Position statement regarding the current standing of exercise therapy in Austria (Positionspapier zur Situation der Trainingstherapie in Österreich)

Linda K. Rausch[*1 2], Anita Birklbauer[2 3 4], Peter Federolf[1 2], Anne Hecksteden[1 5], Peter Hofmann[6 4], Josef Niebauer[7], Bernhard Reich[2 7 8], Florian Rieder[2 7], Sebastian Ruin[2 6], Jürgen Scharhag[9], Barbara Seebacher[10 11 12], Gunnar Treff[2 7], Harald Tschan[13], Barbara Wessner[2 9], Sabine Würth[2 3], Erich Müller[2 3]

[1] Department of Sport Science, University of Innsbruck, Innsbruck, Austria
[2] Austrian Sport Science Society (Österreichische Sportwissenschaftliche Gemeinschaft, ÖSG), Innsbruck, Austria
[3] Department of Sport Science and Kinesiology, University of Salzburg, Salzburg, Austria
[4] Austrian Association of Sport Scientists (Verband von SportwissenschafterInnen Österreichs, VSÖ), Graz, Austria
[5] Institute of Physiology, Medical University Innsbruck, Innsbruck, Austria
[6] Institute of Human Movement Science, Sport and Health, University of Graz, Graz, Austria
[7] Institute of Sports Medicine, Prevention and Rehabilitation & Research Institute for Molecular Sports Medicine and Rehabilitation, Paracelsus Medical University, Salzburg, Austria
[8] REHA Zentrum Salzburg, Salzburg, Austria
[9] Department of Sport and Human Movement Science, University of Vienna, Vienna, Austria
[10] Clinical Department of Neurology, Medical University Innsbruck, Innsbruck, Austria
[11] Department of Rehabilitation Science, Münster Clinic for Rehabilitation , Münster, Austria
[12] Karl Landsteiner Institute for Interdisiplinary Research, Münster Clinic for Rehabilitation, Münster, Austria
[13] Centre for Sport Science and University Sports, University of Vienna, Vienna, Austria

[*] linda.rausch@uibk.ac.at

POSITION STATEMENT

Submitted: 30 January 2024

Accepted: 8 April 2024

Published: 14 June 2024

ABSTRACT

In Austria, exercise therapy is an accredited profession that requires academic training on a university's master level. However, exercise therapy is not listed in the service plans of health and medical insurance funds and is therefore not reimbursed as a health service for patients.

This position paper aims to compile the scientific evidence of the efficacy and effectiveness of exercise therapy as a treatment component in medical care. It also informs about the skills and competencies that exercise therapists acquire during their university education in sport science. Based on that,

Editor-in-Chief:

Claudio R. Nigg, University of Bern, Switzerland

the necessity to include exercise therapy as a health service for patients is argued. Additionally, legal parity for exercise therapists within the healthcare professions offering evidence-based treatment methods is advocated.

Numerous studies confirm that exercise therapy clearly leads to improvements in musculoskeletal, internal, neurological, psychiatric, and psychosomatic diseases. Exercise therapy is thus a highly evidence-based, low-side-effect component of prevention, treatment, and rehabilitation measures for almost all chronic diseases. It has a positive impact on pathogenesis, symptoms, fitness, quality of life, morbidity, and mortality of patients.

The five-year academic training in sport science for exercise therapists conveys medical, theoretical knowledge, and practical skills on training and exercise, communication-related, sports-, and movement-related skills, as well as a profound education in scientific methodology.

Consequently, the integration of exercise as therapeutic treatment into the healthcare system is highly indicated from a medical, societal and economic perspective. A new legal framework offering self-employment regulations for exercise therapists is required.

Keywords

accredited exercise therapists, legal equality, self-employment, effectiveness of exercise therapy

Citation:

Rausch, L. K., Birklbauer, A., Federolf, P., Hecksteden, A., Hofmann, P., Niebauer, J., Reich, B., Rieder, F., Ruin, S., Scharhag, J., Seebacher, B., Treff, G., Tschan, H., Wessner, B., Würth, S., & Müller, E. (2024). Position statement regarding the current standing of exercise therapy in Austria (Positionspapier zur Situation der Trainingstherapie in Österreich). *Current Issues in Sport Science*, *9*(1), Article 001. https://doi.org/10.36950/2024.9ciss001

Preamble

The rising prevalence of chronic diseases in all medical fields highlights the systemic necessity of effective therapies in the healthcare system. Exercise therapy is a highly evidence-based, low-side-effect component of prevention, treatment and rehabilitation measures for almost all chronic diseases. It has a positive effect on the pathogenesis, symptoms, fitness, quality of life, morbidity, and mortality of affected patients. The high prevalence of chronic diseases is partly or entirely caused by physical inactivity and can be partially or even completely treated by adequately structured physical exercise. Consequently, countries such as Australia, Canada, and New Zealand have already integrated exercise therapy into their healthcare systems. In Austria, exercise therapy is not included as a healthcare service in the catalogs of medical insurance companies. This implies a withholding of a health-effective therapy service in patient care.

In addition, exercise therapists are only allowed to work under supervision and in an employment rela-

tionship, despite their academic qualifications. This legal restriction represents a significant inequality compared to graduates of medically-technical diploma courses (MTD professions) despite equal or higher formal qualification.

For this reason, the boards of the University Institutes of Sport Science and the Professional Associations of Sport Science wrote position letters to the Federal Minister of Education, Science and Research, as well as the Federal Minister of Social Affairs, Health, Care and Consumer Protection at the end of 2023. They urged them to address the legal inequality between university graduates in the fields of sport science specialized in exercise therapy compared to graduates of MTD professions.

The legal framework classifies exercise therapy as an "addition" to the so-called "auxiliary services" in the Medical Assistants Professions Act (MAPA), § 27 (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz, 2012). This forces exercise therapists into an employment relationship under the supervision of physicians or physiotherapists. The requirement is not in line with the academic level of education. Candidates for general accreditation as exercise therapists must hold a master's degree in sport science with a specialization in exercise therapy. The duration of this academic path is at least 5 years. The legislation also allows for individual accreditation, requiring a submission of all MAPA-contents in addition to a completed bachelor's degree. Even in this case, the usual standard of a bachelor's degree is exceeded, as many of the contents related to exercise therapy are offered in the master's degree programs of sport science. In contrast, graduates of MTD professions can complete a three-year bachelor's degree and then work both as an employee and/or self-employed. This represents a significant inequality in formal qualifications.

This position paper aims to:

1. Compile the scientific evidence of the efficacy and effectiveness of exercise therapy as a treatment component in the medical care of patients.
2. Outline the skills and competencies that exercise therapists in Austria acquire during their university studies in sport science.
3. Demonstrate the demand for exercise therapy as a health service for patients. Additionally, it aims to advocate legal parity for exercise therapists within the healthcare professions.

Exercise therapy: Definition, development, and international comparison

Exercise therapy is a complex and multimodal intervention that aims to influence the development or progression of chronic diseases and their symptoms, as well as the patient's physical performance, quality of life, morbidity, and mortality, through the use of structured physical exercise and appropriate methods in prevention and rehabilitation (Hofmann et al., 2009).

Countries such as Australia, Canada, New Zealand, and the United Kingdom already use exercise therapy in the management of chronic diseases according to "Exercise is Medicine" (Gillis et al., 2021). Accredited exercise therapists are successfully integrated into the healthcare system (Canadian Society for Exercise Physiology (CSEP), 2022; Exercise and Sports Science Australia, 2022; Saynor & Shepherd, 2022; The Physiological Society, 2021; University of Auckland, 2022).

In the European Union, the integration of exercise therapists (Exercise Therapists, Clinical Exercise Physiologists, Accredited Exercise Physiologists) into the healthcare system is not yet standard and is handled differently in each country (Carrard et al., 2022). The sport science representatives of universities in Spain, Sweden, Italy, Belgium, Norway, Denmark and Germany advocate for the establishment of an exercise therapy license (Carrard et al., 2023; Pascual, 2019).

Sport scientists have been employed in inpatient rehabilitation clinics in Austria since the mid-1980s and in outpatient rehabilitation clinics since the early 2000s (Leischik et al., 2005). However, it was not until 2012 that a legal framework was established for exercise therapy. Since then, sport scientists can be accredited as exercise therapists by the Federal Ministry by law, but they can only work as employees. Currently, about 1000 exercise therapists are accredited by the Federal Ministry in Austria and work in outpatient and inpatient rehabilitation facilities, medical practices, or health centers in close collaboration with related professional groups.

Evidence-based value of exercise therapy

Although exercise therapy is firmly anchored in current national and international treatment guidelines providing the highest level of evidence for a variety of diseases, its systemic implementation as a standard treatment in healthcare and thus in rehabilitation and prevention has not yet taken place (Kujala, 2009; Pedersen & Saltin, 2015). To support its systemic implementation, the evidence for musculoskeletal, internal, neurological, and psychiatric diseases is summarized below.

Musculoskeletal diseases

An indication for the (rehabilitative) treatment of musculoskeletal diseases and injuries exists for chronic inflammatory, metabolic, and degenerative musculoskeletal diseases, as well as for diseases due to malformation or dysfunction of the musculoskeletal system (Reiter et al., 2020). Exercise therapy is already an essential part of the rehabilitation of these diseases and is a service provided by national insurance institutions for orthopedic rehabilitation due to clear scientific evidence (Izquierdo et al., 2021). However, it is not included in the general medical treatment options of Austrian health insurances (Reiter et al., 2020). When considering international guidelines, exercise therapy is cited as a central component of the rehabilitation of traumatological and orthopedic diseases, and as a central component of general medical treatment by the National Institute for Health and Care Excellence (British Orthopaedic Association, 2024; Izquierdo et al., 2021). Specific training and exercise programs for the respective diseases are anchored in these recommendations based on scientific literature. For example, a systematic review and meta-analysis by Hughes et al. (2017) in the British Journal of Sports Medicine demonstrates that low-load training with blood flow restriction following anterior cruciate ligament reconstruction, knee osteoarthritis, or sarcopenia is more effective than low-load training alone. Thus, blood flow restriction training represents an effective clinical rehabilitation tool for the musculoskeletal system (Hughes et al., 2017). A recent review by Conley et al. (2023) once again confirmed the high effectiveness of an interdisciplinary treatment approach with exercise as a central element, for example for osteoarthritis. This also applies to osteoporosis, rheumatoid arthritis, back pain, as well as knee and hip osteoarthritis, among others (Conley et al., 2023; Pesare et al., 2023; Sattler et al., 2023; Young et al., 2023).

Internal diseases: Cardiovascular diseases, diabetes, lung diseases and cancer

Physical exercise is a non-pharmacological therapeutic option based on the highest scientific evidence class *Ia* for the treatment of chronic diseases of the internal organs. This includes disorders of the cardiovascular system, diabetes, lung diseases and cancer, fatty liver disease, and obesity (Keating et al., 2023; I.-M. Lee et al., 2012; Stine et al., 2023).

Adequately adapted and structured physical exercise has been shown to have a positive effect on the heart muscle (Hambrecht et al., 1995), on coronary vessels (Niebauer et al., 1995, 1997), and on skeletal muscle (Adams et al., 2017) in patients with cardiovascular diseases. The most well-documented training modality is continuous endurance training (CET). CET reliably and reproducibly improves peak work capacity and has been shown to be effective in reducing cardiac as well as all-cause mortality (Adams et al., 2017). In patients

with stable coronary artery disease, 3 sessions of 1-hour CET at intensities of approximately 75-80% of maximum heart rate over a period of 6 weeks improved peak work capacity by 21% (Tschentscher et al., 2016). Another commonly utilized training method is High-Intensity Interval Training (HIIT), characterized by intermittent periods of high-intensity effort and active recovery periods (e.g., 4 sets of 4-minute intervals at 90 to 95% of maximum heart rate with 3 minutes of active recovery phases at 70% of maximum heart rate, protocol according to Helgerud et al., 2007). This has been successfully applied in patients with stable coronary artery disease, as well as chronic heart failure, to achieve improvements in maximal oxygen uptake capacity (Wisløff et al., 2007). Strength training is also a significant training method that, when combined with aerobic training, improved muscle strength, exercise capacity, and mobility in patients with coronary artery disease (Yamamoto et al., 2016). Not only physical performance is increased, also quality of life of patients is improved by physical exercise (Anderson, 2016; Dibben et al., 2023; Reich et al., 2020). Therefore, a physical training-centered rehabilitation program is recommended as the standard therapy with evidence grade Ia for cardiovascular diseases after acute hospitalization (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften, 2020; Arnett et al., 2019; Pelliccia et al., 2021; Virani et al., 2023).

For the prevention and treatment of diabetes mellitus physical exercise is a key element according to a position paper of the American College of Sports Medicine and the American Diabetes Association, because it can prevent or at least delay the onset of the disease (Colberg et al., 2010). In the recently published European Society of Cardiology guideline on the management of cardiovascular diseases in patients with diabetes mellitus, the importance of structured physical exercise is also rated with an Ia evidence grade (Marx et al., 2023). These guidelines include the recommendation of strength training at least twice a week at an intensity of 60 to 80% of the one-repetition maximum. Structured endurance training is also recommended twice weekly, with intensity determined based on individual markers during spiroergometry (Marx et al., 2023). Additionally, HIIT training has been shown to be an effective alternative to traditional endurance programs, with a positive impact on cardiorespiratory fitness and body composition in individuals with obesity (Türk et al., 2017).

In the treatment of pulmonary diseases, physical exercise improves lung function and functional capacity and reduces pulmonary symptoms (Neunhäuserer et al., 2016, 2021), anxiety, and depression (Blackstock et al., 2018). For example, Neunhäuserer et al. (2021) demonstrated that a 12-week HIIT on the bicycle (duration: 31 minutes) combined with strength training (8 strength exercises on machines, each with 8 to 15 repetitions) three times per week positively impacted the exercise tolerance and respiratory exchange ratio of patients with chronic obstructive pulmonary disease. According to the American Thoracic Society, physical exercise is the core of rehabilitation and an essential part of the treatment of pulmonary diseases (Holland et al., 2021).

Also in oncology, the importance of physical exercise as a rehabilitation and adjuvant therapy to chemotherapy is becoming increasingly important (Mayr et al., 2022; Stout et al., 2021; Westphal et al., 2018). Current position papers from Australia, the USA, and other countries confirm the importance and the increasing significance of physical exercise in the treatment, follow-up, and palliative care of these diseases (Hayes et al., 2019; Parke et al., 2022; Pollán et al., 2020).

An interdisciplinary medical therapy that excludes physical exercise explicitly no longer corresponds to current national (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften, 2020; Bergler-Klein et al., 2022; Österreichische Diabetes Gesellschaft, 2023) and international treatment guidelines (Marx et al., 2023; Pelliccia et al., 2021) or position papers (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften, 2020; Virani et al., 2023). Consequently, when health and medical insurance funds do not include exercise therapy in their service catalogs, they are withholding

a treatment modality that is rated at the highest evidence class. This omission potentially risks accelerated disease progression, along with increased morbidity and mortality among patients.

Neurological diseases

Comprehensive scientific evidence has led to the development of guidelines for exercise therapy for people with stroke, multiple sclerosis, or Parkinson's disease (Kim & Kastner, 2019; Lai et al., 2017). These guidelines recommend various combinations of endurance and strength training as the basis for exercise therapy to address neurologically induced motor functional disorders.

For stroke survivors, task-oriented physical exercise significantly contributes to the restoration of physical functions, while other effective measures include resistance exercises, aerobic activities (such as treadmill training and arm ergometry), robot-assisted therapy, as well as combined functional resistance and aerobic exercises (K. E. Lee et al., 2022; Saunders et al., 2020).

A recent systematic review by Andreu-Caravaca et al. (2023) confirmed that strength training programs not only improve strength and functional capacity but also significantly enhance balance and reduce fatigue in people with multiple sclerosis. Additionally, sensorimotor training and endurance exercises have the greatest effect on the overall health-related quality of life in people with multiple sclerosis (Reina-Gutiérrez et al., 2022). Exercise has been shown to be safe and effective for improving motor function and to have a beneficial disease-modifying effect in people with multiple sclerosis (Dalgas et al., 2019).

Strength training also has an extremely positive effect on muscle strength, functional mobility, and quality of life in patients with Parkinson's disease, while endurance training has a considerable positive effect on their cardiorespiratory fitness and functional capacity (Gamborg et al., 2022). Alternative forms of exercise have also proven to be effective as exercise therapy for Parkinson's disease. Positive effects on the Unified Parkinson's Disease Rating Scale, on depression, and on quality of life have been observed through forms such as Qigong as an aerobic training form, Tai Chi as balance training, or even fast cycling with low resistance and water training (Ernst et al., 2023; Wu et al., 2017).

Overall, the evidence supports exercise therapy as an effective approach for managing the consequences of multiple sclerosis, stroke, or Parkinson's disease. Exercise therapy is increasingly gaining importance as a rehabilitation method. General benefits include improvements in physiological performance, symptoms such as fatigue, depression, and overall quality of life (Lai et al., 2017; Motl et al., 2017; Motl & Pilutti, 2012).

Psychiatric and psychosomatic diseases

The therapeutic effectiveness of exercise therapy and physical activity in patients with psychiatric disorders has been increasingly supported in recent years. Current reviews and position papers (Stubbs et al., 2018) have indicated that positive effects can be expected for a wide range of psychiatric disorders, including attention-deficit/hyperactivity disorder (Dastamooz et al., 2023; Neudecker et al., 2019; Sun et al., 2022), psychotic disorders (Shimada et al., 2022), suicidality (Neunhäuserer et al., 2013), and substance abuse (Wang et al., 2014). These effects have been particularly evident in psychosomatic conditions, especially anxiety and depression disorders (Björkman & Ekblom, 2022; Blumenthal & Rozanski, 2023; Heissel et al., 2023; Singh et al., 2023; Wanjau et al., 2023).

According to Schuch & Stubbs (2019) and others, exercise reduces the risk of severe depression (Knapen et al., 2015). The World Health Organization has emphasized the importance of physical activity in the management and prevention of depression with general international exercise guidelines (World Health Organization, 2017). These emerging findings have also led to a newly proposed subspecialty called "lifestyle psychiatry" (p. 51) which promotes the use of physical activity as an adjunct therapy for patients with severe depression (Blumenthal & Rozanski, 2023).

Besides others, sport and exercise therapy is listed as adjunct therapy in the Austrian S3 treatment guidelines for anxiety disorders and depression, and are often carried out with a holistic approach to exercise (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften, 2014). Not only does endurance-related physical activity have a positive effect on anxiety and depression disorders, but also an 8-week coordination-centered strength training had an antidepressant effect in young adults (O'Sullivan et al., 2023).

German-language compendia laid the groundwork for the systematic integration of exercise therapy into the treatment of mental illnesses in 2010 (Broocks, 2010; Hölter, 2011; Markser & Bär, 2015). The growing body of empirical evidence for the effectiveness of exercise and physical activity underlines the importance of exercise therapy approaches in the field of psychiatry and psychosomatics (Blumenthal & Rozanski, 2023).

Summary: Efficacy and effectiveness of exercise therapy

The extensive body of scientific evidence supporting the effectiveness of exercise therapy in at least 26 chronic diseases across various medical disciplines (Pedersen & Saltin, 2015) underlines the need for its structural implementation for prevention, treatment and rehabilitation in the healthcare system. This is currently inadequate, particularly in Austria, resulting in a significant missed opportunity to provide the population with health-oriented therapeutic services. Although the evidence supports a very broad range of applications for exercise therapy, it is currently not included as a health service by the health and medical insurance funds. A therapy process guided by academically trained and government-accredited exercise therapists would offer the highest likelihood for long-term therapeutic success and for fostering motivation and adherence to exercise and physical activity in patients (Dean et al., 2021; Hrkać et al., 2022).

The academic education for exercise therapy in Austria

The academic training to become an exercise therapist is part of the bachelor's (BA) and master's (MA) programs in sport science offered at all four sport science institutes of the state universities in Austria, located in Graz, Innsbruck, Salzburg, and Vienna (Weiss et al., 2023). The theoretical minimum requirement set out in the Medical Assistants Professions Act § 30 is exceeded in the sport science curricula of all universities (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz, 2012). The legal minimum requirement does not reflect the scope and diversity, which sport science graduates bring to practice, although exercise therapy substantially relies on it in rehabilitation and prevention. Table 1 shows the legal minimum requirements for the Training Therapy Education Ordinance, the exercise therapy-specific teaching modules, and the diverse additional options of the university programs in which exercise therapy is embedded. As part of the exercise therapy modules in the curricula, basic knowledge about disease patterns, clinical aspects, the diagnosis and standard therapy of diseases and the effects of exercise therapy are embedded. Based on this knowledge, the relevant exercise therapies are taught in terms of their effect on pathogenesis, symptoms, fitness and quality of life according to Pedersen & Saltin (2015), as well as the

content of exercise therapy planning, technical equipment, aids and support/positioning.

Table 1
The legal minimum requirements compared to the course modules at the sport science institutes of Austrian universities

ECTS	TT-AV*	GRAZ	INNS	SLBG	VIE
Mandatory Modules					
Anatomy & Physiology	16.0	16.0	22.0	18.0	19.0
Kinematics & Training Science	16.0	23.0	23.5	25.0	20.0
Pathologies and Exercise Therapies[1]	20.0	20.0	24.0	21.0	25.0
Occupation-specific Legal Frameworks[2]	3.0	3.0	5.0	3.0	3.0
First Aid and Hygiene	3.0	3.5	4.5	3.0	3.0
Communication and Motivaton[3]	3.0	3.0	3.0	6.0	6.0
Total	**61.0**	**68.5**	**82.0**	**76.0**	**76.0**
Additional Modules in Exercise Therapy					
Current Research & Performance Diagnostics in Exercise Therapy			7.5		
Theory-Guided Skill Acquisition in Exercise Therapy			5.0		
Specialization Module in Exercise Therapy and Public Health		31.0			
Treatment of Sports Injuries				2.0	
Special Aspects of Exercise Therapy in Orthopedics/Internal Medicine/ Neurology				6.0	
Master Seminar Exercise Therapy				5.0	
Health Promotion, Prevention, Rehabilitation, and Fitness					20.0
Total		**31.0**	**12.5**	**13.0**	**20.0**
Additional Mandatory Modules in Sports Science					
Movement Science and Biomechanics		25.5	28.0	27.0	31.0
Training Science		24.5	26.5	23.0	22.0
Empirical Methods (e.g. statistics)		25.0	27.0	25.0	29.0
Psychology, Sociology, Sports Pedagogy		31.5	30.5	26.5	18.0
Total		**106.5**	**112.0**	**101.5**	**100.0**

The table is based on a generalization of the BA and MA curricula of sport science in Austria. INNS = Innsbruck, SLZB = Salzburg, VIE = Vienna, ECTS = European Credit Transfer System; 1 ECTS corresponds to an average workload of 25 hours

*Legal minimum requirement of the Medical Assistants Professions Act § 30 (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz, 2012)

[1]Pathologies, clinical aspects, diagnoses, and standard treatment as well as effects of exercise training in the clinical fields of internal diseases, musculoskeletal diseases, neurology/psychiatry/psychosomatics; indications, contraindications connected to different medical conditions and corresponding exercise therapies within these fields

[2]Professions and facilities in the healthcare sector (focus: healthcare professions working in the field of exercise therapy and facilities relevant to exercise therapy)

[3]Focus: patients, relatives, interdisciplinary team

The practical training in the field of exercise therapy is carried out in the form of internships in healthcare, rehabilitation, and health institutions which can take place in all medical fields (internal diseases, musculoskeletal diseases, and neurology/psychiatry/psychosomatics). The minimum amount of required working hours by law (325 hours equivalent to 13 ECTS) are exceeded in the compulsory and elective modules of all universities. For the internship, cooperation agreements are established between the universities and various hospitals, health insurance companies, and clinic associations in the individual federal states of Austria. Currently, each university has at least 15 corresponding cooperation agreements (Supplemental material).

Table 1 indicates that the Exercise Therapy Act does not adequately reflect the academic education level. This contributes to the devaluation of the academic status of the exercise therapist profession. Consequently, sport scientists in the field of exercise therapy are very often inadequately recognized.

Academic competence areas in the Austrian curricula as the basis for patient-oriented exercise therapy

Withholding of exercise therapy as a health-promoting intervention for patients in the healthcare system also entails withholding the expertise of the professionals responsible for its implementation. Graduates of the BA and MA curricula in sport science have skills in various health-promoting areas that are to be valued as the basis for exercise therapy work in a hospital. These skills are described in more detail below.

Communication, mediation, and consulting competencies

Graduates are particularly suited to conceive, lead, and further develop individual and group therapies due to their didactic and pedagogical knowledge. Based on this competency, information and consulting processes can also be conducted. In addition, graduates have communicative skills to promote the motivation and compliance of patients and their accompanying persons. These communication skills and professional competencies complement the skills that physicians, physiotherapists, occupational therapists, nurses, and others bring to an interdisciplinary team and lead to better success (Karl-Franzens-Universität Graz, 2013; Leopold-Franzens-Universität Innsbruck, 2019; Paris Lodron-Universität Salzburg, 2022b; Universität Wien, 2014).

Sport and movement-related skills

Through specific interdisciplinary knowledge and practical skills, graduates are able to find suitable didactic approaches for patients and also convey them to multipliers. There is a broad movement experience and technical competence in all basic sports as well as the fundamental knowledge of correct movement execution through the sports practical basic training in the Bachelor's degree programs in sport science (Karl-Franzens-Universität Graz, 2017; Leopold-Franzens-Universität Innsbruck, 2021; Paris Lodron-Universität

Salzburg, 2022a; Universität Wien, 2020). This is essential, particularly for professional guidance of movement execution in exercise therapy.

Scientific skills

Graduates have in-depth knowledge of empirical research methods, especially in the field of sports science, which can be applied in the fields of physiology, biomechanics, psychology, and training sciences. This includes, for example, exercise stress tests (exercise physiology), performance diagnostic motor procedures (training, movement science), 3D motion analyses (biomechanics), or psychophysiological diagnostics. Furthermore, training sessions can be designed as scientific interventions embedded in a diagnostic frame and outlined in research projects. Research projects in the field of exercise therapy are carried out independently and applications are further developed or therapy concepts are evaluated (part of master curricula “sport science” of the Universities of Graz, Innsbruck, Salzburg and Vienna). The research-led training also includes rehabilitation and prevention concepts in the field of primary, secondary, and tertiary prevention. In the course of their scientific training, exercise therapists are enabled to collect, prepare, analyze, and manage data. This is reflected primarily in the master's theses, which are published in university libraries. Topics for master's theses have been conducted in cooperation with hospitals and rehabilitation centers. Master’s theses frequently meet the requirements for an international, peer-reviewed publication. Furthermore, when searching with the keywords "sport science AND Austria AND exercise AND therapy" on the research platform PubMed between 2012 and 2023, a total of 614 publications were found.

Diagnostic skills

Based on their physiological, biomechanical, sports psychological, and pedagogical expertise, graduates have the ability to apply existing diagnostic concepts according to medical guidelines and to develop suitable diagnostic concepts. The application of these concepts is also based on ethical responsibility and professional competence to adequately convey them to third parties (according to § 27 of the MAPA (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz, 2012)).

Practical relevance and special features of exercise therapy

The transfer of evidence-based knowledge into practice is the necessary basis for exercise therapy as a treatment service. This includes well-established and proven sports scientific measurement methods, such as non- or minimally invasive performance diagnostics in heart and lung diseases (e.g., spirometry, ergometry, or cardio pulmonary exercise testing, if necessary with measurement of blood lactate concentration; Wonisch et al., 2008). The application of training sciences sets the basis for the optimization of training loads and an adequate implementation of training methods, such as interval training (Tschakert & Hofmann, 2013). In the field of musculoskeletal diseases and in neurology, modern 3D motion analysis systems (e.g., Motion Capturing Systems) are used for gait monitoring and exercise therapy adjustment(Lam et al., 2023). Not only the professional execution of these non- or minimally invasive diagnostic standard procedures, but also the application-oriented interpretation of the results according to the latest training science standards can be used for an optimized recovery process of patients (Wonisch et al., 2008).

In addition to the application of existing diagnostic and training methods, the development of new measurement methods and their validation in the clinical field is possible. Comprehensive knowledge of current scientific literature and the ability to transfer theoretical knowledge to its practical application are essential. This specific knowledge allows to identify gaps in diagnostics or work processes so that new therapy methods can be developed or methodical procedures can be identified that facilitate and improve the clinical work process. Skills in data collection, data management, and data analysis, as well as the application of various current software applications for data han-

dling and statistics are essential and well-established in university sport science programs.

The critical examination and evaluation of current trends and developments (e.g., handling of fitness trackers, smartwatches, smartphones) can also be used by sport scientists to establish a sustainable understanding of health-oriented movement behavior in patients (Wonisch et al., 2008). New insights gained from the exercise therapy field are derived from the experiences of sport scientists, and non-linear periodized training plans are currently being studied, which could complement or even replace traditional linear training systems (Kiesl et al., 2022). For example, a four-week rehabilitation training can be divided into four micro-cycles with one introduction cycle, two loading cycles, and one recovery-stabilization cycle, with the load individually adjusted (after medical approval) according to the intensity, duration, frequency, and type of exercise, as well as the timing of the individual sessions according to the F.I.T.T. (Frequency, Intensity, Time, Type) principle (Ammann et al., 2014; Baschung Pfister et al., 2015; Bland et al., 2021; Lemos et al., 2020; Neil-Sztramko et al., 2019). Exercise therapy guidelines were published in 2009 (Hofmann et al., 2009) and have been continuously developed since then.

Economic aspects of exercise therapy

In Austria, there is a lack of exact, publicly accessible data on the cost accounting of rehabilitation measures, which is mainly due to the limited accessibility of data from social insurance institutions. Despite the heterogeneity of exercise therapy application areas, the exact cost accounting of exercise therapy work by sport scientists in Austria can be shown for specific diseases in prevention and/or rehabilitation contexts (Mayer et al., 2017, 2020). For example, the treatment of diabetes with 1.7 billion euros per year accounts for about 5% of healthcare costs, and these costs are expected to increase due to demographic reasons (Schmutterer et al., 2017). Therefore, experts are calling for measures to reduce subsequent complications through early intervention. Improvement suggestions in diabetes care include expanding the program "Therapy Active" and diabetes training by incorporating an exercise module. In this module, exercise plans for patients are created and adapted to the patient's health and training status. These measures could be implemented by exercise therapists at any time.

International studies show a favorable cost-benefit ratio. For example, in cardiac rehabilitation, a multimodal intervention in a study by Dibben et al. (2023) resulted in cost savings of USD 9.200 - 42.535 per quality-adjusted life year. Oldridge & Taylor (2020) showed strong evidence of cost-effectiveness for supervised exercise therapy, and Shields et al. (2023) provided evidence of cost-effectiveness for exercise therapy in patients with coronary heart disease. Turner-Stokes et al. (2016) reported relevant evidence of cost-effectiveness for exercise therapy in neurological diseases, where the rehabilitation measure, for example for severely disabled patients, already paid off after just 14.2 months.

In the economic accounting of exercise therapy in Austria, a strong transparency deficit is evident. If transparency was given, there would be a better basis for negotiations with insurance companies when it comes to establishing exercise therapy as a health care service. Furthermore, collective bargaining agreements governing the financial remuneration of sport scientists in exercise therapy could be established on a more robust basis. This approach would avoid prioritizing short-term economic gains over benefits that are more sustainable, effective, and ultimately more cost-effective in the long run.

Conclusion and position statement

The current position paper provides comprehensive scientific evidence for the effectiveness of exercise therapy. Exercise therapy is successfully practiced in preventive and rehabilitative care by university-educated sport scientists following an interdisciplinary approach.

Yet, a significant number of patients within the Austrian healthcare system are deprived of proven effective exercise therapy. This therapeutic approach has demonstrated the potential to positively impact the pathogenesis (though not universally), alleviate symptoms, enhance fitness, and improve the quality of life for patients in 26 chronic diseases, potentially contributing to a longer and higher-quality life. Therefore, we advocate the following positions:

1. It is evidently crucial for exercise therapy to attain recognition as an independent, billable treatment by Austrian health and social insurance companies. Furthermore, it should be administered and invoiced by sport scientists acting as autonomous exercise therapists under medical prescription.
2. A modification in the legal framework is imperative to eradicate the legal discrimination against university graduates specializing in sport science, particularly in the field of exercise therapy, in comparison to graduates of medically-technical diploma professions.

References

Adams, V., Reich, B., Uhlemann, M., & Niebauer, J. (2017). Molecular effects of exercise training in patients with cardiovascular disease: Focus on skeletal muscle, endothelium, and myocardium. *American Journal of Physiology-Heart and Circulatory Physiology*, *313*(1), H72–H88. https://doi.org/10.1152/ajpheart.00470.2016

Ammann, B. C., Knols, R. H., Baschung, P., De Bie, R. A., & De Bruin, E. D. (2014). Application of principles of exercise training in sub-acute and chronic stroke survivors: A systematic review. *BMC Neurology*, *14*(1), 167. https://doi.org/10.1186/s12883-014-0167-2

Anderson, B. A. (2016). The attention habit: How reward learning shapes attentional selection. In *Annals of the New York Academy of Sciences* (Vol. 1369, pp. 24–39).

Andreu-Caravaca, L., Ramos-Campo, D. J., Chung, L. H., Martínez-Rodríguez, A., & Rubio-Arias, J. Á. (2023). Effects and optimal dosage of resistance training on strength, functional capacity, balance, general health perception, and fatigue in people with multiple sclerosis: A systematic review and meta-analysis. *Disability and Rehabilitation*, *45*(10), 1595–1607. https://doi.org/10.1080/09638288.2022.2069295

Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften. (2014). *S3-Leitlinie: Behandlung von Angststörungen. Gesamtversion [S3 Guideline: Treatment of Anxiety Disorders. Full Version]*. https://register.awmf.org/assets/guidelines/051-028l_S3_Angstst%C3%B6rungen_2014-05_1.pdf

Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften. (2020). *S3-Leitlinie zur kardiologischen Rehabilitation (LL-KardReha) im deutschsprachigen Raum Europas, Deutschland, Österreich, Schweiz (D-A-CH). Gesamtversion [S3-Guideline Cardiac Rehabilitation (LL-KardReha) in the German-speaking Region of Europe, Germany, Austria, Switzerland (D-A-CH). Full Version]*. https://register.awmf.org/assets/guidelines/133-001l_S3-Kardiologische-Rehabilitation-in-D-A-CH_2020-12_verlaengert.pdf

Arnett, D. K., Blumenthal, R. S., Albert, M. A., Buroker, A. B., Goldberger, Z. D., Hahn, E. J., Himmelfarb, C. D., Khera, A., Lloyd-Jones, D., McEvoy, J. W., Michos, E. D., Miedema, M. D., Muñoz, D., Smith, S. C., Virani, S. S., Williams, K. A., Yeboah, J., & Ziaeian, B. (2019). 2019 ACC/AHA Guideline on the primary prevention of cardiovascular disease: A report of the American College of Cardiology/American Heart Association Task Force on clinical practice guidelines. *Circulation*, *140*(11). https://doi.org/10.1161/CIR.0000000000000678

Baschung Pfister, P., De Bruin, E. D., Tobler-Ammann, B. C., Maurer, B., & Knols, R. H. (2015). The relevance of applying exercise training principles when designing therapeutic interventions for patients with inflammatory myopathies: A systematic review. *Rheumatology International*, *35*(10), 1641–1654. https://doi.org/10.1007/s00296-015-3343-9

Bergler-Klein, J., Rainer, P. P., Wallner, M., Zaruba, M.-M., Dörler, J., Böhmer, A., Buchacher, T., Frey, M., Adlbrecht, C., Bartsch, R., Gyöngyösi, M., & Fürst, U.-M. (2022). Cardio-oncology in Austria: Cardiotoxicity and surveillance of anti-cancer therapies: Position paper of the Heart Failure Working Group of the Austrian Society of Cardiology. *Wiener Klinische Wochenschrift*, *134*(17–18), 654–674. https://doi.org/10.1007/s00508-022-02031-0

Björkman, F., & Ekblom, Ö. (2022). Physical exercise as treatment for PTSD: A systematic review and meta-analysis. *Military Medicine*, *187*(9–10), e1103–e1113. https://doi.org/10.1093/milmed/usab497

Blackstock, F. C., Lareau, S. C., Nici, L., ZuWallack, R., Bourbeau, J., Buckley, M., Durning, S. J., Effing, T. W., Egbert, E., Goldstein, R. S., Kelly, W., Lee, A., Meek, P. M., & Singh, S. (2018). Chronic obstructive pulmonary disease education in pulmonary rehabilitation. An official American Thoracic Society/Thoracic Society of Australia and New Zealand/Canadian Thoracic Society/British Thoracic Society workshop report. *Annals of the American Thoracic Society*, *15*(7), 769–784. https://doi.org/10.1513/AnnalsATS.201804-253WS

Bland, K. A., Neil-Sztramko, S. E., Zadravec, K., Medysky, M. E., Kong, J., Winters-Stone, K. M., & Campbell, K. L. (2021). Attention to principles of exercise training: An updated systematic review of randomized controlled trials in cancers other than breast and prostate. *BMC Cancer*, *21*(1), 1179. https://doi.org/10.1186/s12885-021-08701-y

Blumenthal, J. A., & Rozanski, A. (2023). Exercise as a therapeutic modality for the prevention and treatment of depression. *Progress in Cardiovascular Diseases*, *77*, 50–58. https://doi.org/10.1016/j.pcad.2023.02.008

British Orthopaedic Association. (2024). *NICE Trauma and orthopaedic guidelines*. https://www.boa.ac.uk/standards-guidance/nice-trauma-and-orthopaedic-guidelines.html.

Broocks, A. (2010). Bewegungstherapie bei psychischen Erkrankungen [Exercise therapy for internal diseases]. In K.-M. Braumann & N. Stiller (Eds.), *Bewegungstherapie bei internistischen Erkrankungen* (pp. 201–209). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-01332-4_15

Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz. (2012). *Medizinisches Assistenzberufegesetz [Medical Assistants Professions Act]*. §§ 27 - 34. https://www.ris.bka.gv.at/eli/bgbl/i/2012/89/P0/NOR40242691

Canadian Society for Exercise Physiology (CSEP). (2022). *CSEP Professional Standards Program. CSEP Clinical Exercise Physiologist (CSEP-CEP)*. https://csep.ca/csep-certification/csep-professional-standards-program-cep/.

Carrard, J., Gut, M., Croci, I., McMahon, S., Gojanovic, B., Hinrichs, T., & Schmidt-Trucksäss, A. (2022). Exercise science graduates in the healthcare system: A comparison between Australia and Switzerland. *Frontiers in Sports and Active Living*, *4*, 766641. https://doi.org/10.3389/fspor.2022.766641

Carrard, J., Morais Azevedo, A., Gojanovic, B., Edouard, P., Pandya, T., Robinson, D. G., Dönmez, G., Ušacka, L., Martínez Stenger, R. A., Mendonça, L. D. M., Thornton, J., Reis E Silva, M., Schneider, I., Zwerver, J., Jederström, M., Fagher, K., AlSeyrafi, O., Zondi, P., Ahamed, F., … Verhagen, E. (2023). Sport and exercise medicine around the world: Global challenges for a unique healthcare discipline. *BMJ Open Sport & Exercise Medicine*, *9*(1), e001603. https://doi.org/10.1136/bmjsem-2023-001603

Colberg, S. R., Sigal, R. J., Fernhall, B., Regensteiner, J. G., Blissmer, B. J., Rubin, R. R., Chasan-Taber, L., Albright, A. L., & Braun, B. (2010). Exercise and type 2 diabetes. *Diabetes Care*, *33*(12), e147–e167. https://doi.org/10.2337/dc10-9990

Conley, B., Bunzli, S., Bullen, J., O'Brien, P., Persaud, J., Gunatillake, T., Dowsey, M. M., Choong, P. F. M., & Lin, I. (2023). Core recommendations for osteoarthritis care: A systematic review of clinical practice guidelines. *Arthritis Care & Research*, *75*(9), 1897–1907. https://doi.org/10.1002/acr.25101

Dalgas, U., Langeskov-Christensen, M., Stenager, E., Riemenschneider, M., & Hvid, L. G. (2019). Exercise as medicine in multiple sclerosis—Time for a paradigm shift: Preventive, symptomatic, and disease-modifying aspects and perspectives. *Current Neurology and Neuroscience Reports*, *19*(11), 88. https://doi.org/10.1007/s11910-019-1002-3

Dastamooz, S., Sadeghi-Bahmani, D., Farahani, M. H. D., Wong, S. H. S., Yam, J. C. S., Tham, C. C. Y., & Sit, C. H. P. (2023). The efficacy of physical exercise interventions on mental health, cognitive function, and ADHD symptoms in children and adolescents with ADHD: An umbrella review. *eClinicalMedicine*, *62*, 102137. https://doi.org/10.1016/j.eclinm.2023.102137

Dean, B. J. F., Collins, J., Thurley, N., Rombach, I., & Bennell, K. (2021). Exercise therapy with or without other physical therapy interventions versus placebo interventions for osteoarthritis –Systematic review. *Osteoarthritis and Cartilage Open*, *3*(3), 100195. https://doi.org/10.1016/j.ocarto.2021.100195

Dibben, G. O., Faulkner, J., Oldridge, N., Rees, K., Thompson, D. R., Zwisler, A.-D., & Taylor, R. S. (2023). Exercise-based cardiac rehabilitation for coronary heart disease: A meta-analysis. *European Heart Journal*, *44*(6), 452–469. https://doi.org/10.1093/eurheartj/ehac747

Ernst, M., Folkerts, A.-K., Gollan, R., Lieker, E., Caro-Valenzuela, J., Adams, A., Cryns, N., Monsef, I., Dresen, A., Roheger, M., Eggers, C., Skoetz, N., & Kalbe, E. (2023). Physical exercise for people with Parkinson's disease: A systematic review and network meta-analysis. *Cochrane Database of Systematic Reviews*, *2023*(5). https://doi.org/10.1002/14651858.CD013856.pub2

Exercise and Sports Science Australia. (2022). *Accredited Exercise Physiologist. Scope of practice*. https://www.essa.org.au/Public/Professional_Standards/ESSA_Scope_of_Practice_documents.aspx

Gamborg, M., Hvid, L. G., Dalgas, U., & Langeskov-Christensen, M. (2022). Parkinson's disease and intensive exercise therapy — An updated systematic review and meta-analysis. *Acta Neurologica Scandinavica*, *145*(5), 504–528. https://doi.org/10.1111/ane.13579

Gillis, C., Davies, S. J., Carli, F., Wischmeyer, P. E., Wootton, S. A., Jackson, A. A., Riedel, B., Marino, L. V., Levett, D. Z. H., & West, M. A. (2021). Current landscape of nutrition within prehabilitation oncology research: A scoping review. *Frontiers in Nutrition*, *8*, 644723. https://doi.org/10.3389/fnut.2021.644723

Hambrecht, R., Niebauer, J., Fiehn, E., Kälberer, B., Offner, B., Hauer, K., Riede, U., Schlierf, G., Kübler, W., & Schuler, G. (1995). Physical training in patients with stable chronic heart failure: Effects on cardiorespiratory fitness and ultrastructural abnormalities of leg muscles. *Journal of the American College of Cardiology*, *25*(6), 1239–1249. https://doi.org/10.1016/0735-1097(94)00568-B

Hayes, S. C., Newton, R. U., Spence, R. R., & Galvão, D. A. (2019). The Exercise and Sports Science Australia position statement: Exercise medicine in cancer management. *Journal of Science and Medicine in Sport*, *22*(11), 1175–1199. https://doi.org/10.1016/j.jsams.2019.05.003

Heissel, A., Heinen, D., Brokmeier, L. L., Skarabis, N., Kangas, M., Vancampfort, D., Stubbs, B., Firth, J., Ward, P. B., Rosenbaum, S., Hallgren, M., & Schuch, F. (2023). Exercise as medicine for depressive symptoms? A systematic review and meta-analysis with meta-regression. *British Journal of Sports Medicine*, *57*(16), 1049–1057. https://doi.org/10.1136/bjsports-2022-106282

Helgerud, J., Høydal, K., Wang, E., Karlsen, T., Berg, P., Bjerkaas, M., Simonsen, T., Helgesen, C., Hjorth, N., Bach, R., & Hoff, J. (2007). Aerobic high-intensity intervals improve V˙O2max more than moderate training. *Medicine & Science in Sports & Exercise*, *39*(4), 665–671. https://doi.org/10.1249/mss.0b013e3180304570

Hofmann, P., Wonisch, M., & Pokan, R. (2009). Grundprinzipien der therapeutischen Trainingslehre [Fundamental principles of therapeutic exercise science]. In R. Pokan, W. Benzer, H. Gabriel, P. Hofmann, E. Kunschitz, K. Mayr, G. Samitz, K. Schindler, & M. Wonisch (Eds.), *Kompendium der kardiologischen Prävention und Rehabilitation* (pp. 329–351). Springer Vienna. https://doi.org/10.1007/978-3-211-69390-2_43

Holland, A. E., Cox, N. S., Houchen-Wolloff, L., Rochester, C. L., Garvey, C., ZuWallack, R., Nici, L., Limberg, T., Lareau, S. C., Yawn, B. P., Galwicki, M., Troosters, T., Steiner, M., Casaburi, R., Clini, E., Goldstein, R. S., & Singh, S. J. (2021). Defining modern pulmonary rehabilitation. An official American Thoracic Society workshop report. *Annals of the American Thoracic Society*, *18*(5), e12–e29. https://doi.org/10.1513/AnnalsATS.202102-146ST

Hölter, G. (2011). *Bewegungstherapie bei psychischen Erkrankungen: Grundlagen und Anwendung [Exercise therapy for mental illness: Principles and application]*. Deutscher Ärzteverlag.

Hrkać, A., Bilić, D., Černy-Obrdalj, E., Baketarić, I., & Puljak, L. (2022). Comparison of supervised exercise therapy with or without biopsychosocial approach for chronic nonspecific low back pain: A randomized controlled trial. *BMC Musculoskeletal Disorders*, *23*(1), 966. https://doi.org/10.1186/s12891-022-05908-3

Hughes, L., Paton, B., Rosenblatt, B., Gissane, C., & Patterson, S. D. (2017). Blood flow restriction training in clinical musculoskeletal rehabilitation: A systematic review and meta-analysis. *British Journal of Sports Medicine*, *51*(13), 1003–1011. https://doi.org/10.1136/bjsports-2016-097071

Izquierdo, M., Merchant, R. A., Morley, J. E., Anker, S. D., Aprahamian, I., Arai, H., Aubertin-Leheudre, M., Bernabei, R., Cadore, E. L., Cesari, M., Chen, L.-K., De Souto Barreto, P., Duque, G., Ferrucci, L., Fielding, R. A., García-Hermoso, A., Gutiérrez-Robledo, L. M., Harridge, S. D. R., Kirk, B., … Singh, M. F. (2021). International exercise recommendations in older adults (ICFSR): Expert consensus guidelines. *The Journal of Nutrition, Health and Aging*, *25*(7), 824–853. https://doi.org/10.1007/s12603-021-1665-8

Karl-Franzens-Universität Graz. (2013). *Curriculum für das Masterstudium Sport- und Bewegungswissenschaften an der Karl-Franzens-Universität Graz. Änderungen [Curriculum for the Master Program Sport and Exercise Science at the Karl-Franzens-University Graz. Changes*. Karl-Franzens-Universität Graz. https://static.uni-graz.at/fileadmin/urbi-institute/Sportwissenschaft/Bilder/Aktuelles/Studienplan_Sport_und_Bewegungswissenschaften_Master.pdf

Karl-Franzens-Universität Graz. (2017). *Curriculum für das Bachelorstudium Sport- und Bewegungswissenschaften. Curriculum 2017 [Curriculum for the Bachelor Program Sport and Exercise Science. Curriculum 2017]*. Karl-Franzens-Universität Graz. https://static.uni-graz.at/fileadmin/urbi-institute/Sportwissenschaft/Dokumente/Studienpl%C3%A4ne/Curriculum_2017_Bachelorstudium_Sport_und_Bewegungswissenschaften.pdf

Keating, S. E., Sabag, A., Hallsworth, K., Hickman, I. J., Macdonald, G. A., Stine, J. G., George, J., & Johnson, N. A. (2023). Exercise in the management of metabolic-associated fatty liver disease (MAFLD) in adults: A position statement from Exercise and Sport Science Australia. *Sports Medicine*, *53*(12), 2347–2371. https://doi.org/10.1007/s40279-023-01918-w

Kiesl, D., Kuzdas-Sallaberger, M., Fuchs, D., Brunner, S., Kommenda, R., Tischler, C., Hornich, H., Akbari, K., Kellermair, J., Blessberger, H., Ocenasek, H., Hofmann, P., Zimmer, P., & Vosko, M. R. (2022). Protocol for the exercise, cancer and cognition – The ECCO-Study: A randomized controlled trial of simultaneous exercise during neo-/adjuvant chemotherapy in breast cancer patients and its effects on neurocognition. *Frontiers in Neurology*, *13*, 777808. https://doi.org/10.3389/fneur.2022.777808

Kim, N. Y., & Kastner, S. (2019). A biased competition theory for the developmental cognitive neuroscience of visuo-spatial attention. *Current Opinion in Psychology*, *29*, 219–228. https://doi.org/10.1016/j.copsyc.2019.03.017

Knapen, J., Vancampfort, D., Moriën, Y., & Marchal, Y. (2015). Exercise therapy improves both mental and physical health in patients with major depression. *Disability and Rehabilitation*, *37*(16), 1490–1495. https://doi.org/10.3109/09638288.2014.972579

Kujala, U. M. (2009). Evidence on the effects of exercise therapy in the treatment of chronic disease. *British Journal of Sports Medicine*, *43*(8), 550–555. https://doi.org/10.1136/bjsm.2009.059808

Lai, B., Young, H.-J., Bickel, C. S., Motl, R. W., & Rimmer, J. H. (2017). Current trends in exercise intervention research, technology, and behavioral change strategies for people with disabilities: A scoping review. *American Journal of Physical Medicine & Rehabilitation*, *96*(10), 748–761. https://doi.org/10.1097/PHM.0000000000000743

Lam, W. W. T., Tang, Y. M., & Fong, K. N. K. (2023). A systematic review of the applications of markerless motion capture (MMC) technology for clinical measurement in rehabilitation. *Journal of Neuroengineering and Rehabilitation*, *20*(1), 57. https://doi.org/10.1186/s12984-023-01186-9

Lee, I.-M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., & Katzmarzyk, P. T. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. *The Lancet*, *380*(9838), 219–229. https://doi.org/10.1016/S0140-6736(12)61031-9

Lee, K. E., Choi, M., & Jeoung, B. (2022). Effectiveness of rehabilitation exercise in improving physical function of stroke patients: A systematic review. *International Journal of Environmental Research and Public Health*, *19*(19), 12739. https://doi.org/10.3390/ijerph191912739

Leischik, R., Dworrak, B., Gülker, H., & Littwitz, H. (2005). Prognostische Bedeutung der physikalischen Streßechokardiographie bei 3329 ambulanten Patienten (5jährige Langzeitstudie) [Prognostic Significance of Physical Stress Echocardiography in 3329 Outpatients (5-Year Long-Term Study)]. *Austrian Journal of Cardiology*, *12*(11–12), 292–302.

Lemos, J. R., Da Cunha, F. A., Lopes, A. J., Guimarães, F. S., Do Amaral Vasconcellos, F. V., & Dos Santos Vigário, P. (2020). Respiratory muscle training in non-athletes and athletes with spinal cord injury: A systematic review of the effects on pulmonary function, respiratory muscle strength and endurance, and cardiorespiratory fitness based on the FITT principle of exercise prescription. *Journal of Back and Musculoskeletal Rehabilitation*, *33*(4), 655–667. https://doi.org/10.3233/BMR-181452

Leopold-Franzens-Universität Innsbruck. (2019). *Curriculum für das Masterstudium Sportwissenschaft an der Fakultät für Psychologie und Sportwissenschaft der Universität Innsbruck [Curriculum for the Master's program in Sports Science at the Faculty of Psychology and Sports Science at the University of Innsbruck]*. Leopold-Franzens-Universität Innsbruck. https://www.uibk.ac.at/fakultaeten-servicestelle/pruefungsreferate/gesamtfassung/ma-sportwissenschaft_stand-01.10.2019.pdf

Leopold-Franzens-Universität Innsbruck. (2021). *Curriculum für das Bachelorstudium Sportwissenschaft an der Fakultät für Psychologie und Sportwissenschaft der Universität Innsbruck [Curriculum for the Bachelor's degree program in Sports Science at the Faculty of Psychology and Sports Science at the University of Innsbruck]*. Leopold-Franzens-Universität Innsbruck. https://www.uibk.ac.at/fakultaeten-servicestelle/pruefungsreferate/gesamtfassung/ba-sportwissenschaft_stand-01.10.2021.pdf

Markser, V. Z., & Bär, K.-J. (Eds.). (2015). *Sport- und Bewegungstherapie bei seelischen Erkrankungen: Forschungsstand und Praxisempfehlungen [Sports and Exercise Therapy for Mental Disorders: Research Status and Practical Recommendations]*. Schattauer. https://www.ciando.com/img/books/extract/3608268154_lp.pdf

Marx, N., Federici, M., Schütt, K., Müller-Wieland, D., Ajjan, R. A., Antunes, M. J., Christodorescu, R. M., Crawford, C., Di Angelantonio, E., Eliasson, B., Espinola-Klein, C., Fauchier, L., Halle, M., Herrington, W. G., Kautzky-Willer, A., Lambrinou, E., Lesiak, M., Lettino, M., McGuire, D. K., … Zeppenfeld, K. (2023). 2023 ESC Guidelines for the management of cardiovascular disease in patients with diabetes. *European Heart Journal*, *44*(39), 4043–4140. https://doi.org/10.1093/eurheartj/ehad192

Mayer, S., Felder-Puig, R., Gollner, E., & Dorner, T. E. (2020). Bewegungsverhalten, Kosten mangelnder körperlicher Aktivität und Bewegungsförderung in Österreich [Physical activity behavior, costs of lack of physical activity and promotion of physical activity in Austria]. *Das Gesundheitswesen*, *82*(S 03), S196–S206. https://doi.org/10.1055/a-1219-7701

Mayer, S., Kiss, N., Łaszewska, A., & Simon, J. (2017). Costing evidence for health care decision-making in Austria: A systematic review. *PLOS ONE*, *12*(8), e0183116. https://doi.org/10.1371/journal.pone.0183116

Mayr, B., Reich, B., Greil, R., & Niebauer, J. (2022). The effect of exercise training on endothelial function in postmenopausal women with breast cancer under aromatase inhibitor therapy. *Cancer Medicine*, *11*(24), 4946–4953. https://doi.org/10.1002/cam4.4833

Motl, R. W., & Pilutti, L. A. (2012). The benefits of exercise training in multiple sclerosis. *Nature Reviews Neurology*, *8*(9), 487–497. https://doi.org/10.1038/nrneurol.2012.136

Motl, R. W., Sandroff, B. M., Kwakkel, G., Dalgas, U., Feinstein, A., Heesen, C., Feys, P., & Thompson, A. J. (2017). Exercise in patients with multiple sclerosis. *The Lancet Neurology*, *16*(10), 848–856. https://doi.org/10.1016/S1474-4422(17)30281-8

Neil-Sztramko, S. E., Medysky, M. E., Campbell, K. L., Bland, K. A., & Winters-Stone, K. M. (2019). Attention to the principles of exercise training in exercise studies on prostate cancer survivors: A systematic review. *BMC Cancer*, *19*(1), 321. https://doi.org/10.1186/s12885-019-5520-9

Neudecker, C., Mewes, N., Reimers, A. K., & Woll, A. (2019). Exercise interventions in children and adolescents with ADHD: A systematic review. *Journal of Attention Disorders*, *23*(4), 307–324. https://doi.org/10.1177/1087054715584053

Neunhäuserer, D., Reich, B., Mayr, B., Kaiser, B., Lamprecht, B., Niederseer, D., Ermolao, A., Studnicka, M., & Niebauer, J. (2021). Impact of exercise training and supplemental oxygen on submaximal exercise performance in patients with COPD. *Scandinavian Journal of Medicine & Science in Sports*, *31*(3), 710–719. https://doi.org/10.1111/sms.13870

Neunhäuserer, D., Steidle-Kloc, E., Weiss, G., Kaiser, B., Niederseer, D., Hartl, S., Tschentscher, M., Egger, A., Schönfelder, M., Lamprecht, B., Studnicka, M., & Niebauer, J. (2016). Supplemental oxygen during high-intensity exercise training in non-hypoxemic chronic obstructive pulmonary disease. *The American Journal of Medicine*, *129*(11), 1185–1193. https://doi.org/10.1016/j.amjmed.2016.06.023

Neunhäuserer, D., Sturm, J., Baumgartlinger, M. M., Niederseer, D., Ledl-Kurkowski, E., Steidle, E., Plöderl, M., Fartacek, C., Kralovec, K., Fartacek, R., & Niebauer, J. (2013). Hiking in suicidal patients: Neutral effects on markers of suicidality. *The American Journal of Medicine*, *126*(10), 927–930. https://doi.org/10.1016/j.amjmed.2013.05.008

Niebauer, J., Hambrecht, R., Marburger, C., Hauer, K., Velich, T., Von Hodenberg, E., Schlierf, G., Kübler, W., & Schuler, G. (1995). Impact of intensive physical exercise and low-fat diet on collateral vessel formation in stable angina pectoris and angiographically confirmed coronary artery disease. *The American Journal of Cardiology*, *76*(11), 771–775. https://doi.org/10.1016/S0002-9149(99)80224-0

Niebauer, J., Hambrecht, R., Velich, T., Hauer, K., Marburger, C., Kälberer, B., Weiss, C., Von Hodenberg, E., Schlierf, G., Schuler, G., Zimmermann, R., & Kübler, W. (1997). Attenuated progression of coronary artery disease after 6 years of multifactorial risk intervention: Role of physical exercise. *Circulation*, *96*(8), 2534–2541. https://doi.org/10.1161/01.CIR.96.8.2534

Oldridge, N., & Taylor, R. S. (2020). Cost-effectiveness of exercise therapy in patients with coronary heart disease, chronic heart failure and associated risk factors: A systematic review of economic evaluations of randomized clinical trials. *European Journal of Preventive Cardiology*, *27*(10), 1045–1055. https://doi.org/10.1177/2047487319881839

Österreichische Diabetes Gesellschaft. (2023). Diabetes mellitus - Anleitungen für die Praxis [Diabetes melllitus - Guidelines for Practice]. *Wiener klinische Wochenschrift*, *135 [Suppl 1]*. https://www.oedg.at/pdf/OEDG-Leitlinien-2023.pdf

O'Sullivan, D., Gordon, B. R., Lyons, M., Meyer, J. D., & Herring, M. P. (2023). Effects of resistance exercise training on depressive symptoms among young adults: A randomized controlled trial. *Psychiatry Research*, *326*, 115322. https://doi.org/10.1016/j.psychres.2023.115322

Paris Lodron-Universität Salzburg. (2022a). *Curriculum für das Bachelorstudium Sport- und Bewegungswissenschaft an der Universität Salzburg. Version 2022 [Curriculum for the Bachelor's degree program in Sport and Exercise Science at the University of Salzburg. Version 2022]*. Paris Lodron-Universität Salzburg. https://www.plus.ac.at/wp-content/uploads/2023/03/BA_Spowi_2022.pdf

Paris Lodron-Universität Salzburg. (2022b). *Curriculum für das Masterstudium Sport- und Bewegungswissenschaft: Therapie-Gesundheit-Leistung an der Universität Salzburg. Version 2022 [Curriculum for the Master's degree program in Sport and Exercise Science: Therapy-Health-Performance at the University of Salzburg. Version 2022]*. Paris Lodron-Universität Salzburg. https://www.plus.ac.at/wp-content/uploads/2023/03/MA_Spowi_2022.pdf

Parke, S. C., Ng, A., Martone, P., Gerber, L. H., Zucker, D. S., Engle, J., Gupta, E., Power, K., Sokolof, J., Shapar, S., Bagay, L., Becker, B. E., & Langelier, D. M. (2022). Translating 2019 ACSM cancer exercise recommendations for a physiatric practice: Derived recommendations from an international expert panel. *PM&R*, *14*(8), 996–1009. https://doi.org/10.1002/pmrj.12664

Pascual, S. C. (2019). *Context analysis in the development for future implementation of Exercise is Medicine initiative as prevention and treatment resource for chronic diseases at primary healthcare settings*. [PhD thesis]. [object Object].

Pedersen, B. K., & Saltin, B. (2015). Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine & Science in Sports*, *25*(S3), 1–72. https://doi.org/10.1111/sms.12581

Pelliccia, A., Sharma, S., Gati, S., Bäck, M., Börjesson, M., Caselli, S., Collet, J.-P., Corrado, D., Drezner, J. A., Halle, M., Hansen, D., Heidbuchel, H., Myers, J., Niebauer, J., Papadakis, M., Piepoli, M. F., Prescott, E., Roos-Hesselink, J. W., Graham Stuart, A., … Rakhit, D. (2021). 2020 ESC Guidelines on sports cardiology and exercise in patients with cardiovascular disease. *European Heart Journal*, *42*(1), 17–96. https://doi.org/10.1093/eurheartj/ehaa605

Pesare, E., Vicenti, G., Kon, E., Berruto, M., Caporali, R., Moretti, B., & Randelli, P. S. (2023). Italian Orthopaedic and Traumatology Society (SIOT) position statement on the non-surgical management of knee osteoarthritis. *Journal of Orthopaedics and Traumatology*, *24*(1), 47. https://doi.org/10.1186/s10195-023-00729-z

Pollán, M., Casla-Barrio, S., Alfaro, J., Esteban, C., Segui-Palmer, M. A., Lucia, A., & Martín, M. (2020). Exercise and cancer: A position statement from the Spanish Society of Medical Oncology. *Clinical and Translational Oncology*, *22*(10), 1710–1729. https://doi.org/10.1007/s12094-020-02312-y

Reich, B., Benzer, W., Harpf, H., Hofmann, P., Mayr, K., Ocenasek, H., Podolsky, A., Pokan, R., Porodko, M., Puelacher, C., Sareban, M., Traninger, H., Ziegelmeyer, W., & Niebauer, J. (2020). Efficacy of extended, comprehensive outpatient cardiac rehabilitation on cardiovascular risk factors: A nationwide registry. *European Journal of Preventive Cardiology*, *27*(10), 1026–1033. https://doi.org/10.1177/2047487319898958

Reina-Gutiérrez, S., Cavero-Redondo, I., Martínez-Vizcaíno, V., Núñez De Arenas-Arroyo, S., López-Muñoz, P., Álvarez-Bueno, C., Guzmán-Pavón, M. J., & Torres-Costoso, A. (2022). The type of exercise most beneficial for quality of life in people with multiple sclerosis: A network meta-analysis. *Annals of Physical and Rehabilitation Medicine*, *65*(3), 101578. https://doi.org/10.1016/j.rehab.2021.101578

Reiter, D., Fülöp, G., Pochobradsky, E., Röthlin, F., & Stoppacher, A. (2020). *Rehabilitationsplan 2020 [Rehabilitation plan 2020]*. Gesundheit Österreich. https://www.sozialversicherung.at/cdscontent/load?contentid=10008.742311&version=1611835415

Sattler, L., Kan, A., Hing, W., & Vertullo, C. (2023). The addition of structured lifestyle modifications to a traditional exercise program for the management of patients with knee osteoarthritis: A systematic review and meta-analysis of randomised trials. *Musculoskeletal Science and Practice*, *68*, 102858. https://doi.org/10.1016/j.msksp.2023.102858

Saunders, D. H., Sanderson, M., Hayes, S., Johnson, L., Kramer, S., Carter, D. D., Jarvis, H., Brazzelli, M., & Mead, G. E. (2020). Physical fitness training for stroke patients. *Cochrane Database of Systematic Reviews*, *2020*(3). https://doi.org/10.1002/14651858.CD003316.pub7

Saynor, Z. L., & Shepherd, A. I. (2022). Exercise Is Medicine, but does not need to be prescribed by a physician: Time to recognize the role and expertise of the clinical exercise professional. *PRiMER*, *6*. https://doi.org/10.22454/PRiMER.2022.950894

Schmutterer, I., Delcour, J., & Griebler, R. (2017). *Österreichischer Diabetesbericht 2017 [Austrian Diabetes Report 2017]*. Bundesministerium für Gesundheit und Frauen. https://jasmin.goeg.at/id/eprint/327/

Schuch, F. B., & Stubbs, B. (2019). The role of exercise in preventing and treating depression. *Current Sports Medicine Reports*, *18*(8), 299–304. https://doi.org/10.1249/JSR.0000000000000620

Shields, G. E., Rowlandson, A., Dalal, G., Nickerson, S., Cranmer, H., Capobianco, L., & Doherty, P. (2023). Cost-effectiveness of home-based cardiac rehabilitation: A systematic review. *Heart (British Cardiac Society*, *109*(12), 913–920. https://doi.org/10.1136/heartjnl-2021-320459

Shimada, T., Ito, S., Makabe, A., Yamanushi, A., Takenaka, A., Kawano, K., & Kobayashi, M. (2022). Aerobic exercise and cognitive functioning in schizophrenia: An updated systematic review and meta-analysis. *Psychiatry Research*, *314*, 114656. https://doi.org/10.1016/j.psychres.2022.114656

Singh, B., Olds, T., Curtis, R., Dumuid, D., Virgara, R., Watson, A., Szeto, K., O'Connor, E., Ferguson, T., Eglitis, E., Miatke, A., Simpson, C. E., & Maher, C. (2023). Effectiveness of physical activity interventions for improving depression, anxiety and distress: An overview of systematic reviews. *British Journal of Sports Medicine*, *57*(18), 1203–1209. https://doi.org/10.1136/bjsports-2022-106195

Stine, J. G., Long, M. T., Corey, K. E., Sallis, R. E., Allen, A. M., Armstrong, M. J., Conroy, D. E., Cuthbertson, D. J., Duarte-Rojo, A., Hallsworth, K., Hickman, I. J., Kappus, M. R., Keating, S. E., Pugh, C. J. A., Rotman, Y., Simon, T. G., Vilar-Gomez, E., Wong, V. W.-S., & Schmitz, K. H. (2023). American College of Sports Medicine (ACSM) International Multidisciplinary Roundtable report on physical activity and nonalcoholic fatty liver disease. *Hepatology Communications*, *7*(4). https://doi.org/10.1097/HC9.0000000000000108

Stout, N. L., Santa Mina, D., Lyons, K. D., Robb, K., & Silver, J. K. (2021). A systematic review of rehabilitation and exercise recommendations in oncology guidelines. *CA: A Cancer Journal for Clinicians*, *71*(2), 149–175. https://doi.org/10.3322/caac.21639

Stubbs, B., Vancampfort, D., Hallgren, M., Firth, J., Veronese, N., Solmi, M., Brand, S., Cordes, J., Malchow, B., Gerber, M., Schmitt, A., Correll, C. U., De Hert, M., Gaughran, F., Schneider, F., Kinnafick, F., Falkai, P., Möller, H.-J., & Kahl, K. G. (2018). EPA guidance on physical activity as a treatment for severe mental illness: A meta-review of the evidence and position statement from the European Psychiatric Association (EPA), supported by the International Organization of Physical Therapists in Mental Health (IOPTMH). *European Psychiatry*, *54*, 124–144. https://doi.org/10.1016/j.eurpsy.2018.07.004

Sun, W., Yu, M., & Zhou, X. (2022). Effects of physical exercise on attention deficit and other major symptoms in children with ADHD: A meta-analysis. *Psychiatry Research*, *311*, 114509. https://doi.org/10.1016/j.psychres.2022.114509

The Physiological Society. (2021). *Clinical Exercise Physiologists are now eligible for professional registration*. https://www.physoc.org/news_article/clinical-exercise-physiologists-are-now-eligible-for-professional-registration/.

Tschakert, G., & Hofmann, P. (2013). High-intensity intermittent exercise: Methodological and physiological aspects. *International Journal of Sports Physiology and Performance*, *8*(6), 600–610. https://doi.org/10.1123/ijspp.8.6.600

Tschentscher, M., Eichinger, J., Egger, A., Droese, S., Schönfelder, M., & Niebauer, J. (2016). High-intensity interval training is not superior to other forms of endurance training during cardiac rehabilitation. *European Journal of Preventive Cardiology*, *23*(1), 14–20. https://doi.org/10.1177/2047487314560100

Türk, Y., Theel, W., Kasteleyn, M. J., Franssen, F. M. E., Hiemstra, P. S., Rudolphus, A., Taube, C., & Braunstahl, G. J. (2017). High intensity training in obesity: A meta-analysis. *Obesity Science & Practice*, *3*(3), 258–271. https://doi.org/10.1002/osp4.109

Turner-Stokes, L., Williams, H., Bill, A., Bassett, P., & Sephton, K. (2016). Cost-efficiency of specialist inpatient rehabilitation for working-aged adults with complex neurological disabilities: A multicentre cohort analysis of a national clinical data set. *BMJ Open*, *6*(2), e010238. https://doi.org/10.1136/bmjopen-2015-010238

Universität Wien. (2014). *Curriculum für das Masterstudium Sportwissenschaft [Curriculum for the Master's degree program in Sports Science]*. Universität Wien. https://lehre-schmelz.univie.ac.at/fileadmin/user_upload/p_studienangebote_schmelz/Studium/Studienangebote/Studienrichtung/Master_Spowi/Curriculum_MA_Sportwissenschaft_aktuell_SS2016.pdf

Universität Wien. (2020). *Curriculum für das Bachelorstudium Sportwissenschaft [Curriculum for the Bachelor's degree program in Sports Science]*. Universität Wien. https://senat.univie.ac.at/fileadmin/user_upload/s_senat/konsolidierte_Bachelorcurricula/BA_Sportwissenschaft.pdf

University of Auckland. (2022). *Clinical exercise physiology*. https://www.auckland.ac.nz/en/study/study-options/find-a-study-option/clinical-exercise-physiology.html.

Virani, S. S., Newby, L. K., Arnold, S. V., Bittner, V., Brewer, L. C., Demeter, S. H., Dixon, D. L., Fearon, W. F., Hess, B., Johnson, H. M., Kazi, D. S., Kolte, D., Kumbhani, D. J., LoFaso, J., Mahtta, D., Mark, D. B., Minissian, M., Navar, A. M., Patel, A. R., … Williams, M. S. (2023). 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the management of patients with chronic coronary disease: A report of the American Heart Association/American College of Cardiology joint committee on Clinical practice guidelines. *Circulation*, *148*(9). https://doi.org/10.1161/CIR.0000000000001168

Wang, D., Wang, Y., Wang, Y., Li, R., & Zhou, C. (2014). Impact of physical exercise on substance use disorders: A meta-analysis. *PLoS ONE*, *9*(10), e110728. https://doi.org/10.1371/journal.pone.0110728

Wanjau, M. N., Möller, H., Haigh, F., Milat, A., Hayek, R., Lucas, P., & Veerman, J. L. (2023). Physical activity and depression and anxiety disorders: A systematic review of reviews and assessment of causality. *AJPM Focus*, *2*(2), 100074. https://doi.org/10.1016/j.focus.2023.100074

Weiss, S., Ditto, M., Füszl, S., Lanske, P., Lust, A., Oberleitner-Tschan, C., & Wenda. (2023). *Gesundheitsberufe in Österreich 2023 [Healthcare professions in Austria 2023]*. Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz (BMSGPK). https://broschuerenservice.sozialministerium.at/Home/Download?publicationId=489

Westphal, T., Rinnerthaler, G., Gampenrieder, S. P., Niebauer, J., Thaler, J., Pfob, M., Fuchs, D., Riedmann, M., Mayr, B., Reich, B., Melchardt, T., Mlineritsch, B., Pleyer, L., & Greil, R. (2018). Supervised versus autonomous exercise training in breast cancer patients: A multicenter randomized clinical trial. *Cancer Medicine*, *7*(12), 5962–5972. https://doi.org/10.1002/cam4.1851

Wisløff, U., Støylen, A., Loennechen, J. P., Bruvold, M., Rognmo, Ø., Haram, P. M., Tjønna, A. E., Helgerud, J., Slørdahl, S. A., Lee, S. J., Videm, V., Bye, A., Smith, G. L., Najjar, S. M., Ellingsen, Ø., & Skjaerpe, T. (2007). Superior cardiovascular effect of aerobic interval training versus moderate continuous training in heart failure patients: A randomized study. *Circulation*, *115*(24), 3086–3094. https://doi.org/10.1161/CIRCULATIONAHA.106.675041

Wonisch, M., Berent, R., Klicpera, M., Laimer, H., Marko, C., Pokan, R., Schmid, P., & Schwann, H. (2008). Praxisleitlinien Ergometrie [Ergometry practice guidelines]. *Austrian Journal of Cardiology*, *15 (Supplementum A-Praxisleitlinien Ergometrie)*, 3–17.

World Health Organization. (2017). *Depression and other common mental disorders: Global health estimates*. World Health Organization. https://iris.who.int/handle/10665/254610

Wu, P.-L., Lee, M., & Huang, T.-T. (2017). Effectiveness of physical activity on patients with depression and Parkinson's disease: A systematic review. *PLOS ONE*, *12*(7), e0181515. https://doi.org/10.1371/journal.pone.0181515

Yamamoto, S., Hotta, K., Ota, E., Mori, R., & Matsunaga, A. (2016). Effects of resistance training on muscle strength, exercise capacity, and mobility in middle-aged and elderly patients with coronary artery disease: A meta-analysis. *Journal of Cardiology*, *68*(2), 125–134. https://doi.org/10.1016/j.jjcc.2015.09.005

Young, J. J., Pedersen, J. R., & Bricca, A. (2023). Exercise therapy for knee and hip osteoarthritis: Is there an ideal prescription? *Current Treatment Options in Rheumatology*, *9*(3), 82–98. https://doi.org/10.1007/s40674-023-00205-z

Acknowledgements

The first author would like to thank Sylvia Titze for advising the final writing process of the paper.

We acknowledge the use of Perplexity AI and Chat GPT in translating the German version of the manuscript into English.

Funding

The authors have no funding or support to report.

Competing interests

The authors have declared that no competing interests exist.

Data availability statement

All relevant data are within the paper.