Code%20of%20Ethics%20provides,good%2C%20and%20avoidance%20of%20harm

Regardless of job title, professional affiliation, work setting, or population served, one must abide by these guidelines when making professional decisions. One must act with the highest possible standards of conduct and encourage the ethical behavior of all those with whom they work.[200]

Coursework One Takes in College to Become a Professional

After high school, the next question if you want to be in the kinesiology field, is what's next? The good news is that Kinesiology offers many career paths from certificates, to associate in arts degrees, bachelor's degrees, master's degrees, and Doctorate degrees. Once you find out what career path you are interested in, find out what colleges around you offer. From adult classes to community college and 4-year schools, there are many options to choose from to get started. Depending on which Kinesiology career pathway you decide, this will determine the class work required to complete. Will you only take classes on campus or will need to take extra hours in a lab or required hours in a work setting is something to think about.

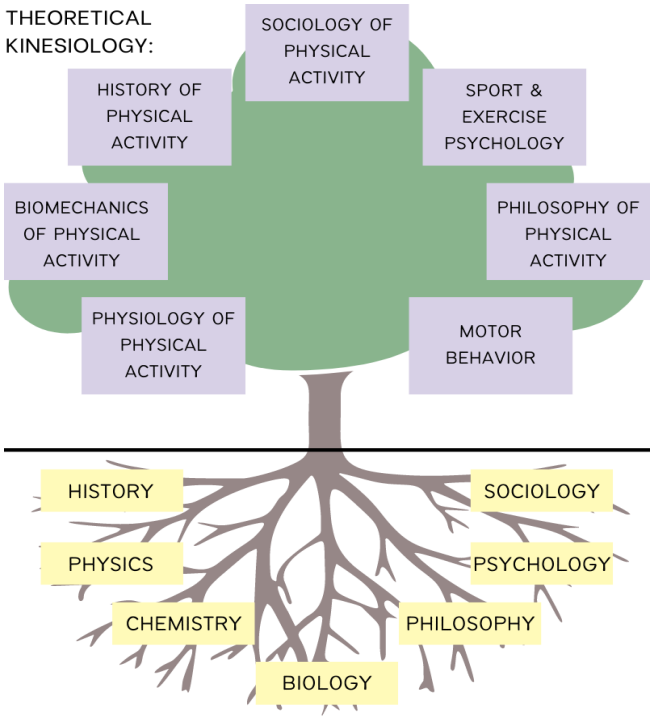

Figure 9.2: Theoretical Kinesiology[201]

[200] Academic Integrity and Ethics Across the Disciplines. (n.d.). *Rhode Island College Library*. Retrieved from https://library.ric.edu/c.php?g=62216&p=400365#:~:text=The%20Code%20of%20Ethics%20provides,good%2C%20and%20avoidance%20of%20harm

[201] Image by College of the Canyons ZTC Team, references 12.5 of Being a Physical Activity Professional

Depending on your field of study and degree requirements, you might pursue a traditional internship or another type of training experience. Note the differences between the following types:

Internship – A period of work experience in a professional organization, in which participants (interns) are exposed to and perform some of the tasks of actual employees. Internships are usually a relatively high commitment and may be paid and/or result in college credit. Externship/Job Shadowing – Usually a lower-commitment experience and shorter than internships. Participants observe work activities and perhaps undertake small projects.

Apprenticeship – A defined period of on-the-job training in which the student is formally doing the job and learning specific skills. Unlike most internships, apprenticeships are usually formal requirements to attain a license or gain employment in skilled trades, and they are growing in use in healthcare.

Clinicals, Student Teaching, and Related Experiences – Healthcare and other fields often have specific requirements for clinical (learning experience in healthcare facilities) or student teaching. These are often components of the major and are required for both graduation and licensure.

Service Learning – Students learn educational standards by tackling real-life problems in their community. Involvement could be hands-on, such as working in a homeless shelter. Students could also indirectly tackle broad issues, such as by solving a local environmental problem.

Undergraduate Research – Even as an undergrad, you may find opportunities to partake in actual research in your field of study. Colleges often have strict guidelines on types and levels of participation, and you will likely need to apply. The benefits include firsthand knowledge of a core academic activity and exposure to more people in your field.

Related Employment – It may be possible to get a regular, low-level paying job directly in your field of study or in a related place of work. While it's not essential, simply being around the profession will better inform and prepare you.[202]

[202] Baldwin, A. "Your Map to Success: The Career Planning Cycle" in College Success by Amy Baldwin. Published by OpenStax under a CC BY 4.0 license. Lightly edited for clarity, brevity, and consistency with its new context. Access for free at https://openstax.org/books/college-success/pages/1-introduction

Chapter 9 Resources

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Supporting Perceptual-Motor Skills and Movement Concepts. (2021, January 4). *College of the Canyons*. https://socialsci.libretexts.org/@go/page/39413

Chapter 10: Careers in Kinesiology

What We Do

Kinesiology refers to the science of human movement and the study of mechanics within the human body in terms of performance and function. It focuses on a range of issues, from health maintenance to rehabilitation and athletic competition. Most professional kinesiologists will work alongside people who suffer chronic illness, got involved in an accident, or were born with a disability that impacts their full range of motion. These professionals will assess the movement capabilities of patients and apply physical science concepts that might aid in their rehabilitation in the areas of work, sports, and exercise.[203]

Any field in kinesiology can lead to a rewarding lifelong career but can take years of education and experience along with multiple certifications. These high standards are important because as a kinesiologist you will be working with and informing human beings. Each person you meet is a unique combination of their previous history, injuries, fears, and goals. There will undoubtedly be much change and advancement in all fields of kinesiology with advancing technology. From more accurate and cheaper personal wearable devices to complete augmented reality simulations for athletic training or rehabilitation environments. Growth and opportunity will continue to expand with a career and education in kinesiology. You could help shape the future of kinesiology!

Kinesiology has become a common and respected major in many American universities. There can be different focuses in each school, so before enrolling in a program it may help to explore their department website and review what research their professors are conducting. If possible, schedule an official visit and visit the campus and labs in person. This is especially true for pursuing a master's or Ph.D.[204]

Work Environment

Kinesiologists work in a range of different health-related areas that have a focus on medicine and movement at the same time. Some professionals will work in physical therapy environments, whereas others will work in athletic training, physical education, or recreational program management for fitness. Some will even find employment in the physical education departments of public schools, or they may work alongside professional athletes.[205]

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[203] Sanchez, R. (n.d.). Kinesiology Careers + Salary Basics. Retrieved from https://www.healthgrad.com/physical-health/kinesiology/

[204] Titus, W (2024). Future Education and Careers in Kinesiology. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/98763

[205] Sanchez, R. (n.d.). Kinesiology Careers + Salary Basics. Retrieved from https://www.healthgrad.com/physical-health/kinesiology/

How to Become a Kinesiologist

The first step is to find an educational program covering the various areas of Kinesiology. Such programs have options that cover exercise, health-based science, athletic training, and physical education. Some departments for Kinesiology may also offer Bachelor of Science degrees in athletic training and exercise programs. These courses might include insights into psychology, clinical neurology, biomechanics, pathophysiology, and anatomy.

Training & Certification Requirements

Those looking for opportunities to coach others at a high school or even middle school level will be required to obtain certification as a teacher. Many programs will include an option for individuals who want to teach using their Kinesiology degree. In some cases, however, individuals will simply want to work within a medical environment to help people get the most out of their movement for the sake of rehabilitation after an injury or to overcome a disability. In this case, certification may also be required from clinical and medical boards to ensure that an individual is fit to work with patients in a hospital setting. Some organizations offer certification in this field that you can use to demonstrate your skills and qualifications:[206]

- American Society of Exercise Physiologists
- American College of Sports Medicine

Possible Career Options

1. **Health Promotion**
   Kinesiologists in the health industry are trying to enhance individuals' health, fitness, and well-being. Kinesiologists can be found working in fitness facilities, personal training/corporate wellness facilities, and industry.

2. **Clinical/Rehabilitation**
   Kinesiologists work with individuals with disabling conditions to regain their optimal physical function. They work with individuals in their homes, fitness facilities, rehabilitation clinics, and at the worksite. They also work alongside physiotherapists and occupational therapists.

3. **Ergonomics**
   Kinesiologists work in this industry to assess the suitability of workstations and provide suggestions for design modifications and assistive devices.

4. **Health and Safety**
   Kinesiologists are involved in consulting with this industry to identify hazards and provide recommendations and solutions to optimize the health and safety of workers.

[206] Sanchez, R. (n.d.). Kinesiology Careers + Salary Basics. Retrieved from https://www.healthgrad.com/physical-health/kinesiology/

5. **Disability Management/Case Coordination**
   Kinesiologists recommend and provide a plan of action to return an injured individual to their optimal function in all aspects of life.

6. **Management/Research/Administration**
   Kinesiologists frequently fulfill roles in all the above areas, research, and manage businesses.

7. **Health Education**
   Kinesiologists working in health education teach people about behaviors that promote wellness. They develop and implement strategies to improve the health of individuals and communities. Community health workers collect data and discuss health concerns with members of specific populations or communities.

8. **Athletic Training**
   Kinesiologists working in the athletic training arena work in cooperation with physicians. Athletic trainers strive to prevent athletes from suffering injuries, diagnose them if they have suffered an injury, and apply the appropriate treatment.

9. **Athletic Coaches and Scouts**
   Kinesiologists who pursue careers as athletic coaches develop new talent and guide an athlete's progress in a specific sport. They teach amateur or professional athletes the skills they need to succeed at their sport. Many coaches are also involved in scouting. Scouts look for new players and evaluate their skills and likelihood for success at the college, amateur, or professional level.

10. **Physical Education Teacher**
    Kinesiologists working as physical education teachers are responsible for teaching students about fitness, sports, and health. They help students stay both mentally and physically fit by teaching them to make healthy choices.

Kinesiology Earning Potential

According to the US Bureau of Labor Statistics (BLS), the median annual salary for fitness and aerobics instructors was approximately $84,020 for those who obtain a Doctor of Physical Therapy degree, $80,150 for those with a master's degree, and $36,160 for those without a higher-level education.[207]

[207] Sanchez, R. (n.d.). Kinesiology Careers + Salary Basics. Retrieved from https://www.healthgrad.com/physical-health/kinesiology/

Kinesiology Job Outlook

According to the BLS, the increase in employment opportunities for Kinesiologists from 2014 to 2024 will be around 27% for those with a master's degree and 34% for those with a doctoral degree.[208] According to Indeed.com, the average national salary of jobs for Kinesiology was $58,000.00, with a high confidence ranking based on over 250 sources. Average Kinesiology salaries for job postings nationwide are 1% higher than average salaries for all job postings.[209] As of 2015, the Bureau of Labor Statistics finds that the job growth for exercise physiologists will increase by 11%, which is faster than average.

Kinesiology-Related Job Titles

According to Indeed.com, the following career/job titles with salary figures are most closely related to Kinesiology.[210]

Table 10.1: Career & Salary

Career/Job Title	Average Salary
Personal Trainer Life Fitness	$57,000
Healthcare Coordinator	$35,000
Adjunct Faculty Physical Education	$91,000
Health & Wellness Representative	$29,000
Curriculum Development Manager	$59,000
Biological Sciences Instructor	$43,000
Fitness Coordinator	$36,000
Fitness Facility Manager	$40,000

[208] Sanchez, R. (n.d.). Kinesiology Careers + Salary Basics. Retrieved from https://www.healthgrad.com/physical-health/kinesiology/

[209] Sanchez, R. (n.d.). Kinesiology Careers + Salary Basics. Retrieved from https://www.healthgrad.com/physical-health/kinesiology/

[210] Kinesiology Careers. (n.d.). *Indeed*. Retrieved from https://www.indeed.com/career/salaries/Kinesiology?from=whatwhere

Continuing Education

Curriculum Overview for Master's in Kinesiology

For people who are interested in devoting their career to physical exercise, fitness, and reducing incidents of diseases in our society, getting a master's degree in Kinesiology could be a smart choice. Kinesiology is the study of the mechanics of body movement, and many people who obtain this type of master's degree will have to complete educational programs that will involve advanced study of physiology and biomechanics. These programs will prepare you for a career in personal or corporate fitness assessment and training.

Generally, the curriculum for this degree is directed toward students who have previous experience or education in movement science, occupational therapy, or physical therapy.

Depending upon the online master's program you choose, you may take these types of classes:[211]

- Evidence-based Practice in Kinesiology and Nutrition
- Human Bioenergetics
- Advanced Exercise Programming and Assessment
- Special Topics in Kinesiology
- Evidence-based Practice in Kinesiology and Nutrition
- Movement Neuroscience
- Biomechanics of Normal and Abnormal Movement
- Psychology of Motor Control and Learning
- Instrumentation for Motor Control Research

Many people who earn a Master's in Kinesiology become exercise physiologists. Exercise physiologists design exercise and fitness programs to help patients overcome chronic diseases and injuries. They also help patients to improve their body composition, heart function, and flexibility. A professional with a Master's in Kinesiology will typically do some or all the following:

- Analyze the medical history of patients to determine the best exercise regimen.
- Do stress and fitness tests with advanced medical equipment to determine patients' level of fitness
- Measure the use of oxygen, heartbeat, blood pressure, and other vital patient indicators
- Come up with new exercise programs to ensure that patients are healthy
- Supervise tests to ensure that patients are safe

[211] Sanchez, R. (n.d.). Types of Masters in Kinesiology Degrees. Retrieved from https://www.healthgrad.com/physical-health/types-masters-kinesiology-degrees/

Careers

Adapted Physical Education Specialists

These professionals provide individualized physical education instruction and services to children, youth, or adults with exceptional physical needs due to gross motor developmental delays or other impairments. A sample of reported job titles: Adapted Physical Activity Specialist, Adapted Physical Education Specialist (APE Specialist), Adapted Physical Education Teacher (Adapted PE Teacher), Adapted Physical Educator, Certified Adapted Physical Educator, DAPE Specialist (Developmental Adapted Physical Education Specialist), DAPE Teacher (Developmental Adapted Physical Education Teacher).

Tasks

- Adapt instructional techniques to the age and skill levels of students.
- Instruct students, using adapted physical education techniques, to improve physical fitness, gross motor skills, perceptual motor skills, or sports and game achievement.
- Provide individual or small groups of students with adapted physical education instruction that meets desired physical needs or goals.
- Provide students with positive feedback to encourage them and help them develop an appreciation for physical education.
- Establish and maintain standards of behavior to create safe, orderly, and effective environments for learning.[212]

Athletic Director

An athletic director (commonly "athletics director" or "AD") is an administrator at many American clubs or institutions, such as colleges and universities, as well as in larger high schools and middle schools, who oversees the work of coaches and related staff involved in athletic programs.[213]

Position at Institution

Modern athletic directors are often in a precarious position, especially at larger institutions. Although technically in charge of all coaches, they are often far less well-compensated and less famous, with few having their own television and radio programs as many coaches now do. In attempting to deal with misconduct by coaches, they often find their efforts trumped by a coach's powerful connections, particularly if they are an established figure with a long-term winning record. Additionally, in the case of severe coaching misconduct being proven, often the athletic director will be terminated along with the offending coach.

Over the last several years, the role of an athletic director has changed dramatically. Before, the athletic department was overseen by one of the school's head coaches. Now, the position

[212] Summary Report for: 11-9179.01—Fitness and Wellness Coordinators. (n.d.). *O*NET ONLINE*. Retrieved from https://www.onetonline.org/link/summary/11-9179.01?redir=11-9039.02

[213] Athletic Director. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Athletic_director

attracts executives inside and outside the sports industry. Athletic directors can negotiate multimillion-dollar media deals and manage powerful coaches, usually the highest-paid employees in the state. Based on the division and the school's athletic needs, athletic directors can also oversee scheduling games and events, monitoring a team's players, and ensuring coaches and players (anyone heavily involved with the department) comply with all of the sports agency's regulations. A bachelor's degree is required for all divisions, and larger schools prefer a master's degree. These degrees normally consist of sports management, psychology, physical education, and business management. The top athletic directors in high school have an average salary ranging from $58,400 to $87,000.[214]

Athletic Trainers

Athletic Trainers evaluate and treat musculoskeletal injuries or illnesses, and provide preventive, therapeutic, emergency, and rehabilitative care. A sample of reported job titles: Athletic Instructor, Athletic Lecturer, Athletic Trainer, Certified Athletic Trainer, Personal Trainer, Resident Athletic Trainer, Women's Athletic Trainer.

Tasks

- Conduct an initial assessment of an athlete's injury or illness to provide emergency or continued care and to determine whether they should be referred to physicians for definitive diagnosis and treatment.
- Assess and report the progress of recovering athletes to coaches or physicians.
- Care for athletic injuries using physical therapy equipment, techniques, or medication.
- Evaluate athletes' readiness to play and provide participation clearances when necessary and warranted.
- Perform general administrative tasks, such as keeping records or writing reports.

Careers as Fitness and Wellness Coordinators

Some Kinesiologists prefer to manage or coordinate fitness and wellness programs and services. The main service of this career option is managing and training wellness specialists, health educators, or fitness instructors. A sample of reported job titles includes Executive Wellness Programs Director, Fitness and Wellness Director, Fitness Coordinator, Fitness Director, Fitness Supervisor, Group Fitness Manager (GFM), Wellness Director, and Wellness Officer.

Tasks

- Manage or oversee fitness or recreation facilities, ensuring safe and clean facilities and equipment.
- Provide individual support or counseling in general wellness or nutrition.
- Supervise fitness or wellness specialists, such as fitness instructors, nutritionists, or health educators.

[214] Athletic Director. (n.d.). In *Wikipedia*. Retrieved from https://en.wikipedia.org/wiki/Athletic_director

- Conduct needs assessments or surveys to determine interest in, or satisfaction with, wellness and fitness programs, events, or services.
- Develop or coordinate fitness and wellness programs or services.[215]

Careers in Nutrition

If you are considering a career in nutrition, it is important to understand the opportunities that may be available to you. Both registered dietitians (RD) and nutritionists provide nutrition-related services to people in the private and public sectors. A nutritionist is an unregistered professional who may have acquired knowledge via avenues that may be questionable in credibility. However, an RD is a healthcare professional with credentials from the Commission on Dietetic Registration and can provide nutritional care in the areas of health and wellness for individuals and groups. RDs are nutrition professionals who work to apply nutritional science, using evidence-based best practices, to help people nourish their bodies and improve their lives.[216]

Becoming an RD requires a Bachelor's or master's degree in Dietetics from an accredited program, including courses in biology, chemistry, biochemistry, microbiology, anatomy and physiology, nutrition, and food-service management. Other suggested courses include economics, business, statistics, computer science, psychology, and sociology. In addition, people who pursue this path must complete a dietetic internship and pass a national exam. Also, some states have licensure that requires additional forms and documentation. To become a registered dietetic technician, you must complete an undergraduate dietetic program and pass a national exam. Forty-seven states have licensure requirements for RDs and nutritionists, but a few remaining states do not have laws that regulate this profession.[217]

Coaches and Scouts

Coaches and Scouts instruct and coach groups or individuals in the fundamentals of sports for the primary purpose of competition and demonstrate techniques and methods of participation. They evaluate athletes' strengths and weaknesses as possible recruits or to improve the athletes' technique to prepare them for competition. Some are required to hold teaching certifications and should be reported in the appropriate teaching category. A sample of reported job titles: Baseball Coach, Basketball Coach, Coach, Cross Country Coach, Football Coach, Gymnastics Coach, Soccer Coach, Softball Coach, Track and Field Coach, Volleyball Coach.

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[215] Summary Report for: 11-9179.01—Fitness and Wellness Coordinators. (n.d.). *O*NET ONLINE*. Retrieved from https://www.onetonline.org/link/summary/11-9179.01?redir=11-9039.02

[216] University of Hawaii at Manoa Food Science and Human Nutrition Program. (n.d.). Careers in Nutrition. *Pressbooks*. Retrieved from https://pressbooks.oer.hawaii.edu/humannutrition2/chapter/18-careers-in-nutrition/

[217] University of Hawaii at Manoa Food Science and Human Nutrition Program. (n.d.). Careers in Nutrition. *Pressbooks*. Retrieved from https://pressbooks.oer.hawaii.edu/humannutrition2/chapter/18-careers-in-nutrition/

Tasks

- Plan, organize, and conduct practice sessions.
- Provide training direction, encouragement, motivation, and nutritional advice to prepare athletes for games, competitive events, or tours.
- Adjust coaching techniques, based on the strengths and weaknesses of athletes.
- Instruct individuals or groups in sports rules, game strategies, and performance principles, such as specific ways of moving the body, hands, or feet, to achieve desired results.
- Plan strategies and choose team members for individual games or sports seasons.[218]

Exercise Trainers and Group Fitness Instructors

These professionals instruct and coach groups or individuals in exercise activities for the primary purpose of personal fitness and implementing individualized approaches to exercise. They also demonstrate techniques and form, observe participants, and explain corrective measures necessary to improve skills. A sample of reported job titles: Aerobics Instructor, Fitness Instructor, Fitness Specialist, Fitness Technician, Fitness Trainer, Group Exercise Instructor, Group Fitness Instructor, Personal Trainer, Private Trainer, Yoga Instructor.

Tasks

- Observe participants and inform them of corrective measures necessary for skill improvement.
- Evaluate individuals' abilities, needs, and physical conditions, and develop suitable training programs to meet any special requirements.
- Plan routines, choose appropriate music, and choose different movements for each set of muscles, depending on participants' capabilities and limitations.
- Offer alternatives during classes to accommodate different levels of fitness.
- Teach proper breathing techniques used during physical exertion.[219]

Kinesiotherapist

Another possible occupation you can consider with a master's degree in Kinesiology is that of a kinesiotherapist. A kinesiotherapist uses various rehabilitative exercises, physical education, and reconditioning to treat patients who have difficulties with movement. This interesting field emerged after World War II as a new way of exercise therapy to treat service people's injuries so they could get back on active duty. Today, a kinesiotherapist can work in many different types of healthcare facilities, such as nursing homes or long-term care centers. Most kinesiotherapists work under the supervision of a doctor and the health care team consisting of a nurse, social worker, and dietician.

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[218] Summary Report for: 11-9179.01—Fitness and Wellness Coordinators. (n.d.). *O*NET ONLINE*. Retrieved from https://www.onetonline.org/link/summary/11-9179.01?redir=11-9039.02

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The typical roles of the kinesiotherapist are the following:[220]

- **Assessment:** The professional's first job is to determine what training, and exercises could help their patients. Thus, one must evaluate the patient's physical skills and activity levels. The assessments will help the kinesiotherapist determine how much help their patients need for daily tasks, such as eating, walking, and getting in/out of bed.
- **Treatment:** The treatment plan is based on what is learned during the assessment. The typical kinesiotherapist will base the plan on the physical and psychological aspects of physical exercise and provide physical education and reconditioning.
- **Other common duties:** Many in this profession also have administrative duties that include documenting patient visits and ordering exercise equipment and supplies for helping with the tasks of daily living.

Physical Education Teachers

PE teachers are responsible for developing curricula that are inclusive, engaging, and tailored to the developmental stages of their students. The activities they plan range from games that build motor skills in young children to more advanced fitness routines and sports for older students. Their work is not limited to physical activity; it also incorporates education on healthy living, including lessons on nutrition, mental health, and the benefits of regular exercise.

Elementary PE Teachers focus on introducing foundational motor skills, such as running, jumping, and throwing, often through games and activities that emphasize fun and participation. These early experiences help children associate physical activity with enjoyment and build confidence in their abilities. For example, games like tag or relay races are not only entertaining but also teach coordination and social interaction.

Middle School PE Teachers expand on these foundations by incorporating structured sports, teamwork, and strategy. This stage is pivotal as students begin to form attitudes about physical activity that may carry into adulthood. Teachers might introduce team sports like basketball or soccer, emphasizing the importance of collaboration and perseverance.

High School PE Teachers often provide advanced instruction in sports and fitness, catering to diverse student interests and abilities. They may offer elective courses in areas like weight training, yoga, or aerobics, giving students a chance to explore activities they can carry into adulthood. Additionally, high school PE teachers play a critical role in preparing student-athletes for competitive play, often serving as coaches for school teams.[221]

[220] Sanchez, R. (n.d.). Types of Masters in Kinesiology Degrees. Retrieved from https://www.healthgrad.com/physical-health/types-masters-kinesiology-degrees/
[221] Runk, L (2024). Teaching Physical Education. *LibreTexts.* Retrieved from https://med.libretexts.org/@go/page/99892

Physical Therapists

Assess, plan, organize, and participate in rehabilitative programs that improve mobility, relieve pain, increase strength, and improve or correct disabling conditions resulting from disease or injury.[222] A sample of reported job titles: Acute Care PT (Acute Care Physical Therapist), Doctor of Physical Therapy (DPT), Home Care Physical Therapist (Home Care PT), Inpatient Physical Therapist (Inpatient PT), Outpatient Physical Therapist (Outpatient PT), Pediatric Physical Therapist (Pediatric PT), Registered Physical Therapist (RPT), Therapist.

Tasks

- Plan, prepare, and carry out individually designed programs of physical treatment to maintain, improve, and restore physical functioning, alleviate pain, or prevent physical dysfunction in patients.
- Perform and document an initial exam, evaluating data to identify problems and determine a diagnosis before intervention.
- Record prognosis, treatment, response, and progress in the patient's chart or enter information into the computer.
- Instruct patient and family in treatment procedures to be continued at home.
- Evaluate the effects of treatment at various stages and adjust treatments to achieve maximum benefit.[223]

Fitness Organizations[224]

- **NCCA:** (National Commission for Certifying Agencies
  - *Source: usqif.org*
  - Website: https://www.credentialingexcellence.org/ncca

- **IHRSA:** The International Health, Racquet, and Sportsclub Association
  - *Source: ihrsa.org*
  - Website: https://www.ihrsa.org/

- **ACSM:** The American College of Sports Medicine
  - *Source:* nirsa.net
  - Website: https://www.acsm.org/

- **ACE:** The American Council on Exercise
  - *Source: acefitness.org*
  - Website: https://www.acefitness.org/

[222] Summary Report for: 11-9179.01—Fitness and Wellness Coordinators. (n.d.). *O*NET ONLINE*. Retrieved from https://www.onetonline.org/link/summary/11-9179.01?redir=11-9039.02
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- **AFS:** The Association of Fitness Studios
  - *Source: afs.com*
  - Website: https://member.afsfitness.com/

- **NASM: T**he National Academy of Sports Medicine
  - Source: nasm.org
  - Website: https://www.nasm.org/

- **NSCA:** National Strength and Conditioning Association
  - *Source: nsca*.com
  - Website: https://www.nsca.com/

- **National Fitness Trade Journal**
  - *Source: nationalfitnesstradejournal.com*
  - Website: https://www.nationalfitnesstradejournal.com/

- **Club Industry**
  - Source: clubindustry.com
  - Website: https://www.clubindustry.com/

- **IDEA Health and Fitness**
  - Source: ideafit.com
  - Website: https://www.ideafit.com/

Chapter 10 Resources

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