

Kinesiology in the 21st century: From a practice-oriented discipline to an interdisciplinary scientific framework: A critical review

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ABSTRACT

Kinesiology, as the scientific study of human movement, has undergone substantial conceptual and structural changes over the past decades. According to Mraković, kinesiology is defined as an empirical, experimentally based science that studies the laws, principles, and patterns of controlled and purposeful physical activity and its effects on the human organism. This definition highlights the scientific and systematic nature of the discipline. The aim of this review paper is to examine the development of kinesiology in the 21st century, with particular emphasis on its paradigm shift from a practice-oriented field toward an interdisciplinary scientific discipline. The analysis is based on foundational and contemporary literature, including empirical and systematic studies. The findings suggest that kinesiology has evolved into a comprehensive field integrating biological, social, and behavioural sciences. Modern kinesiology focuses on health, performance, and human development, addressing global challenges such as physical inactivity and chronic disease. The discipline is increasingly recognised as a central scientific framework for understanding human movement in the 21st century. The review further demonstrates that the future development of kinesiology will depend on interdisciplinary collaboration, methodological standardization, international scientific cooperation, and the integration of emerging technologies such as wearable sensors, artificial intelligence, motion analysis systems, and precision exercise medicine. These developments position kinesiology as a central scientific discipline for addressing contemporary challenges in health, human performance, and physical activity across the lifespan.

Keywords: kinesiology; human movement; paradigm shift; interdisciplinarity; physical activity; health; sport science.

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INTRODUCTION

Kinesiology is defined as the scientific study of human movement and the processes that determine the effects of physical activity on the human organism (Sporiš et al., 2013). In a more precise scientific framework, kinesiology is described as an empirical and experimentally based science that studies the laws, principles, and patterns of controlled and purposeful physical activity and its influence on the human body (Mraković, 1992). This definition emphasises both the scientific foundation and applied nature of kinesiology as a discipline. Earlier theoretical foundations of the field can also be found in the work of Momirović, who defined kinesiology as a science of movement efficiency and transformation processes influenced by physical activity (Momirović, 1969; Momirović, 1971).

The term kinesiology originates from the Greek words *kinesis* (movement) and *logos* (study), meaning the science of movement (Sporiš et al., 2013; Renson, 2000). Since its first formal use in the 19th century, kinesiology has developed as a complex and multidisciplinary field encompassing various domains such as sport, physical education, recreation, and rehabilitation (Čustonja et al., 2009; Sporiš et al., 2013). However, throughout its historical development, the discipline has been characterised by a lack of unified terminology, with multiple terms used to describe similar or overlapping areas of study (Čustonja et al., 2009).

Numerous terms have been used in both European and American academic contexts, including sport science, physical education, exercise science, human movement science, and human performance (Čustonja et al., 2009; Sporiš et al., 2013; Thomas & Nelson, 1990). This terminological diversity reflects the interdisciplinary nature of the field but also creates challenges in defining its scientific identity and structure (Mills, 1992; Wade & Baker, 1992). The absence of a universally accepted term has been recognised as a significant issue, potentially affecting the organisation of study programmes and the development of the discipline (Čustonja et al., 2009).

Historically, physical education was the dominant concept in the early development of kinesiology-related disciplines (Čustonja et al., 2009; Findak, 2001). Physical education played a crucial role in shaping the early academic structure of the field, particularly through its pedagogical and methodological orientation (Findak, 2001). Most academic institutions in Europe and the United States established programmes focused on the preparation of physical education teachers, which influenced the early structure and orientation of the discipline (Prskalo, 2004; Milanović, 2013). Prskalo emphasises the importance of kinesiology in the educational system, particularly in the development of motor skills and lifelong physical activity habits (Prskalo, 2004).

Over time, the expansion of scientific knowledge led to the recognition that human movement studies extend beyond education and require a broader scientific framework (Sporiš et al., 2013). Milanović highlights the transition from purely pedagogical models toward scientifically grounded approaches in training and performance, particularly in sport systems (Milanović, 2013). This shift reflects the broader transformation of kinesiology into a discipline that integrates theory, research, and practical application.

In Europe, the development of the discipline has been strongly influenced by the concept of sport and sport science, which became dominant during the second half of the 20th century (Sporiš et al., 2013; Müller, 2008). The emergence of sport science as an academic discipline marked a significant step toward the scientificisation of human movement studies (Müller, 2008). The establishment of organisations such as the European College of Sport Science further reinforced this orientation (ECSS, 2020). However, the dominance

of the term *sport* reflects historical and socio-cultural factors rather than a comprehensive scientific perspective (Čustonja et al., 2009).

In contrast, the development of kinesiology in the United States followed a different trajectory. The field gradually shifted toward an interdisciplinary model integrating health, performance, and scientific research (Čustonja et al., 2009; Newell, 1990). The increasing use of the term kinesiology in academic institutions reflects the effort to establish a unified and comprehensive scientific identity (American Kinesiology Association, 2021). According to empirical analyses, terms such as *health*, *physical education*, and *kinesiology* are most frequently used in American higher education institutions (Čustonja et al., 2009).

Despite these regional differences, the need for a unified scientific concept has become increasingly evident. Kinesiology is now widely recognised as an umbrella term encompassing various subdisciplines related to human movement (Sporiš et al., 2013; Malina, 2017). It integrates knowledge from biological, social, and behavioural sciences, allowing for a comprehensive understanding of movement as a complex human phenomenon (Bouchard et al., 2012; Kenney et al., 2015). Findak and Prskalo further emphasise the importance of integrating educational, health, and sport perspectives within a unified kinesiological framework (Findak, 2001; Prskalo, 2004).

The importance of kinesiology in modern society has grown significantly due to the increasing prevalence of sedentary lifestyles and chronic diseases (WHO, 2020; Blair, 2012). Physical inactivity has been identified as one of the major risk factors for global health, highlighting the need for scientific approaches to promote physical activity and improve quality of life (Haskell et al., 2007). In this context, kinesiology plays a crucial role in developing strategies for prevention, rehabilitation, and performance enhancement (Bompa & Buzzichelli, 2019; Milanović, 2013).

Furthermore, the evolution of kinesiology reflects broader changes in scientific paradigms. The traditional reductionist approach, focused on isolated aspects of movement, is being replaced by a holistic and integrative perspective that considers the interaction between biological, psychological, and social factors (Maguire, 1991; Kuhn, 1962). This shift is consistent with contemporary trends in science, which emphasise interdisciplinarity and the integration of knowledge across different fields (Lakatos, 1970).

The structural development of kinesiology has led to the formation of distinct but interconnected subdisciplines, including exercise physiology, biomechanics, motor control, sport psychology, and kinesiotherapy (Bartlett, 2022; Powers & Howley, 2018). These areas contribute to a unified scientific framework, positioning kinesiology as a central discipline in the study of human movement (Issurin, 2021). Momirović's early theoretical contributions remain relevant in understanding the transformation processes underlying motor behaviour and performance (Momirović, 1971).

Given these developments, the 21st century represents a period of significant transformation for kinesiology. The discipline is transitioning from a practice-oriented field toward a scientifically grounded and socially relevant domain. This transformation is characterised by the integration of research, education, and practical application, as well as the increasing importance of technological advancements in movement analysis and performance monitoring (Faigenbaum & Myer, 2020).

The aim of this review paper is to analyse the paradigm and structural shifts of kinesiology in the 21st century, with particular emphasis on its evolving scientific identity, interdisciplinary nature, and societal relevance.

During the last decade, kinesiology has undergone one of the most significant transformations since its formal establishment as an academic discipline. Advances in digital technologies, artificial intelligence, wearable sensing systems, three-dimensional motion analysis, exercise medicine, and public health have expanded the traditional boundaries of kinesiology far beyond physical education and competitive sport. Consequently, contemporary kinesiology increasingly functions as an interdisciplinary scientific framework integrating biological sciences, behavioural sciences, engineering, medicine, rehabilitation, public health, and data science. This evolution reflects not only scientific progress but also changing societal needs associated with ageing populations, sedentary lifestyles, chronic disease prevention, and personalized health promotion.

Therefore, this review not only examines the historical evolution of kinesiology but also critically evaluates its contemporary scientific identity, international development, interdisciplinary integration, and future research priorities within the broader context of human movement science.

METHODS

Literature search strategy

A comprehensive literature search was conducted using PubMed, Web of Science, Scopus, Google Scholar, SPORTDiscus, and relevant Croatian scientific databases. Searches included publications from database inception through July 2026. Additional references were identified through manual searches of reference lists and relevant institutional publications. Both historical and contemporary literature were considered to provide a comprehensive overview of the evolution of kinesiology.

Search terms

Representative search terms included combinations of:

- Kinesiology.
- Human movement science.
- Sport science.
- Exercise science.
- Physical education.
- Interdisciplinarity.
- Paradigm shift.
- Motor behaviour.
- Physical activity.
- Public health.
- Exercise medicine.
- Biomechanics.

Using Boolean operators AND and OR.

Eligibility criteria

Literature was included when it:

- Addressed kinesiology as a scientific discipline.
- Examined conceptual or methodological development.
- Discussed interdisciplinary perspectives.
- Presented empirical or theoretical contributions.
- Was published in peer-reviewed journals, academic books, or institutional scientific documents.

Analytical framework

A qualitative narrative synthesis was performed to identify recurring conceptual themes regarding the scientific identity of kinesiology, historical development, interdisciplinarity, public health relevance, technological innovation, and future research directions. Particular attention was given to comparing Croatian and international perspectives in order to evaluate the evolving role of kinesiology within contemporary science.

RESULTS

The findings are presented according to major conceptual themes identified across the reviewed literature. To maintain methodological transparency, this section reports the principal findings derived from the reviewed sources, whereas their broader interpretation and implications are presented separately in the Discussion. The results are organised into eight thematic domains reflecting the historical evolution, conceptual development, interdisciplinary expansion, and contemporary role of kinesiology.

Terminology

International evidence further indicates that differences in terminology extend beyond semantics. Variations in institutional naming influence curriculum design, research priorities, funding structures, academic identity, and interdisciplinary collaboration. Consequently, terminology represents both a conceptual and organizational issue within contemporary kinesiology.

Croatian contribution

The reviewed literature consistently recognises Croatian scholarship as one of the leading European contributors to the conceptual development of kinesiology. However, international literature on the discipline remains substantially broader, encompassing complementary perspectives from North America, Australia, and other European research communities.

Structural shift

Table 1. Traditional versus contemporary kinesiology.

Traditional kinesiology	Contemporary kinesiology
Physical education	Human movement science
Teacher education	Research-intensive discipline
Sport performance	Health, performance & society
Single discipline	Interdisciplinary science
Limited technology	AI, wearable sensors, digital health
Local orientation	Global collaboration
Descriptive	Evidence-based
Isolated subdisciplines	Integrated scientific framework

Education

Recent literature further suggests that kinesiology education increasingly incorporates digital learning environments, interdisciplinary curricula, evidence-based teaching strategies, and competencies related to health promotion, technology, and lifelong physical activity.

Health

Contemporary evidence demonstrates that physical inactivity has become one of the leading global risk factors for non-communicable diseases, including cardiovascular disease, type 2 diabetes, obesity, selected

cancers, and mental health disorders. Consequently, kinesiology has become increasingly integrated with preventive medicine, public health, healthy ageing, and Exercise is Medicine initiatives.

The reviewed literature further highlights the growing importance of precision exercise medicine, whereby physical activity interventions are increasingly individualized according to genetic, physiological, behavioural, and environmental characteristics.

Interdisciplinary science

The interdisciplinary nature of contemporary kinesiology extends beyond the integration of traditional biological sciences. Modern research increasingly combines biomechanics, physiology, psychology, neuroscience, rehabilitation sciences, public health, epidemiology, engineering, artificial intelligence, data science, and wearable sensing technologies to investigate human movement across diverse populations and environments.

Emerging technologies

The reviewed literature indicates that technological innovation represents one of the principal drivers of contemporary kinesiology. Motion capture systems, inertial measurement units (IMUs), wearable sensors, force platforms, electromyography, eye-tracking technology, artificial intelligence, and machine-learning algorithms increasingly enable objective assessment of movement quality, physical activity, performance optimisation, rehabilitation outcomes, and injury prevention. These developments substantially expand the methodological capabilities of kinesiology and strengthen its role within evidence-based healthcare and sport sciences.

International perspective

Although Croatian scholarship has played an important role in conceptualizing kinesiology as an independent scientific discipline, the international literature demonstrates increasing convergence toward interdisciplinary human movement science. Similar developments are evident within the American Kinesiology Association, the European College of Sport Science, Exercise is Medicine, and contemporary public health initiatives, suggesting that kinesiology is becoming a globally recognised scientific framework rather than a regionally defined academic discipline.

Table 2. Summary table.

Theme	Main finding
Emerging technologies	AI, wearable sensors, motion capture and digital health are transforming contemporary kinesiology.
Future development	Precision exercise medicine, interdisciplinary collaboration and evidence-based practice represent major future directions.

DISCUSSION

The present review demonstrates that kinesiology has undergone one of the most substantial conceptual transformations in its history. Rather than representing merely the scientific study of physical activity or sport performance, contemporary kinesiology has evolved into a comprehensive interdisciplinary framework integrating biological, behavioural, medical, educational, technological, and social sciences. The reviewed literature consistently supports this transition while simultaneously revealing several conceptual and methodological challenges that continue to influence the scientific identity of the discipline.

Paradigm shift

Perhaps the most important finding emerging from this review concerns the paradigm shift occurring within contemporary kinesiology. Historically, the discipline developed primarily from physical education and sport training traditions, where movement was predominantly interpreted through pedagogical or performance-oriented perspectives. During the past several decades, however, kinesiology has progressively adopted an interdisciplinary scientific identity encompassing health sciences, neuroscience, biomechanics, psychology, rehabilitation, epidemiology, engineering, and data science.

This transition reflects more than simple disciplinary expansion. It represents a fundamental change in how human movement is conceptualised, investigated, and applied. Contemporary kinesiology increasingly examines movement as a complex adaptive system influenced by biological, psychological, environmental, and technological interactions rather than isolated physiological or mechanical processes.

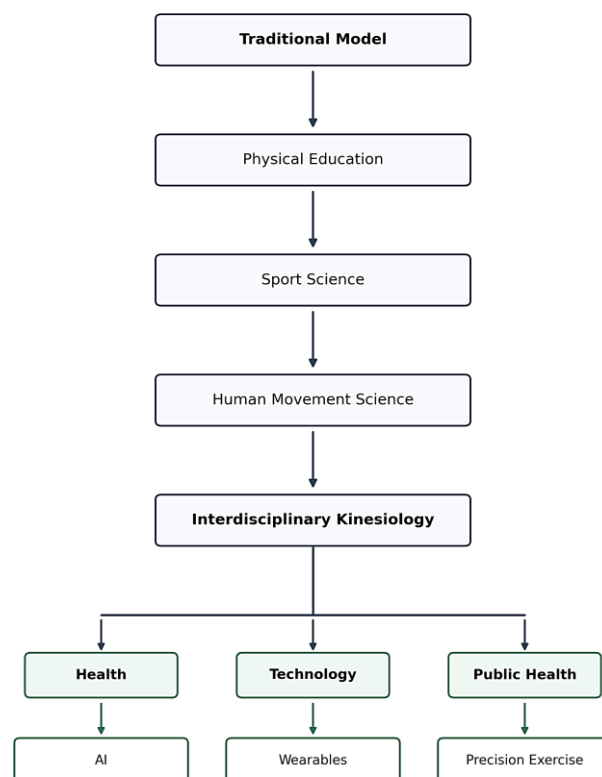


Figure 2. Evolution of kinesiology.

Croatian and international perspectives

One of the principal strengths of Croatian kinesiology has been the early recognition of the need for a unified scientific identity. Croatian scholars have consistently advocated for kinesiology as the most comprehensive scientific framework for studying human movement. Nevertheless, the international literature demonstrates that disciplinary development continues to vary considerably among geographical regions. North American institutions increasingly emphasize health promotion, exercise science, and public health, whereas many European institutions retain stronger historical links with sport science and physical education. Australian and

Asian research communities similarly demonstrate growing integration between movement science, rehabilitation, digital health, and precision medicine.

Critical appraisal

Despite the considerable development of kinesiology, several conceptual and methodological limitations remain evident. First, substantial inconsistency persists regarding disciplinary terminology and scientific boundaries. The coexistence of terms such as kinesiology, sport science, exercise science, human movement science, and physical education continues to create conceptual ambiguity that may influence curriculum development, funding priorities, publication practices, and interdisciplinary collaboration.

Second, much of the conceptual literature remains descriptive rather than analytical. Although numerous publications discuss interdisciplinarity, relatively few provide operational models explaining how physiology, biomechanics, psychology, neuroscience, pedagogy, and public health interact within an integrated scientific framework.

Third, contemporary technological developments are progressing considerably faster than conceptual frameworks. Artificial intelligence, wearable technologies, digital health, motion capture, and data-driven methodologies are increasingly incorporated into kinesiology research, yet their theoretical integration remains incomplete.

Contemporary technologies

Digital transformation represents one of the defining characteristics of twenty-first century kinesiology. Motion capture systems, wearable inertial sensors, force platforms, electromyography, eye-tracking systems, smartphone-based monitoring, digital twins, and artificial intelligence increasingly provide objective assessment of movement quality, rehabilitation outcomes, physical activity behaviour, and performance optimisation. These technologies substantially enhance research precision while simultaneously creating new methodological and ethical challenges related to data management, privacy, standardisation, and algorithm transparency.

Public health

The reviewed literature further demonstrates that the future of kinesiology extends well beyond competitive sport. Physical inactivity, obesity, population ageing, chronic disease prevention, workplace health, exercise oncology, and mental health have become central research priorities. Consequently, kinesiology increasingly contributes to precision exercise medicine, preventive healthcare, healthy ageing, and evidence-based public health interventions.

Alternative perspectives

Although the reviewed literature generally supports kinesiology as an independent scientific discipline, alternative viewpoints remain. Some authors continue to regard kinesiology as a component of sport science, whereas others consider it synonymous with human movement science or exercise science. These differing perspectives reflect historical, institutional, and cultural differences rather than universally accepted scientific definitions. Continued international dialogue will therefore be essential for achieving greater conceptual consistency.

Practical implications

The interdisciplinary evolution of kinesiology has important practical implications for universities, researchers, practitioners, and policymakers. Educational programmes should increasingly integrate data science, artificial

intelligence, biomechanics, psychology, rehabilitation sciences, and public health. Likewise, future research should encourage collaboration among physiologists, engineers, physicians, psychologists, computer scientists, and movement scientists to address increasingly complex societal challenges.

Collectively, the reviewed evidence indicates that kinesiology has progressed from a fragmented academic discipline toward an internationally recognised interdisciplinary scientific framework. Nevertheless, continued conceptual refinement, methodological standardisation, international collaboration, and technological integration will be essential for further strengthening its scientific identity and societal relevance during the coming decades.

AUTHOR CONTRIBUTIONS

All authors meet the criteria for authorship in accordance with established ethical guidelines. Contributions are specified according to the CRediT (Contributor Roles Taxonomy) as follows: Conceptualisation: Naim Čeleš, Jasmin Budimlić, Nijaz Skender, Natalija Kurtović, Marjan Ninčević. Methodology: Goran Sporiš, Mate Vukoja, Boriss Bazanov, Ivica Franjko. Formal analysis: Ahmet Naci Dilek, Maki Grle, Jerko Prlić, Dejan Tiric, Bozenka Galić Tiric, Tolga Tek. Investigation: Patrik Kramarić, Ivan Đuroci, Besnik Morina, Davor Lješević, Ernest Šabić. Data curation: Davorin Antoniće, Dražen Čular, Ivica Franjko, Ivan Đuroci, Davor Lješević. Writing – original draft: Hrvoje Ajman, Željko Širić, Željko Kovačević. Writing – review & editing: Besnik Morina. Supervision: Milan Milošević y Veljko Vukičević.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

AI USE DISCLOSURE

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REFERENCES

- American Kinesiology Association. (2021). *About kinesiology*. <https://www.americankinesiology.org>
- Bartlett, R. (2022). *Introduction to sports biomechanics*. Routledge.
- Blair, S. N. (2012). Physical inactivity: The biggest public health problem of the 21st century. *British Journal of Sports Medicine*, 46(1), 1–2.
- Bompa, T., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training*. Human Kinetics. <https://doi.org/10.5040/9781718225435>
- Bouchard, C., Blair, S. N., & Haskell, W. L. (2012). *Physical activity and health*. Human Kinetics. <https://doi.org/10.5040/9781492595717>
- Corbin, C. B. (2014). *Concepts of fitness and wellness*. McGraw-Hill.
- Čustonja, Z., Milanović, D., & Sporiš, G. (2009). Kinesiology in the names of higher education institutions in Europe and the United States of America. *Kinesiology*, 41(2), 136–146.
- Davids, K., Button, C., & Bennett, S. (2008). *Dynamics of skill acquisition*. Human Kinetics.
- Ekkekakis, P. (2013). *The measurement of affect, mood, and emotion*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511820724>
- European College of Sport Science. (2020). *Position statements and scientific framework*. <https://www.ecss.eu>
- Faigenbaum, A. D., & Myer, G. D. (2020). *Youth physical development*. Human Kinetics.
- Findak, V. (2001). *Metodika tjelesne i zdravstvene kulture*. Školska knjiga.
- Findak, V. (2017). Kinesiology education of the future. *Kinesiology*, 49(1), 1–9.
- Haskell, W. L., Lee, I.-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., Macera, C. A., Heath, G. W., Thompson, P. D., & Bauman, A. (2007). Physical activity and public health. *Medicine & Science in Sports & Exercise*, 39(8), 1423–1434. <https://doi.org/10.1249/mss.0b013e3180616b27>
- Issurin, V. (2021). *Training theory: Scientific foundations*. Routledge.
- Kenney, W. L., Wilmore, J. H., & Costill, D. L. (2015). *Physiology of sport and exercise*. Human Kinetics.
- Kohl, H. W., Craig, C. L., Lambert, E. V., Inoue, S., Alkandari, J. R., Leetongin, G., & Kahlmeier, S. (2012). The pandemic of physical inactivity. *The Lancet*, 380(9838), 294–305. [https://doi.org/10.1016/S0140-6736\(12\)60898-8](https://doi.org/10.1016/S0140-6736(12)60898-8)
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. University of Chicago Press.
- Lakatos, I. (1970). *Criticism and the growth of knowledge*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139171434>
- Maguire, J. (1991). Human sciences and sport. *International Review for the Sociology of Sport*, 26(1), 65–86. <https://doi.org/10.1177/101269029102600104>

- Malina, R. M. (2017). *Growth, maturation and physical activity*. Human Kinetics.
- Milanović, D. (2013). *Teorija treninga*. Kineziološki fakultet.
- Mills, J. P. (1992). The identity of kinesiology. *Quest*, 44(2), 141–148.
- Momirović, K. (1969). *Osnove teorije kretanja*. Institute of Kinesiology, College of Physical Education.
- Momirović, K. (1971). *Teorijski aspekti kineziologije*. Faculty of Physical Culture, University of Zagreb.
- Mraković, M. (1992). *Kineziologija*. Fakultet za fizičku kulturu.
- Müller, E. (2008). Development of sport science in Europe. *European Journal of Sport Science*, 8(1), 1–10.
- Newell, K. M. (1986). Constraints on the development of coordination. In M. G. Wade & H. T. A. Whiting (Eds.), *Motor development in children: Aspects of coordination and control* (pp. 341–360). Martinus Nijhoff. https://doi.org/10.1007/978-94-009-4460-2_19
- Newell, K. M. (1990). Physical activity, knowledge types, and degree programs. *Quest*, 42(3), 243–268. <https://doi.org/10.1080/00336297.1990.10483998>
- Powers, S. K., & Howley, E. T. (2018). *Exercise physiology*. McGraw-Hill.
- Prskalo, I. (2004). *Kineziološka edukacija*. Visoka učiteljska škola.
- Ratey, J. J., & Loehr, J. E. (2011). The positive impact of physical activity. *Harvard Business Review*, 89(10), 62–70.
- Renson, R. (2000). Kinesiology and its historical roots. *Kinesiology*, 32(1), 5–15.
- Sporiš, G., Badrić, M., Prskalo, I., & Bonacin, D. (2013). Kinesiology: Systematic review. *Sport Science*, 6(1), 7–23.
- Thomas, J. R., & Nelson, J. K. (1990). *Research methods in physical activity*. Human Kinetics.
- Wade, M. G., & Baker, J. (1992). Terminology in kinesiology. *Quest*, 44(2), 200–210.
- Warburton, D. E. R., & Bredin, S. S. D. (2017). Health benefits of physical activity. *Current Opinion in Cardiology*, 32(5), 541–556. <https://doi.org/10.1097/HCO.0000000000000437>
- World Health Organization. (2020). *Guidelines on physical activity and sedentary behaviour*. World Health Organization.



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