前 言

本刊主要收录Web of Science核心合集数据库有关体教融合、体医融合、奥林匹克教育、冰雪运动、体育工程、反兴奋剂、文化与新闻传播领域的最新研究成果。

Web of Science核心合集包括Science Citation Index Expanded (SCIE)、社会科学引文索引(SSCI)、艺术和人文引文索引(A&HCI)、Emerging Sources Citation Index (ESCI)、Conference Proceedings Citation Index (CPCI)、Book Citation Index (BKCI)等，是科学及学术研究的全球原创引证索引。其涵盖超过250个自然科学、社会科学、艺术和人文学科。

本刊旨在利用Web of Science核心合集平台为广大师生提供有关目前热点的最新研究内容。检索出的数据采用书目共现分析系统（Bicomb V2021）对文献信息进行提取，包括期刊、关键词、标题、发文年份等，相同含义的字段去重且批量合并，同时去除没有实质意义的字段，对所提取的字段进行频次统计，形成高频矩阵，并使用社会网络分析软件Ucinet绘制成知识图谱，进行共词聚类分析。

本期选录体教融合方面的文献16篇，体医融合方面的文献15篇，冰雪运动方面的文献15篇，体育工程方面的文献11篇，反兴奋剂方面的文献10篇。

目 录

体育工程

反兴奋剂

责任编辑：马赛迈

体教融合

本期体教融合学术研究共检索到英文相关文献148篇，研究热点主要集中在对体育教师的支持和评估、学生运动技能与评估工具和个人发展、体育对儿童身心发展的影响等。检索结果如下：1）关键词共词分析。提取关键词483个，经过数据清洗后关键词为435个，词频为2及以上的关键词有44个，累计百分比为38.62%，高频关键词有体育教育、体育活动、幸福感、教育学、教师教育等，生成可视化知识图谱（见下图）。2）来源期刊分析。涉及期刊110种，其中载文3篇及以上的期刊有14种，所载文献累计百分比为63.64%，刊载体教融合前三位的期刊分别为：Physical education and sport pedagogy（JCR学科分区Q1），European Physical Education Review（JCR学科分区Q2），Movimento（JCR学科分区Q4、Q4）。3）学科交叉分析。引用文献总计4924篇，最多的频次为10次，分别为*Motivational profiles for secondary school physical education and its relationship to the adoption of a physically active lifestyle among university students*和*Principles and practice of structural equation modeling*。4）学术关注度分析。文献级别用量最多的是5次，排名前三位的文献分别为：*Using Health Education to Address Student Physical Activity and Nutrition: Evidence and Implications to Advance Practice*、*Portuguese research on physical education and sport didactics-a critical discussion*、*Observing physical education teachers' need-supportive and need-thwarting styles using a circumplex approach: how does it relate to student outcomes?*
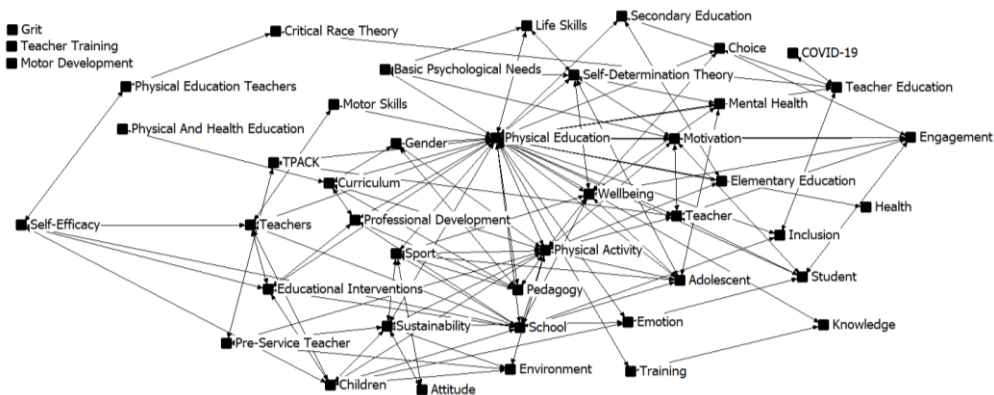
Gruno, J., & Gibbons, S. (2023). Implementing nature-based physical activity in physical and health education teacher education. Journal of Adventure Education and Outdoor Learning, 1-18.

ABSTRACT

In this study we sought to answer the following regarding student learning: After bi-weekly implementation of nature-based physical activity (NBPA) in a Physical and Health Education Teacher Education (PHETE) course, did pre-service elementary teachers report a greater perceived competence and motivation to teach children NBPA? The term NBPA refers to physical activities that are done in natural areas, require little specialized equipment, can be done by most children, are cost-efficient, and can be used by teachers on a regular basis. As part of the NBPA experiences in PHETE, we employed focus groups for data collection. Applying self-determination theory as a lens, we found that, overall, participants reported feeling more competent and motivated to teach NBPA. Their motivation increased due to their experiences as learners and their ability to think as teachers. Future research could extend this study to explore if pre-service teachers incorporate NBPA during their teaching practicums after learning NBPA in their PHETE courses.

Bezeau, D., Turcotte, S., Desbiens, J. F., Spallanzani, C., Roy, M., Vandercleyen, F., & Beaudoin, S. (2023). Physical education teachers' assessment practices in health education. Physical Education and Sport Pedagogy, 1-13.

ABSTRACT

This article focuses on the assessment of health education (HE) in physical education (PE). PE is one of the school disciplines that can contribute substantially to educational actions in HE (Kirk, D. 2018. "Physical Education-as-Health Promotion: Recent Developments and Futures Issues." Education and Health 36 (3): 70-75). However,

studies conducted on PE teachers' practices indicate that assessment in HE is challenging, even though it is mandatory in Quebec schools (Bezeau, D., S. Turcotte, S. Beaudoin, and J. Grenier. 2020. "Health Education Assessment Practices Used by Physical Education and Health Teachers in a Collaborative Action Research." Physical Education and Sport Pedagogy 25 (4): 379-393). Few studies have focused on the assessment practices of PE teachers in HE, resulting in a limited amount of empirical data being currently available (Georgakis, S., and R. Wilson. 2012. "Australian Physical Education and School Sport: An Exploration Into Contemporary Assessment." Asian Journal of Exercise & Sports Science 9 (1): 37-52). A well-planned assessment in which pupils are involved promotes their learning and makes them accountable for their own health (Leirhaug, P. E., and C. Annerstedt. 2016. "Assessing with new Eyes? Assessment for Learning in Norwegian Physical Education." Physical Education and Sport Pedagogy 21 (6): 616-631). It is necessary to investigate PE teachers' assessment practices in HE to improve the current scientific knowledge on the subject and to better understand the main challenges they face.ObjectivesThis article addresses three research objectives that aim to determine: 1) assessment practices as reported by PE teachers who assess in HE, 2) the reasons given by PE teachers who do not assess in HE for not doing so, and 3) the perceived contribution of PE teachers to the development of pupils' autonomy in health and well-being.Method223 elementary school (pupils: 5-11 years old) PE teachers from Quebec (Canada) answered a questionnaire including five closed-ended and two open-ended questions specific to assessment practices in HE. A quantitative analysis of the data from the five open-ended questions was carried out using descriptive statistics in addition to a Kruskall-Wallis rank analysis (Howell, D. C. 2008. Methodes statistiques en sciences humaines. De Boeck) with a Mann-Whitney post-hoc test (& alpha; < .05; Siegel, S., and N. J. Castellan Jr. 1988. Nonparametric Statistics for the Behavioral Sciences (2nd ed.). Mcgrawhill). These analyses were conducted using five independent variables: 1) gender, 2) teaching experience, 3) number of schools where they teach, 4) contract status, and 5) socioeconomic background of the school. Also, the Goodman-Kruskall's G coefficient was used to analyze statistical associations between

items. A qualitative analysis of the data from the two open-ended questions was carried out following (L'ecuyer, R. 1990. Methodologie de l'analyse developpementale de contenu : methode GPS et concept de soi. Presses de l'Universite du Quebec) steps of inductive content analysis.FindingsA large majority of the participants claimed to assess in HE (84.9%). They also mentioned respecting the official programs (87.7%), building tools to assess in HE (87.4%), assessing pupils' progress (84.4%) and having an impact on their pupils' autonomy in matters of health (74.9%).

Those participants who worked in multiple schools assessed more in the short term (U = 2426, p = .028). Finally, those who did not assess HE (15.1%) mentioned a lack of feasibility and a lack of resources.ConclusionThis study contributes to the scientific literature by focusing on an area for which there are few empirical studies and which represents a challenge for practical settings. The results show that a large majority of PE teachers assess in HE, while some face challenges that lead them to not assess this competency at all, even though it is mandatory. Based on these findings, we believe it is important to work with PE teachers to lessen the impact of these challenges on their assessment practices to help pupils' learning.

Lobo, J. (2023). Perceived Physical Education Teachers' Emotional Support and its direct interrelation to Learners' Academic Resilience. Sportis. Scientific Journal of School Sport, Physical Education and Psychomotricity, 9(3), 527-544.

ABSTRACT

Academic resiliency is a learner's ability to overcome scholastic setbacks. Additionally, it was discovered that instructors' emotional support can boost academic resilience. However, these studies are predominantly vast in the elementary and secondary level, and are not connected to Physical Education in the Higher Education Context. This study has utilized two distinct questionnaires: Teacher's Emotional Support Scale (TESS) and Academic Resiliency Scale (ARS-30). After performing Multiple Regression, it was observed that Teacher's Emotional Support predicts Academic Resiliency, suggesting

that teacher's emotional support has a direct and significant influence to academic resiliency. Furthermore, it was discovered that Teacher's Sensitivity and Regard to Adolescent Perspective has a direct influence to learners' academic resilience, except positive climate. Physical education teachers may be able to help learners who are struggling academically by providing them with emotional support. The results emphasized the necessity of college learners' access to emotional support from teachers in building resilience. Finally, the results were examined, with an emphasis on how the development of learners' personal and contextual resources can have a positive effect on their well-being.

Zubillaga-Olague M, Cañadas L, Moura A. (2023). Assessment Aspects of Student's Motor Skills and Assessment Tools in Physical Education[J]. Apunts: Educació Física i Esports, 153.

ABSTRACT

Educational developments call for a change in the way in which aspects related to students' motor skills are assessed in the field of physical education, moving towards a global assessment that goes beyond assessment centred on physical performance. This research aims: (i) to analyse the most and least valued variables in relation to the assessment aspects of student motor skills and the type of assessment tools used by PE teachers; (ii) to assess whether there are statistically significant differences in these aspects among Primary and Secondary school teachers, according to teaching experience, according to the highest academic degree obtained and the type of school in which they teach; and (iii) to assess the relationship between the assessment tools used and the aspects that are assessed in relation to student motor skills. Quantitative, comparative, correlational and cross-sectional research was carried out. A total of 455 physical education teachers from all over Spain took part. The data was collected through the Questionnaire on Assessment Processes in Physical Education #AssessPE. The results demonstrated that among the assessment aspects of students' motor skills, teachers

reported giving greater importance to whether students know and respect health and hygiene habits and motor problem solving. In terms of assessment tools, teachers indicate that those most frequently used are contextualised game situations and observation sheets, with tests being the least frequently used. There are some differences in these aspects depending on the variables studied, although they are not constant. Finally, there is no clear relationship between most of the assessment tools studied and the motor skill assessment aspects.

Lohmann, J., Nigg, C., Hertle, I., & Kugelmann, C. (2023). Preservice physical education teachers' beliefs about sustainable development in physical education—scale development and validation. German Journal of Exercise and Sport Research, 1-12.

ABSTRACT

Climate change poses a major challenge to people and ecosystems and calls for action across all areas to contribute to a sustainable transformation of society. To shape this transformation, it is crucial that teachers implement education for sustainable development (ESD) in schools for a more sustainable future generation, which also applies to physical education (PE) teachers. However, little is known about PE teachers' beliefs, a key dimension of professional competence, regarding the implementation of ESD in PE. Hence, the goal of this study was to 1) develop a scale to capture PE teachers' beliefs about the relevance of sustainable development generally and in the context of PE, and 2) investigate its psychometric properties and criterion validity. The analysis using exploratory structural equation modeling in a cross-sectional sample of 206 preservice teachers resulted in a 10-item instrument with good psychometric properties (comparative fit index [CFI] = 0.976; root mean square error of approximation [RMSEA] = 0.047; standardized root mean square residual [SRMR] = 0.057) and reliability across three factors: a) general beliefs about the relevance of sustainable development, b) positive, and c) critical subject-specific beliefs about

sustainable development in PE. Based on the value-belief-norm theory, criterion validity was confirmed through associations between biospheric values and beliefs. We conclude that the newly developed scale is appropriate for assessing PE teacher's beliefs about the implementation of ESD in PE.

Albedry, B., Ammons, L., Marenus, M. W., Hammoud, D., Jandali, D., Chrzanowski, M., & Chen, W. (2023). The Effects of an Adventure Education Pilot Study on Social Emotional Learning, Resilience, and Physical Activity among High School Students. American Journal of Health Education, 54(5), 329-342.

ABSTRACT

Research on the effects of adventure education lessons on social emotional skills (SEL), psychological outcomes, and physical activity (PA) is limited. Purpose: This study assessed the effectiveness of adventure education lessons in improving high school students' SEL competencies, resilience, and PA. Methods: 10(th) grade students (mean age = 15 & PLUSMN; enrolled in a 90-minute adventure education class 2-3 times a week for 15 weeks during the winter/spring semester of 2022. Questionnaires measured SEL, resilience, and PA at pre- and posttest, while open-ended questionnaires were collected at the end of the semester. Data analysis involved descriptive statistics, paired t-tests, and constant comparison techniques. Results: indicated significant increases in the total SEL scale ($t = -2.00$, $p = .050$), self-awareness ($t = -2.07$, $p = .043$), self-management ($t = -2.67$, $p = .010$), resilience ($t = 5.69$, $p < .001$), and vigorous PA ($t = -4.13$, $p < .001$) levels over time. Qualitative analysis revealed adventure education promotes communication, teamwork, and building transferrable skills leading to intra- and interpersonal growth. Discussion: High school students saw improvements in SEL, resilience, and physical activity after participating in a semester-long adventure education curriculum. Translation to Health Education Practice The adventure education is useful in improving students' SEL skills, developing resilience, and promoting PA.

Wright, P. M., Richards, K. A., & Ressler, J. D. (2023). Assessing Student Ratings of Developmental Experiences in a High School Physical Education Leadership Program. Journal of Teaching in Physical Education, 1(aop), 1-7.

ABSTRACT

Although physical education (PE) leadership programs are widespread, little research has examined the PE leaders' perceptions of these experiences. The purpose of this study was to assess student ratings of developmental experiences in a PE leadership program compared with ratings of the typical PE student experience. Method: A matched case-control study design was used to assess high school students' (n = 186) subscale scores on the Youth Experience Survey 2.0. Data were analyzed using matched-pairs t tests, and Cohen's d was used as a measure of effect size. Results: As hypothesized, PE leaders reported significantly higher levels of positive experiences and no significant differences on negative experiences. Discussion/Conclusions: Little is known about what happens in most PE leadership programs. Results presented here support claims that PE can support meaningful leadership development. Implications for practice and research are discussed.

Rojo-Ramos, J., Franco-Garc ń, J. M., Mayordomo-Pinilla, N., Pazzi, F., & Gal án-Arroyo, C. (2023, June). Physical Activity and Emotional Regulation in Physical Education in Children Aged 12–14 Years and Its Relation with Practice Motives. In Healthcare (Vol. 11, No. 13, p. 1826). MDPI.

ABSTRACT

This study aimed to analyze the different types of emotional regulation in first and second year high school students according to sex and age. Many adolescents do not meet the minimum WHO recommendations, at a critical stage in which habits that will later be maintained are established. For this reason, physical education is an important means to promote these habits and an understanding of the reasons for their participation

in physical education. For this purpose, PLOC-2 was used. The Kolmogorov-Smirnov test was used to determine the characteristics of the data, the ANOVA test to explore the differences between sexes, and the Spearman test for correlations between the type of regulation and age. The results showed significant differences in several items and emotional regulation by sex and an inverse correlation between age and demotivation. There are differences between the reasons why both sexes perform physical activity, and we have determined that boys have more intrinsic regulation than girls do.

Jelena, M. (2023). Competences of Physical Education Teachers in Education Supported by Digital Technology. International Journal of Cognitive Research in Science, Engineering and Education, 11(2), 331-341.

ABSTRACT

The application of digital technology in teaching physical education provides a basis for its improvement in the direction of promoting physical activity and student development. As one of the most important subjects of the teaching process, teachers have a fundamental role in achieving the goals and tasks of physical education. Physical education teachers are required to develop competences based on which they would implement digital technology in physical education classes in compliance with the imperatives of modern digital education. Therefore, this research is focused on the competences of physical education teachers in education supported by digital technology. The aim of this research is to determine the competences of physical education teachers necessary to fulfil their role in education supported by digital technology. The method used in this theoretical research is the method of theoretical analysis. The technique of content analysis was used. The research instrument consists of the relevant literature on this topic. The theoretical analysis points to a need to expand and improve the digital competences of physical education teachers, which can be achieved by joint action of formal and informal education systems in developing programs that would provide a basis for the professional development and empowerment of physical education teachers

to use digital technology with more certainty and purpose in teaching physical education.

Beni, S., N íChr ón ń, D., Fletcher, T., Bailey, J., Cari ño Fraisse, L., Down, M., ... & Gross, K. (2023). Teachers' sensemaking in implementation of Meaningful Physical Education. Physical Education and Sport Pedagogy, 1-14.

ABSTRACT

While PE has arguably changed little since the 1960s, there is a rich history of the development of innovations in PE pedagogy. A key challenge lies in the sustained and broad use of these innovations. Researchers have sought to understand how teachers implement these innovations in their classrooms and the factors that lead to their sustained use. The concept of sensemaking offers an avenue for considering the processes by which teachers make sense of innovations in relation to a broad variety of personal and situational factors, which influence teachers' conceptualizations and implementation of innovations. Much of the research to date on teachers' sensemaking has centered on the use of innovations which have been mandated through policy and reforms. However, in this research, we take a different approach by beginning with a group of teachers who have voluntarily adopted the Meaningful PE innovation and integrated it into their regular teaching practice for a sustained period of time. The purpose of this research is to understand how these teachers have made sense of Meaningful PE in their local contexts. Methods: Six teachers from five countries (Cambodia, Canada, China, Vietnam and USA) participated as collaborators in the study. Data collection methods included (a) individual semi-structured interviews with teachers, (b) teacher-generated artifacts (e.g. blogs and social media posts), and (c) analysis of teachers' local curriculum documents. An inductive thematic analysis of the data was conducted. Findings: Three themes illustrate how each teacher's sensemaking processes influenced their implementation of Meaningful PE, including making sense of Meaningful PE through (a) the attributes of the innovation, (b) teachers' personal

characteristics and beliefs, and (c) local curriculum. Teachers in this study made sense of Meaningful PE through the ways it clearly connected to their beliefs about PE teaching while also helping to resolve ambiguities and uncertainties in their practice. Implementation of Meaningful PE helped teachers bridge the gap between their espoused vision and enacted practice, while supporting more authentic interpretations and implementation of curricular goals and outcomes. Conclusions: This research holds important implications for supporting PE teachers' sustained professional learning about and implementation of innovative practices in PE. Specifically, the reciprocity between teachers' interpretations of the innovation and their local curriculum points to (a) the importance of situating innovations within teachers' local contexts and alongside local policy mandates when presenting them to teachers and (b) the potential for implementation of innovative approaches that deal with the how and why of teachers' practice to help teachers understand and (re)interpret the what (i.e. mandated content and assessment) of their PE teaching in new ways.

Clark, C., Penney, D., Whittle, R., & Jones, A. (2023). Gendered pedagogy in senior secondary physical education curriculum enactment. Curriculum Studies in Health and Physical Education, 1-19.

ABSTRACT

Arnold's dimensions of movement (1979) and Wilcox's embodied ways of knowing (2009) informed case study research which explored the influence of gender(ed) movement-based pedagogy and associated equity issues in Victorian Certificate of Education (VCE) Physical Education (PE). VCE PE teachers from three schools provided documentation (course, unit, lesson plans, resources, assessment materials) and semi-structured interviews to investigate how teachers used movement and the role gender plays in influencing decisions and approaches relating to movement-based pedagogy. Gender discourses were evident in teachers' decisions regarding the types of movement experiences included in VCE PE, pedagogical approaches and assessment

contexts. Issues of safety were linked to gendered assumptions about learners. Movement is a central tenet of senior secondary PE, yet movement-based pedagogy needs to be more responsive to the needs of all students to ensure equity in students' movement and learning experiences and to positively reflect gender diversity of student cohorts.

Oh, D., & Lee, K. (2023). Humanities-Oriented Physical Education for Social and Emotional Learning. Journal of Physical Education, Recreation & Dance, 94(3), 17-23.

ABSTRACT

Children and adolescents face increased mental health issues and social isolation, especially within the COVID-19 environment. In response to the current situation, the concept of social and emotional learning (SEL) has shown positive influences on children and adolescents. This paper will provide a brief definition and values of SEL. Then, the authors will suggest the concept of Humanities-Oriented Physical Education (HOPE) as a vehicle for SEL. Following this, under the umbrella of HOPE, this paper will introduce one specific pedagogical model that has the potential for creating successful learning environments for SEL within physical education settings.

Serwe-Pandrick, E., Jaitner, D., & Engelhardt, S. (2023). "Reflective practice" in physical education: Didactic interferences between movement practices and intellectual practices from the perspective of physical education teachers in Germany. German Journal of Exercise and Sport Research, 1-11.

ABSTRACT

Physical education (PE) is rooted in a historically evolved subject culture that goes largely unquestioned in everyday teaching and learning. It is characterized by a normative primacy of movement practices, placing it in a precarious relationship with

the intellectual practices required by sports pedagogy and school curricula. The present case study is based on praxeological classroom research and examines how didactic interferences between intellectual reserves and movement reserves are represented in the principle of "reflective practice" in PE. To reconstruct key orientations toward the interfering practices of teaching and learning that guide teachers' actions, we conducted six expert interviews in a PE development project in North Rhine-Westphalia (Germany) and analyzed the interview data based on the coding procedure of grounded theory. The reconstructed orientations guiding PE teachers' actions can be described according to three key dimensions: On the temporal level, one key interference is the scarcity of time for movement. On the spatial level, the space of the gymnasium often stands in the way of establishing and routinizing intellectual practices. On the media level, the use of written forms in PE classes appears to be regarded as a requirement that is imposed upon teachers and that should be kept to a minimum. The results are particularly relevant to research on the institutional professionalization of PE teachers.

Romeu, J., Camerino, O., & Castañer, M. (2023). Optimising Motor Coordination in Physical Education, an Observational Study. Apunts. Educació Física i Esports, (153), 67-78.

ABSTRACT

One of the challenges of Physical Education during compulsory education in primary and secondary school is guaranteeing students' motor development, and coordination is a fundamental element. The aim of the research was to identify the improvement of motor coordination patterns in a selection of students finishing primary education, following a programme of stimulation and progressive intervention based on pedagogical strategies over 41 sessions of Physical Education. This intervention was implemented during three terms of the school year with 25 participants aged 12 (& PLUSMN; 1) from one school. The systematic observational study with a Mixed Methods convergent design approach integrated: the exhaustive observations of the motor behaviours of the whole group-class

from the 41 sessions, and the timely administration of the 3JS test to assess the coordinative development of each of the participants. A motor coordination observation system (COS) was constructed and validated to detect the temporal patterns (T-patterns) of coordinative behaviours recorded using the free LINCE PLUS software and analysed with Theme software. The 3JS test was administered at the beginning and at the end of the didactic intervention. The results reveal differences between the T-patterns before and after the pedagogical intervention, the latter being richer and more diverse, as the coordinative motor elements appeared more frequently and at a higher coordinative level, coinciding with the results of the 3JS test.

Pan, Y. H., Huang, C. H., & Hsu, W. T. (2023). A comparison of the learning effects between TGfU-SE and TGfU on learning motivation, sport enjoyment, responsibility, and game performance in physical education. Frontiers in Psychology, 14.

ABSTRACT

Both the Sport Education (SE) model and Teaching Games for Understanding (TGfU) have been connected to the theory of situated learning, which is a game-centered curricular model. TGfU emphasizes tactical awareness, decision making, and skill execution. The SE model provides a complete season during physical education (PE) lessons. Therefore, it is worth exploring the integration of TGfU with SE (TGfU-SE) model in PE courses, and whether the hybrid TGfU-SE model can achieve better learning effects for students than the TGfU model alone. Purpose: The purpose of the study was to compare the difference in learning effects between the TGfU-SE model and the TGfU model on students' learning motivation, sport enjoyment, responsibility, and game performance. Methods: This study used a quasi-experimental design to compare different learning effects between the experimental group (TGfU-SE) and the control group (TGfU). The participants lived in Taiwan, including two junior high school PE teachers and four PE classes with a total of 90 students (TGfU-SE group, n = 46; TGfU

group, n = 44). Each teacher taught two PE classes, one with an experimental group and one with a control group. This study used four research instruments, including the Responsibility Scale in Physical Education (RSPE), Learning Motivation Scale in Physical Education (LMSPE), Sport Enjoyment Scale in Physical Education (SESPE), and Game Performance assessment instrument (GPAI). Analysis of covariance (ANCOVA) and the independent t-test were used to analyze the data. Results: The results of this study showed that the TGfU-SE model had more positive learning effects on students' learning motivation, sport enjoyment, responsibility, and game performance than the TGfU model. Conclusion: we concluded that the TGfU-SE model had a more positive influence on students' learning performance than the TGfU model. It is suggested that the hybrid TGfU-SE model could be implemented effectively in the PE curriculum.

Hemingway, K., Butt, J., Spray, C., Olusoga, P., & Beretta De Azevedo, L. (2023). Exploring students experiences of secondary school Physical Education in England. Physical Education and Sport Pedagogy, 1-16.

ABSTRACT

There are many diverging views regarding the role and purpose of Physical Education (PE) in secondary schools within the UK. However, very few studies have explored PE processes through the eyes of young people. Adolescence represents a critical time period when physical activity (PA) behaviour patterns are often established. Student disengagement in PE is therefore a concern, as PE has the potential to play an important role in influencing adolescents to develop lifelong PA habits. Secondary school PE is compulsory in the UK until the age of 16, therefore PE teachers have a captive audience who they can influence positively or negatively. Understanding of students' experiences and perceptions of PE could help inform future PE provision.Purpose:The purpose of this study was to explore students' perceptions of PE throughout secondary school (age 11-16) in England, UK. This study aims to explore students' views concerning changes

and continuities from Key Stage (KS3) (age 11-14) to KS4 (age 14-16). We are also interested in the meanings that students attach to their PE experiences, identifying the social structures and processes that shape these meanings.Methods:Using a social constructionist framework, semi-structured interviews were conducted at eight secondary schools across Yorkshire, England. A convenience sample of eligible schools was used to recruit the study participants. Two participants aged 15-16 (Year 11, KS4) were interviewed at each school (N = 16). Inductive and deductive thematic analysis informed by self-determination theory guided the analysis. Thematic analysis comprised three second-order themes which were generated by ten first-order themes drawing students' experiences of PE.Results:Perceptions of PE throughout KS3 (age 11-14) were perceived as unfavourable, owing to too much structure and social comparisons. However, perceptions of KS4 (age 14-16) PE lessons were positive, with students enjoying increased choice, less structure, and an opportunity to relieve the stress and pressure of school life. Students identified the role of the teacher to be significant in enhancing student experience throughout secondary school. However, students acknowledged that the student-teacher relationship changed across secondary school, suggesting a need for numerous pedagogical approaches to be adopted through secondary school PE. In addition, PE is recognised by some students as an opportunity to improve their wellbeing, advocating the need for PE teachers to consider employing more holistic outcomes within PE lessons.Conclusions:The findings of this study suggest that there is a noticeable difference between students' experiences of PE at KS3 (age 11-14) compared to KS4 (age 14-16), questioning if the KS3 curriculum is conducive to support student engagement in PE. The results also indicate that PE teachers could widen the learning of PE beyond the physical domain and incorporate a more holistic approach when planning and delivering PE lessons. The long-term implications of engaging more students in PE is that we may inspire more adolescents to remain physically active into adulthood, and to live healthier, more active lives.

体医融合

本期体医融合学术研究共检索到英文相关文献82篇，研究热点主要集中在对身体活动的推广、身体活动对心血管、中风、糖尿病等慢性病的影响及康复等方面。检索结果如下：1）关键词共词分析。提取关键词222个，经过数据清洗后关键词有219个，词频为2及以上的关键词有24个，累计百分比为35.16%，高频关键词为身体活动、心血管疾病、康复、糖尿病、生活质量等，生成可视化知识图谱（见下图）。2）来源期刊分析。涉及期刊42种，其中载文2篇及以上的期刊有3种，累计百分比为14.29%，刊载体医融合前三位的期刊分别为：BMJ Open Sport & Exercise Medicine，Healthcare（JCR学科分区Q3、Q2），Nutrients（JCR学科分区Q1）。3）交叉学科分析。引用文献总计2110篇，最多的频次为5次，这两篇文献分别是：*ATS statement: Guidelines for the six-minute walk test*、*Exercise intensity assessment and prescription in cardiovascular rehabilitation and beyond: why and how: a position statement from the Secondary Prevention and Rehabilitation Section of the European Association of Preventive Cardiology*。4）学术关注度分析。文献级别用量最多的是2次，排名前两位的文献分别为：*Are exercise prescriptions for patients with cardiovascular disease, made by physiotherapists, in agreement with European recommendations?*、*Physical Activity and Nonalcoholic Fatty Liver Disease: A Roundtable Statement from the American College of Sports Medicine*、*Diet, exercise, and pharmacotherapy for sarcopenia in people with diabetes*。
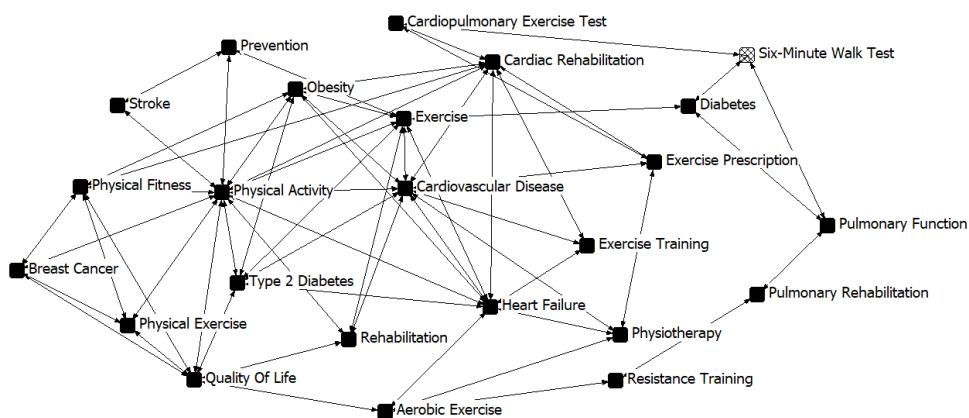
Steinacker, J. M., Van Mechelen, W., Bloch, W., Börjesson, M., Casasco, M., Wolfarth, B., ... & Pitsiladis, Y. P. (2023). Global alliance for the promotion of physical activity: the Hamburg declaration. BMJ Open Sport & Exercise Medicine, 9(3), e001626.

ABSTRACT

Non-communicable diseases (NCDs), including coronary heart disease, stroke, hypertension, type 2 diabetes, dementia, depression and cancers, are on the rise worldwide and are often associated with a lack of physical activity (PA). Globally, the levels of PA among individuals are below WHO recommendations. A lack of PA can increase morbidity and mortality, worsen the quality of life and increase the economic burden on individuals and society. In response to this trend, numerous organisations came together under one umbrella in Hamburg, Germany, in April 2021 and signed the 'Hamburg Declaration'. This represented an international commitment to take all necessary actions to increase PA and improve the health of individuals to entire communities. Individuals and organisations are working together as the 'Global Alliance for the Promotion of Physical Activity' to drive long-term individual and population-wide behaviour change by collaborating with all stakeholders in the community: active hospitals, physical activity specialists, community services and healthcare providers, all achieving sustainable health goals for their patients/clients. The 'Hamburg Declaration' calls on national and international policymakers to take concrete action to promote daily PA and exercise at a population level and in healthcare settings.

Khasanova, A., & Henagan, T. M. (2023). Exercise Is Medicine: How Do We Implement It?. Nutrients, 15(14), 3164.

ABSTRACT

Exercise is well known to have beneficial effects on various disease states. In this paper, we broadly describe the fundamental concepts that are shared among various disease

states, including obesity, type 2 diabetes (T2D), cardiovascular disease (CVD), heart failure (HF), cancer, and psychological well-being, and the beneficial effects of exercise training within these concepts. We highlight issues involved in implementing exercise recommendations and describe the potential impacts and challenges to medical professionals and patients. Problems are identified and discussed with respect to the future roles of professionals in the current built environment with its limited infrastructure to support current physical activity recommendations.

Pavlovic, N., Brady, B., Boland, R., Harris, I. A., Flood, V. M., Genel, F., ... & Naylor, J. M. (2023). A mixed methods approach to investigating physical activity in people with obesity participating in a chronic care programme awaiting total knee or hip arthroplasty. Musculoskeletal Care.

ABSTRACT

Aims: To describe patient-reported physical activity and step count trajectory and explore perceived barriers and enablers to physical activity amongst people with obesity participating in a chronic care programme whilst awaiting arthroplasty. Design Convergent parallel mixed-method study. Method: A patient cohort derived from a longitudinal sample of adults with end-stage osteoarthritis and obesity from a chronic care programme whilst awaiting primary total knee or hip arthroplasty (n = 97) was studied. Physical activity was measured at baseline (entry to the wait list) and before surgery (9-12 months waiting time) using the Lower Extremity Activity Scale (LEAS) and activity monitors (activPAL & TRADE;). A subset of participants completed in-depth semi-structured interviews 6 months after being waitlisted to explore perceived barriers and enablers to physical activity. Themes were inductively derived and then interpreted through the COM-B model. Results: Baseline LEAS and activPAL & TRADE; data were available from 97 and 63 participants, respectively. The proportion of community ambulant individuals reduced from 43% (95% CI 33%-53%) at baseline to 17% (95% CI 9%-28%) pre-surgery. Paired activPAL & TRADE; data (n = 31) for

step count, upright time, and stepping time remained unchanged. Twenty-five participants were interviewed. Five themes underpinning physical activity were mapped to the COM-B model components of capability (physical capability), opportunity (accessibility and social norms), and motivation (self-efficacy and beliefs and physical activity).Conclusions Participation in a chronic care programme did not improve physical activity levels for people with obesity awaiting arthroplasty. Programs cognisant of the COM-B model components may be required to address the natural trajectory of declining physical activity levels while awaiting arthroplasty.

Stine, J. G., Long, M. T., Corey, K. E., Sallis, R. E., Allen, A. M., Armstrong, M. J., ... & Schmitz, K. H. (2023). Physical Activity and Nonalcoholic Fatty Liver Disease: A Roundtable Statement from the American College of Sports Medicine. Medicine and Science in Sports and Exercise.

ABSTRACT

Although physical activity (PA) is crucial in the prevention and clinical management of nonalcoholic fatty liver disease, most individuals with this chronic disease are inactive and do not achieve recommended amounts of PA. There is a robust and consistent body of evidence highlighting the benefit of participating in regular PA, including a reduction in liver fat and improvement in body composition, cardiorespiratory fitness, vascular biology, and health-related quality of life. Importantly, the benefits of regular PA can be seen without clinically significant weight loss. At least 150 min of moderate or 75 min of vigorous intensity PA are recommended weekly for all patients with nonalcoholic fatty liver disease, including those with compensated cirrhosis. If a formal exercise training program is prescribed, aerobic exercise with the addition of resistance training is preferred. In this roundtable document, the benefits of PA are discussed, along with recommendations for 1) PA assessment and screening; 2) how best to advise, counsel, and prescribe regular PA; and 3) when to refer to an exercise specialist.

Ramanan, N., Lee, S., Maharajh, G., Webster, R., & Longmuir, P. E. (2023). Preventing sedentary lifestyles among young children born with congenital heart defects: A feasibility study of physical activity rehabilitation after surgical or catheterization intervention. Plos one, 18(8), e0284946.

ABSTRACT

Background: Children with congenital heart disease (CHD) often have inactive lifestyles and motor skill deficits beginning in infancy. The least active infants continue to be the least active children at school age. Enhancing physical activity and motor development in infancy, at the time of CHD treatment, may prevent inactive lifestyle habits. Methods: All children being treated, through surgery or catheterization, for congenital heart disease are eligible if they are 3 to 72 months of age at enrollment. The Peabody Motor Development Scales (Version 2) and 7-day accelerometry (Actigraph GT9X Link) assess motor skills and physical activity prior to treatment and 7 weeks, 6 months and 12 months post-treatment. Participants are randomized 3:1 to intervention control. Until 7 weeks post-treatment, intervention activities focus on regaining pre-treatment mobility and midline crossing. From 7 weeks to 6 months post-treatment, the intervention is individualized to each child's assessment results and is parent-led, delivered at home and play-based. Conclusion: This feasibility study will provide essential data for a randomized controlled trial to evaluate play-based, parent-delivered interventions optimized to support age-appropriate physical activity and motor skills among young children with CHD. Preliminary intervention efficacy data will inform an evidence-based sample size calculation, optimize intervention timing, and identify hypotheses on the motor skill-physical activity connection and the impact of play-based, parent-led interventions during recovery from CHD treatment. Long-term, the goal is to optimize motor skill and active lifestyles among young children with CHD, enabling their healthy growth and development and enhancing childhood quality of life.

Uhlig-Reche, H., Ontiveros, D., Syzdek, R., Mathews, P., Dalal, L., Amaro, A., ... & Gonzales, N. R. (2023). Description of Baseline Nutrition and Physical Activity Knowledge and Behavior in Acute Stroke/TIA Patients Enrolled in the Health Education on Information Retention and Behavior Change in Stroke (HERBS) Pilot Trial. Nutrients, 15(17), 3761.

ABSTRACT

Lifestyle modifications after stroke are associated with better risk factor control and lower mortality. The primary objective of this study was to describe the knowledge of American Heart Association (AHA) recommendations for diet and exercise in survivors of stroke and transient ischemic attack (TIA). The secondary objectives were to describe their diet and exercise behaviors, self-efficacy (SE), behavioral intent (BI), stage of change, and barriers to change. Data are described from participants enrolled in a prospective educational intervention in mild stroke/TIA survivors. A multiple-choice questionnaire ascertained knowledge of AHA recommendations for diet and exercise, nutrition and physical activity behavior, SE, BI, stage of change, and barriers to change. Twenty-eight stroke/TIA survivors, with a mean age of 61.7 & PLUSMN; 11.8 years, completed questionnaires during their acute hospitalization. Participants underestimated the recommended intake of fruits, vegetables, whole grains, and participation in aerobic exercise and overestimated the recommended intake of sugar and salt. SE demonstrated a significant positive association with combined behavior scores (rs = 0.36, p = 0.043). Greater knowledge of the AHA recommendations was not associated with healthier behavior, greater SE, higher BI, or more advanced stage of change. The gaps between AHA recommendations and stroke/TIA patient knowledge identifies an area for potential intervention in stroke prevention and recovery.

Courel-Ibáñez, J., Estévez-López, F., Hughes, C., Adams, N., Fullen, B. M., Davison, G., ... & McVeigh, J. G. (2023). Proof of concept of prehabilitation: a combination of education and behavioural change, to promote physical activity in people with fibromyalgia. BMJ open, 13(7), e070609.

ABSTRACT

To establish proof of concept of a prehabilitation intervention, a combination of education and behavioural change, preceding a physical activity programme in people with fibromyalgia (FM). Settings Open-label, feasibility clinical trial. Participants Eleven people with FM (10 women). Interventions: The prehabilitation intervention consisted of 4 weeks, 1 weekly session (similar to 1 to 1.5 hours), aimed to increase self-efficacy and understand why and how to engage in a gentle and self-paced physical activity programme (6 weeks of walking with telephone support). Primary and secondary outcome measures Primary outcome was the acceptability and credibility of the intervention by means of the Credibility/Expectancy Questionnaire. Secondary outcomes comprised scales to measure FM severity, specific symptoms and sedentary behaviour. An exit interview was conducted to identify the strengths and weaknesses and barriers to the intervention. Results: One participant dropped out due to finding the walking programme excessively stressful. Participants expected the intervention would improve their symptoms by 22%-38% but resulted in 5%-26% improvements. Participants would be confident in recommending this intervention to a friend who experiences similar problems. The interviews suggested that the fluctuation of symptoms should be considered as an outcome and that the prehabilitation intervention should accomodate these fluctuation. Additional suggestions were to incorporate initial interviews (patient-centred approach), to tailor the programmes to individuals' priorities and to offer a variety of physical activity programmes to improve motivation. Conclusions: This feasibility study demonstrated that our novel approach is acceptable to people with FM. Future interventions should pay attention to flexibility, symptoms fluctuation and patients support.

den Uijl, I., van den Berg-Emons, R. J., Sunamura, M., Lenzen, M. J., Stam, H. J., Boersma, E., ... & Ter Hoeve, N. (2023). Effects of a Dedicated Cardiac Rehabilitation Program for Patients With Obesity on Body Weight, Physical Activity, Sedentary Behavior, and Physical Fitness: The OPTICARE XL Randomized Controlled Trial. Physical therapy, 103(9), pzad055.

ABSTRACT

Objective: Previously published results of the OPTICARE XL open label randomized controlled trial showed no added value of OPTICARE XL CR, a dedicated cardiac rehabilitation (CR) program for patients with obesity, with respect to health-related quality of life (primary outcome). This clinical trial studied the effects of OPTICARE XL CR on several secondary outcomes, which included body weight, physical activity, sedentary behavior, and physical fitness. Methods: Patients with coronary artery disease or atrial fibrillation and body mass index & GE; 30 were randomized to OPTICARE XL CR (n = 102) or standard CR (n = 99). OPTICARE XL CR was a 1-year group intervention, specifically designed for patients with obesity that included aerobic and strength exercise, behavioral coaching, and an aftercare program. Standard CR consisted of a 6- to 12-week group aerobic exercise program, supplemented with cardiovascular lifestyle education. Study end points included body weight, physical activity, sedentary behavior (accelerometer), and physical fitness (6-Minute Walk Test and handgrip strength), which were evaluated 6 months after the end of CR (primary endpoint) and 3 months after the start of CR. Results: Six months after completion of either program, improvements in body weight, physical activity, sedentary behavior, and physical fitness were similar between the groups. Three months after CR start, patients randomized to OPTICARE XL CR showed greater weight loss (mean change = -3.6 vs -1.8 kg) and a larger improvement in physical activity (+880 vs +481 steps per day) than patients randomized to standard CR. Conclusion: Patients allocated to OPTICARE XL CR lost significantly more body weight and showed promising results with respect to physical activity 3 months after the start of CR; however, these short-term results were not expanded or sustained in the longer term. Impact Patients with obesity do not benefit from standard CR programs. The new OPTICARE XL CR program showed its effects in

the short term on weight loss and physical activity, and, therefore, redesign of the aftercare phase is recommended.

Hansen, D., Coninx, K., Beckers, P., Cornelissen, V., Kouidi, E., Neunhauserer, D., ... & Dendale, P. (2023). Appropriate exercise prescription in primary and secondary prevention of cardiovascular disease: why this skill remains to be improved among clinicians and healthcare professionals. A call for action from the EXPERT Network. European journal of preventive cardiology, zwad232.

ABSTRACT

In Europe alone, on a yearly basis, millions of people need an appropriate exercise prescription to prevent the occurrence or progression of cardiovascular disease (CVD). A general exercise recommendation can be provided to these individuals (at least 150 min of moderate-intensity endurance exercise, spread over 3-5 days/week, complemented by dynamic moderate-intensity resistance exercise 2 days/week). However, recent evidence shows that this one size does not fit all and that individual adjustments should be made according to the patient's underlying disease(s), risk profile, and individual needs, to maximize the clinical benefits of exercise. In this paper, we (i) argue that this general exercise prescription simply provided to all patients with CVD, or elevated risk for CVD, is insufficient for optimal CVD prevention, and (ii) show that clinicians and healthcare professionals perform heterogeneously when asked to adjust exercise characteristics (e.g. intensity, volume, and type) according to the patient's condition, thereby leading to suboptimal CVD risk factor control. Since exercise training is a class 1A intervention in the primary and secondary prevention of CVD, the awareness of the need to improve exercise prescription has to be raised among clinicians and healthcare professionals if optimized prevention of CVD is ambitioned.

Hamborg, T. G., Tang, L. H., Andersen, R. M., Skou, S. T., & Simonÿ C. (2023). It is like someone holding your hand when you need it–lived experiences of patients with cardiovascular disease participating in a digital health intervention focusing on the maintenance of physical activity after cardiac rehabilitation. Disability and Rehabilitation: Assistive Technology, 1-11.

ABSTRACT

Purpose: To explore patients with cardiovascular diseases' lived experiences of the support given by a text message intervention focusing on the maintenance of physical activity after supervised cardiac rehabilitation. Methods: In a qualitative study, participants from the feasibility trial FAIR were interviewed individually twice to disclose their lived experiences during and after the trial. Transcribed interviews were analysed based on a phenomenological-hermeneutic method, inspired by Paul Ricoeur's philosophy on narrative and interpretation. Results: Interviews of eight patients with cardiovascular disease (3 females, median age 57 years (range 37 to 74 years)) revealed two themes, The FAIR intervention as a bridge builder in the transition to being physically active in everyday life and Meaningful conditions for maintaining physical activity. Action plans guided physical activity, while text messages facilitated actions and left an impression of still being under supervision. A frame of reference with physical activity, family, being monitored, having to report back, and getting feedback, were incentives for being physically active. Conclusion: From a patient perspective, the text message intervention in the feasibility trial FAIR was valuable to support the maintenance of physical activity in the transition from a supervised exercise-based cardiac rehabilitation programme to everyday life on an individual basis. Participants experienced the intervention to hold their hands in changing behaviour and redefining themselves. Yet, there is an extended need for belonging and personal interactions in future interventions.

Bucciarelli, Valentina, Francesco Bianco, Andrea Di Blasio, Teresa Morano, Desiree Tuosto, Francesco Mucedola, Serena Di Santo, Alessandra Cimini, Giorgio Napolitano, Ines Bucci, and et al. (2023). "Cardiometabolic Profile, Physical Activity, and Quality of Life in Breast Cancer Survivors after Different Physical Exercise Protocols: A 34-Month Follow-Up Study" Journal of Clinical Medicine 12, no. 14: 4795.

ABSTRACT

Background: Breast cancer (BC) and cardiovascular (CV) disease share many risk factors associated with worse outcomes, in terms of cancer relapse, CV events, and quality of life (QoL), that could be counteracted by physical exercise (PE). We aimed to assess the impact of a 12-week differential PE protocol on cardiometabolic profile, QoL, CV- and BC-related long-term outcomes, and physical activity (PA) in a cohort of BC survivors (BCS) not treated with chemotherapy. Methods: 57 BCS participated in a 12-week PE protocol [aerobic exercise training (AET) or resistance exercise training (RET)]. Anthropometric and CV evaluation, health-related (HR)-QoL, daily PA, cortisol, and dehydroepiandrosterone sulfate (DHEA-S) levels were assessed before (T0) and after (T1) PE. We assessed BC and CV outcomes, HR-QoL, CV-QoL, and PA at the follow-up. Results: RET improved waist circumference, DHEA-S, cortisol/DHEA-S, systolic and mean blood pressure, and ventricular/arterial coupling; AET ameliorated sagittal abdomen diameter and pulse wave velocity. Regarding HR-QoL, physical function improved only in AET group. At a mean 34 & PLUSMN; 3.6-month follow-up, we documented no significant differences in CV-QoL, HR-QoL, and PA or CV and BC outcomes. Conclusions: AET and RET determine specific, positive adaptations on many parameters strongly related to CV risk, CV and BC outcomes, and QoL, and should be included in any cardio-oncology rehabilitation program.

Peng, L., Song, Y., Lv, B., & Jing, C. (2023). The effect of implementation of pain neuroscience education and rehabilitation exercise on post-operative pain and recovery after laparoscopic colorectal surgery: a prospective randomized controlled trial. Journal of Anesthesia, 1-12.

ABSTRACT

Purposes: To optimize the efficacy of analgesia and post-operative recovery for patients undergoing laparoscopic colorectal surgery by integrating a composite psycho-somatic analgesia algorithm involving peri-operative rehabilitation exercise and pain neuroscience education into multi-modal analgesia. Methods: A prospective randomized controlled trial was conducted to compare conventional peri-operative analgesia (group CA) and the addition of rehabilitation exercise and pain neuroscience education into it (group REPNE) for patients undergoing laparoscopic colorectal surgery. Acute and chronic post-operative pain, characteristics of pain (pain catastrophizing, sensitization, and trends of neuropathic transformation), and quality of post-operative recovery calibrated with EuroQol Five Dimensions Questionnaire (EQ-5D-5L) were investigated and compared between two groups. Results: A total of 175 patients consented to participate in this study. Compared with those receiving conventional analgesia (group CA, N = 89), patients in group REPNE (N = 86) reported reduced intensity of pain 24 h after surgery, less risk of pain catastrophizing and sensitization, and better quality of life during hospitalization recovery till 1 month after surgery (p < 0.05). No statistical difference was found for neuropathic transformation of post-operative pain or for the incidence of chronic post-operative pain (p > 0.05).Conclusions: The addition of peri-operative rehabilitation exercise and pain neuroscience education into multi-modal analgesia provided better analgesic effect compared with routine practice for patients receiving laparoscopic colorectal surgery and also facilitated better post-operative recovery. This composite psycho-somatic algorithm for peri-operative analgesia merits further application in clinical practice.

Shao, S., Mitsutake, T., & Maruyama, H. (2023, June). Effects of Diamond Steps Exercises on Balance Improvement in Healthy Young and Older Adults: A Protocol Proposal. In Healthcare (Vol. 11, No. 13, p. 1834). MDPI.

ABSTRACT

Diamond step (DS) exercises are associated with multiple components of postural control and, thus, have the potential to efficiently improve balance ability. This study aimed to verify whether DS exercises contribute to improving balance ability. This study included 35 healthy young people and 29 older adults. DS exercises were performed continuously for 3 min, four times a week, for 1 month. Balance ability was assessed at baseline and after 1 and 2 months; eight items in total were examined: 30 s chair stand test, functional reach test, standing on one leg with eyes closed, time required for five rounds of DS, left-right DS, Y balance test, open-close stepping test, and finger-to-floor distance. The difficulty, achievement, and lightness/enjoyment of DS exercises were measured after the first practice and 1 month after beginning the exercises as subjective evaluations. Older adults showed improvement in seven of the eight items, with the exception being the one-legged stance with closed eyes. The subjective evaluation showed a decrease in the level of difficulty of DS exercises for older adults. DS exercises may improve balance by effectively utilizing various postural control strategies. These exercises can be effective and easy to implement, given their moderate difficulty level and self-efficacy.

Jamali, S., Omidi, M., & Yousefi, M. R. (2023). Comparison of the effect of resistance versus aerobic exercise on the serum levels of salusin-α and salusin-β, lipid profile and insulin resistance in overweight/obese women. Science & Sports, 38(5-6), 543-550.

ABSTRACT

Objectives: Increased body fat level or obesity is related to dyslipidemia, high blood

pressure, insulin resistance, respiratory disorders and type 2 diabetes and increases intracellular inflammatory processes and arterial injuries. Equipment and methods: The study participants were 39 overweight/obese women living in Ilam City, Iran who were randomly assigned into three group of aerobic exercise group (treadmill at 50-70% heart rate reserve [HRR]) (n = 13), resistance exercise group (8 to 16 repetitions of 7 upper and lower body exercises at 60% to 80% of 1 repetition maximum) and control group. Training was conducted through three sessions per week for 8 weeks. Repeated measures ANOVA with Bonferroni post-hoc tests were employed to analyze the data (P <= 0.05). Results: The findings showed that the levels of salusin-alpha (P = 0.192), salusin-beta (P = 0.069), high-density lipoprotein (HDL) (P = 0.862), low-density lipoprotein (LDL) (P = 0.941), triglycerides (TG) (P = 0.287), and body fat percentage and insulin resistance (P = 0.99) did not show any significant difference between aerobic and resistance exercise groups. However, a significant difference was observed between the aerobic and resistance exercise groups in total cholesterol (P = 0.007). In general, the results of the present study show that resistance and aerobic exercises have beneficial effects in the prevention of atherosclerosis cardiovascular diseases in obese and overweight women. (c) 2023 Elsevier Masson SAS.

Ruzzolini, M., & Ambrosetti, M. (2023). Cardiopulmonary exercise testing in cardiac rehabilitation: From the reporting form to structured exercise prescription. A proposal from the Italian alliance for cardiovascular rehabilitation and prevention (Itacare-P). International Journal of Cardiology Cardiovascular Risk and Prevention, 200191.

ABSTRACT

The cardiopulmonary exercise test (CPET) is the gold standard for the diagnostic evaluation of exercise intolerance, as for individualized prescription of structured physical training. Exercise is a core component of cardiovascular prevention and rehabilitation activites, but unfortunately the limited availability of CPET-derived

informations often leads to unpowered program's prescription in real life. The Italian Alliance for Cardiovascular Rehabilitation and Prevention (ITACARE-P) has developed a CPET reporting form specifically oriented to exercise prescription, in order to facilitate interventions on lifestyle and during phase II/phase III cardiac rehabilitation programmes. The ITACARE-P CPET reporting form includes a limited number of key variables for clinical practice and individual domains of exercise intensity, suitable both for threshold-based and range-based aerobic training protocols. The adoption of the ITACARE-P CPET reporting form could improve non pharmacological intervention in preventive cardioloy and facilitate collaborative research on physical training within the network of cardiac rehabilitation facilities.

冰雪运动

本期冰雪运动学术研究共检索到英文相关文献145篇，研究热点主要集中在冰雪旅游产品开发、滑雪运动员的运动损伤、滑雪俱乐部管理及营运、冰雪运动员经典技战术分析、以及冰雪运动装备对该运动的影响等方面。检索结果如下：1）关键词共词分析。提取关键词194个，经过数据清洗后关键词有190个，词频为2及以上的关键词有15个，累计百分比为18.95%，高频关键词为越野滑雪、单板滑雪、滑冰、气候变化、冬季旅游等，生成可视化知识图谱（见下图）。2）来源期刊分析。涉及期刊36种，其中载文2篇及以上的期刊有7种，累计百分比为41.67%，排名第一的期刊是Sustainability（JCR学科分区Q2、Q2、Q3、Q3）。3）交叉学科分析。引用文献总计1509篇，最多的频次为4次，该文献是：*The Training of Olympic Alpine Ski Racers*。4）学术关注度分析。文献级别用量最多的是7次，排名前两位的文献分别为：*Investigating Tactics Characteristics of Mass-Start Event of Speed Skating in Pyeongchang Winter Olympics*、*Experience influences kinematic motor synergies: an Uncontrolled manifold approach to simulated Nordic skiing*。
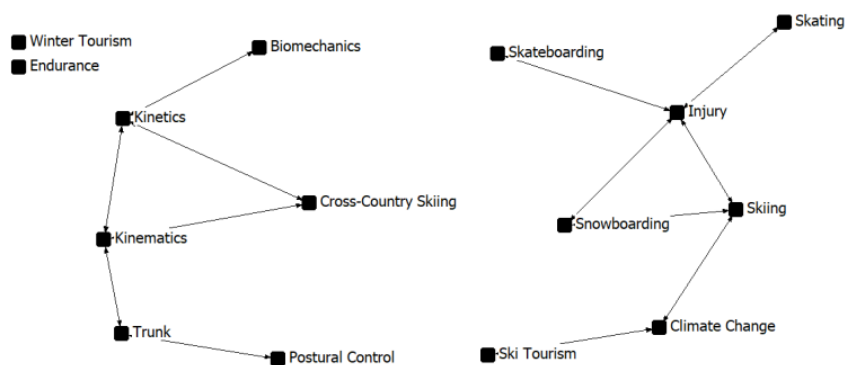
Reichwein, P. (2023). The origins of the Canadian Birkebeiner Ski Festival: invented traditions, winter sportscapes, and heritage sport tourism in sustainability and the UNESCO Beaver Hills Biosphere. Journal of Heritage Tourism, 1-19.

ABSTRACT

The Canadian Birkebeiner Ski Festival emerged as the world's third Birkebeiner cross-country ski loppet in 1985, emulating the Norwegian Birkebeiner and the American Birkebeiner. This study examines the early years of the Canadian Birkebeiner as a heritage sport tourism event with routes near Edmonton, Alberta, that became an annual festival and attraction in western Canada. Invented tradition, sportscapes, and heritage sport tourism are a conceptual frame to analyse how the Festival represented the Birkebeiner legends, how skiers and skiing constituted landscapes, and how the event contributed to sustainability. The Canadian Birkebeiner resulted in a winter sport festival and sportscape that shaped cross-country skiing, trails, and public lands, and was indicative of fluid social relations and rural place making by means of skiing. Based on archival and oral history sources, the study argues the Canadian Birkebeiner was an invented tradition that originated with a ski loppet instrumental in the negotiation of terrain for cross-country skiing that contributed to winter sportscapes and heritage sport tourism in the Cooking Lake-Blackfoot Provincial Recreation Area, and, ultimately, within the UNESCO Beaver Hills Biosphere. It contributes to studies of winter events with local and broader implications for sustainable heritage tourism.

Happ, E., Schnitzer, M., & Scholl-Grissemann, U. (2023). Ski touring on groomed slopes—Exploring an alpine winter sports trend and potential tourism product. Tourism Management Perspectives, 48, 101155.

ABSTRACT

Winter sports tourism in the Alps remains competitive and challenges destinations to develop and offer new tourism products. Slope ski touring (SST) is an excellent example.

In the Alps, this winter sport has been experiencing a tremendous boom. However, SST has been poorly examined in academia. Thus, we aimed to gain in-depth understanding of the SST phenomenon from both a supply and demand perspective by conducting two studies. In Study 1, we interviewed 26 experts to assess the relevance of SST and identify types of slope ski tourers as potential tourist segments. In Study 2, we questioned 6880 slope ski tourers and applied the motivation-opportunity-ability framework to understand why consumers engage in SST and what facilitators are important to them. This article contributes to existing knowledge by (1) analyzing potential SST target groups and their needs and (2) shedding light on the underlying typology and tourism potential of SST.

Palter, J., & Caraway, B. R. (2023). Understanding the approaches taken by private ski clubs in Southern Ontario to address climate change and sustainability. Journal of Outdoor Recreation and Tourism, 43, 100683.

ABSTRACT

The inter-annual weather variation associated with climate change has emerged as a major risk to the ski tourism industry, adversely impacting season length, snow quality, operating and investment costs, visitation, and neighboring markets. Existing research has focused principally on the overall impacts of climate change on the supply and demand of public ski areas operating on a for-profit basis. This study focuses instead on a niche but vital component of the ski industry-private ski clubs in Southern Ontario. This project is guided by the research questions: what are the approaches taken by Southern Ontario private ski clubs to address sustainability and climate change, and how do various stakeholders and operating structures shape these approaches? To answer these questions, we conducted semi-structured interviews with representatives from eight private ski clubs in Southern Ontario. After coding transcripts of the interviews, we identified the following major themes for discussion: resource efficiency, snowmaking, diversification, environmental management, waste management, business model,

stakeholder influence and education. We found that private ski clubs are aware of the challenges they face and are making investments to better adapt their operations to the changing realities of climate change. We also found that there are distinct structural differences from public ski resorts that influence how private clubs approach sustainability, including their revenue model, membership base, and inability to scale. Based on our assessment, we recommend that private ski clubs begin to formally assess their climate resiliency on a regular basis.Management implications: This study provides one of the first considerations of the adaptation and mitigation strategies pursued by private ski clubs confronting climate change in Canada's winter tourism industry. Like their commercial counterparts, private ski clubs in Southern Ontario are subject to decreasing and unreliable snowfall, more variable winter climate conditions, increasing snowmaking requirements, and shortened ski seasons. While these impacts have important management implications, private ski clubs may benefit from their unique pricing structure and loyal membership base. Private ski club managers should look for ways to leverage their predictable revenue flows from annual membership fees for investment in resource efficiency, snowmaking capacity, recreational diversification, environmental management, and outreach. Based on this study, we recommend that clubs begin formally assessing their climate resiliency every 3-5 years to better understand how they can adapt their operations to changing circumstances.

Tsilogianni, D., Cartalis, C., & Philippopoulos, K. (2023). Climate Change Impact Assessment on Ski Tourism in Greece: Case Study of the Parnassos Ski Resort. Climate, 11(7), 140.

ABSTRACT

The sustainability of ski tourism is directly related to the prevailing climatic conditions. This study investigates the impact of climate change on the sector of ski tourism in Greece. For this purpose, the current situation is assessed and the changes in underlying climatic parameters (temperature, snow cover, snow depth) are examined on the basis of

a selected climatic scenario (RCP 4.5) for ski tourism in Greece in general, but also for the specific case of the Parnassos ski resort (PSR). The results refer to the period 2051-2060 compared to 1971-1980 and show a clear increase in temperature and a considerable decrease in snow cover and snowfall throughout the Greek territory, as well as in the special case of PSR. The results for specific snow indicators (duration of the snow season, number of days with an amount of at least 100 and 120 kg m(-2) of natural, groomed, or managed snow, and potential snowmaking hours for wet bulb temperature lower than -2 and -5 & DEG;C) from climate projections for the 1971-2099 period further highlight the risk for mountain tourism in Greece. Decreasing trends for all examined parameters are found for the RCP 4.5 and the RCP 8.5 scenarios. In light of these findings, necessary adaptation measures against climate change are proposed in order to maintain the viability of the ski tourism sector in Greece.

Warren, A., Dea, M., Barron, I. G., & Zapata, I. (2023). Ski and snowboard injury patterns in the United States from 2010 to 2020 in pediatric patients. Injury, 110899.

ABSTRACT

Background: Children and adolescents are at higher risk of injuries from winter sports like skiing and snowboarding which can cause severe lifelong debilitation and death. Purpose: The objective of this study is to perform a nationwide analysis of pediatric skiing and snowboarding injuries to identify patterns regarding patient demographics, type of injuries, outcomes, and admission rates. Study Design: Descriptive Epidemiological Study. Methods: This was a retrospective cohort study of publicly available data. Cases were sourced from the National Electronic Injury Surveillance System (NEISS) from 2010 to 2020 and included 6421 incidents. Results: Even when the highest percentage of injuries was the head at 19.30%; the diagnosis of concussion was placed third while fractures were the most common diagnosis at 38.20%. The proportion of pediatric incidents by hospital type is changing with children's hospitals

currently managing the majority of cases. Conclusions: These findings can assist clinicians in the ED across different hospital types in understanding the patterns of injury to be better prepared for new cases.

Honert, E. C., Harrison, K., & Feeney, D. (2023). Evaluating wrapping alpine ski boots during on-snow carving. Frontiers in Sports and Active Living, 5, 1192737.

ABSTRACT

Introduction: Alpine ski boots enable rapid and precise force transfer between skier and ski while carving. These boots are made of rigid plastic and fit tightly commonly through four buckles. Such a fit can improve speed and control but also pain and discomfort. In athletic footwear, alterations to the upper designed to wrap the foot improve performance during rapid changes of direction and during trail running. The purpose of this study was to systematically evaluate the performance and fit of two different ski boot shell closure mechanisms: a BOA closure and a Buckle closure. Materials and methods: This was a two-part study with 22 subjects performing on-mountain skiing and 10 of those subjects completing an in-laboratory pressure evaluation. Subjects skied in both boots three times each while data from inertial measurement units (IMUs) and plantar pressures were collected along with subjective data. In lab, static dorsal and plantar pressures were collected while the subjects flexed into the boots. Results: The BOA boots improved subjective and objective ski performance; qualitative carving scores were greater, likely through increasing the amount of normal force applied to the ski while turning. There were no differences in edge angles between the boots, as computed from IMUs. The BOA boot also reduced static peak plantar pressures in the rearfoot along with reducing overall static pressure on the dorsum as compared with the Buckle boot. Conclusions: This is the first study to systematically evaluate differences in ski boot closures. The improvements in carving performance in the BOA boot are supported by distinct differences in pressure distribution within each boot, which we speculate contributed to improved performance

by reducing discomfort or pain while still facilitating effective force transfer.

Yang, Y., Sun, X., Hu, L., Ma, Y., & Bu, H. (2023). How Ski Tourism Involvement Promotes Tourists' Low-Carbon Behavior?. Sustainability, 15(13), 10277.

ABSTRACT

China's ski tourism industry has grown tremendously in the past few years, leading to an increasing amount of tourism-related carbon emissions with negative environmental impacts. Although the government and other market participants are trying to solve the problem from both legislative and technological perspectives, encouraging tourists to engage in low-carbon behavior may play a more important role. This study aims to explore how tourism involvement influences ski tourists' low-carbon behavior. A sampling survey was conducted to collect 422 valid responses from two ski resorts (indoor and outdoor). Findings from structural equation modeling revealed a significant positive impact of tourism involvement on both low-carbon tourism behavior and low-carbon daily behavior, and this impact can be serially mediated by place attachment and environmental responsibility. In addition, we confirmed that the impact of ski tourism involvement on place attachment is more significant for outdoor ski resorts compared with indoor ones. This study expands the categories of destinations for research on ski tourism and low-carbon behavior. It provides implications for encouraging visitor pro-environmental behavior while corroborating the social value of ski tourism in addressing environmental issues. It also offers insights for government low-carbon campaigns, business management practices, and individuals with actionable attitudes. However, it is worth noting that this study was conducted in a single latitude region and did not conduct a comparative analysis with different locations across latitudes. Future research could investigate skiers in cities of different latitudes to gain a more comprehensive understanding.

Supej, M., Kalén, A., Verdel, N., Ogrin, J., & Holmberg, H. C. (2023). The Contribution of Ski Poles to Aerodynamic Drag in Alpine Skiing. Applied Sciences, 13(14), 8152.

ABSTRACT

The present study was designed to determine the contribution of the cross-sectional area of the ski poles (S-p) to the total aerodynamic drag during alpine skiing. At three different wind speeds in a wind tunnel, 10 skiers assumed typical alpine skiing postures (high, middle, and tuck), and their frontal aerodynamic drag was assessed with a force plate and their cross-sectional area, along with that of their ski poles, determined by interactive image segmentation. The data collected were utilized to examine intra-subject variation in S-p, the effects of S-p on the coefficient of aerodynamic drag (C-d), and the product of C-d and total cross-sectional area (C-d center dot S. The major findings were as follows: (i) S-p ranged from 0.0067 (tuck position) to 0.0262 m(2) (middle position), contributing 2.2-4.8% of the total cross-sectional area, respectively; (ii) S-p was dependent on wind speed in the high and middle positions; (iii) intra-subject variations ranged from 0.0018 m(2) (27.6%) in the tuck position to 0.0072 m(2) (30.5%) in the high position; (iv) S-p exerted a likely effect on C-d and C-d center dot S. The extensive intra- and inter-skier variability in S-p can account for as much as similar to 5% of the total frontal cross-sectional area and future investigations on how elite skiers optimize their positioning of the poles in a manner that reduces aerodynamic drag are warranted.

Yangutova, A., Dong, S., Cheng, H., Xu, S., Li, F., Li, Z., ... & Boldanov, T. (2023). Assessing the Competitiveness of the Ski Resources around Lake Baikal (Russia) and Measures for Their Further Development. Sustainability, 15(14), 10752.

ABSTRACT

Russia has considerable experience in the development of winter sports and ski resorts. The region around Lake Baikal possesses unique landscapes and cultural unity, making it a hot spot for winter tourism in Russia. The ski resorts around Lake Baikal are among the most attractive tourist destinations during the winter season, attracting a large number of domestic and international tourists. Based on the experience of the Northeast Asia Sustainable Development Research Centre, this study includes a survey of experts from China and Russia. The study focuses on five major ski resorts near Lake Baikal. A comprehensive competitiveness assessment index system and a quantitative evaluation model for winter tourism resorts have been established, which enable a scientific evaluation of the level of comprehensive competitiveness of winter tourism regions near Lake Baikal. The study showed that the Sobolinaya ski resort has excellent competitiveness among the resorts studied, while Bychya and Istland have average competitiveness and Davan and Mamai have low competitiveness. Local natural resources and the level of infrastructure development make the most significant contributions to the overall competitiveness of a resort. The study proposes development measures, such as the creation of a winter tourism complex with the Sobolinaya resort as its core and the establishment of an international special zone for winter tourism along the China-Mongolia-Russia economic corridor. The research results can serve as a basis for decision making to improve the overall competitiveness of the winter tourism industry around Lake Baikal and provide scientific and technical support for cross-border international cooperation in the winter tourism industry between China and Russia.

Huang, Y., Jiang, L., Chen, X., Sun, Q., Zhang, X., Tan, X., ... & Huo, B. (2023). Musculoskeletal simulation of professional ski jumpers during take-off considering aerodynamic forces. Frontiers in Bioengineering and Biotechnology, 11.

ABSTRACT

Introduction: Musculoskeletal simulation has been widely used to analyze athletes' movements in various competitive sports, but never in ski jumping. Aerodynamic forces during ski jumping take-off have been difficult to account for in dynamic simulation. The purpose of this study was to establish an efficient approach of musculoskeletal simulation of ski jumping take-off considering aerodynamic forces and to analyze the muscle function and activity.Methods: Camera-based marker-less motion capture was implemented to measure the take-off kinematics of eight professional jumpers. A suitable full-body musculoskeletal model was constructed for the simulation. A method based on inverse dynamics iteration was developed and validated to estimate the take-off ground reaction force. The aerodynamic forces, which were calculated based on body kinematics and computational fluid dynamics simulations, were exerted on the musculoskeletal model as external forces. The activation and joint torque contributions of lower extremity muscles were calculated through static optimization.Results: The estimated take-off ground reaction forces show similar trend with the results from past studies. Although overall inconsistencies between simulated muscle activation and EMG from previous studies were observed, it is worth noting that the activation of the tibialis anterior, gluteus maximus, and long head of the biceps femoris was similar to specific EMG results. Among lower extremity extensors, soleus, vastus lateralis, biceps femoris long head, gluteus maximus, and semimembranosus showed high levels of activation and joint extension torque contribution.Discussion: Results of this study advanced the understanding of muscle action during ski jumping take-off. The simulation approach we developed may help guide the physical training of jumpers for improved take-off performance and can also be extended to other phases of ski jumping.

Wagner, M., Liebensteiner, M., Dammerer, D., Neugebauer, J., Nardelli, P., & Brunner, A. (2023). Incidence of alpine skiing and snowboarding injuries. Injury, 110830.

ABSTRACT

Background: The incidence of injuries on alpine ski slopes have been assessed using various methods. A decline in injury rate has been observed throughout the literature; however, the actual incidence remains unclear. The purpose of this study was therefore to evaluate the incidence of skiing and snowboarding injuries using largesample data from an entire geographic state. Methods: Data on alpine injuries over the course of five winter seasons between 2017 and 2022 were prospectively collected from the emergency service dispatch center of Tyrol (Austria). The incidence of injuries was assessed in relation to the number of skier days, which was obtained from the chamber of commerce. Results: A total of 43,283 cases were identified, and a total of 98.1 Mio skier days were registered during the inclusion period of our study, resulting in an overall incidence of 0.44 injuries per 1,000 skier days. This is significantly less than reported from previous studies. From 2017/18 to 2021/22 there was a slight increase in injuries per 1000 skier days with an exception only for the COVID-19 related season 2020/21. Conclusion: Our study showed a significant reduction in the incidence of alpine skiing and snowboarding injuries in comparison with previous studies and should be considered a benchmark for future studies. Long-term studies on the efficacy of safety gear, as well as the influence of ski patrol and air-borne rescues on patient outcome are warranted.

Bucher, E., Millet, G. P., Wehrlin, J. P., & Steiner, T. (2023). Test‑retest reliability of ski‑specific aerobic, sprint, and neuromuscular performance tests in highly trained cross‑country skiers. Scandinavian Journal of Medicine & Science in Sports.

ABSTRACT

Purpose: Laboratory tests are commonly performed by cross-country (XC) skiers due to the challenges of obtaining reliable performance indicators on snow. However, only a few studies have reported reliability data for ski-specific test protocols. Therefore, this study examined the test-retest reliability of ski-specific aerobic, sprint, and neuromuscular performance tests. Methods: Thirty-nine highly trained XC skiers (26 men and 13 women, age: 22 +/- 4 years, VO2max: 70.1 +/- 4.5 and 58.8 +/- 4.4 mL center dot kg(-1)center dot min(-1), respectively) performed two test trials within 6 days of a diagonal VO2max test, n = 27; skating graded exercise test to assess the second lactate threshold (LT2), n = 27; 24-min double poling time trial (24-min DP, n = 25), double poling sprint test (Sprint(DP1), n = 27), and 1-min self-paced skating sprint test (Sprint(1-min), n = 26) using roller skis on a treadmill, and an upper-body strength test (UB-ST, n = 27) to assess peak power (P-peak) with light, medium, and heavy loads. For each test, the coefficient of variation (CV), intraclass correlation coefficient (ICC), and minimal detectable change (MDC) were calculated. Results: VO2max demonstrated good-to- excellent reliability (CV = 1.4%; ICC = 0.99; MDC = 112 mL center dot min(-1)), whereas moderate-to- excellent reliability was found for LT2 (CV = 3.1%; ICC = 0.95). Performance during 24-min DP, SprintDP1, and Sprint1- min showed good-to- excellent reliability (CV = 1.0%-2.3%; ICC = 0.96-0.99). Absolute reliability for UB-ST Ppeak was poor (CV = 4.9%-7.8%), while relative reliability was excellent (ICC = 0.93-0.97) across the loads. Conclusion: In highly trained XC skiers, sport-specific aerobic and sprint performance tests demonstrated high test-retest reliability, while neuromuscular performance for the upper body was less reliable. Using

the presented protocols, practitioners can assess within-and between-season changes in relevant performance indicators.

Müller, P. O., Taylor, J., Jordan, M. J., Scherr, J., Verhagen, E., Collins, D., & Spörri, J. (2023). Call for the application of a biopsychosocial and interdisciplinary approach to the return-to-sport framework of snow sports athletes. BMJ Open Sport & Exercise Medicine, 9(3), e001516.

ABSTRACT

Snow sports such as alpine skiing or snowboarding are associated with a high risk of injury and reinjury and are subject to a very special environment with specific rehabilitation challenges that must be addressed. Due to geographic decentralisation, seasonal climatic limitations, alternation of training in off-snow and on-snow settings and unique loading patterns of practising these sports, special rehabilitation structures and processes are required compared with other sports. In addition, returning to preinjury performance requires a high level of confidence and a resumption of risk-taking in demanding situations such as high-speed skiing and high-amplitude jumps. A biopsychosocial and interdisciplinary approach can be viewed as a holistic, athlete-centred approach that promotes interprofessional communication and collaboration. This is particularly central for managing the physical/biological, psychological and social demands of injury management for snow sports. It can help ensure that rehabilitation content is well coordinated and tailored to individual needs. This is because transitions between different rehabilitation phases and caring professionals are well aligned, and rehabilitation is understood not only as purely 'physical recovery' but also as 'psychological recovery' considering the snow sports-specific setting with specific social norms. Ultimately, this may improve the rehabilitation success of snow sports athletes.

Lund-Hansen, M., Gløersen, Ø., Rud, B., & Losnegard, T. (2023). What is the optimal classical style sub-technique during uphill roller skiing in elite male cross-country skiers?. European Journal of Applied Physiology, 1-10.

ABSTRACT

Purpose: To compare performance, physiological and biomechanical responses between double poling (DP) and diagonal stride (DIA) during treadmill roller skiing in elite male cross-country skiers. Method: Twelve skiers (VO2peak DIA(up); 74.7 & PLUSMN; 3.7 ml kg(-1) min(-1)) performed two DP conditions at 1 & DEG; (DPflat) and 8 & DEG; (DPup) incline, and one DIA condition, 8 & DEG; (DIA(up)). Submaximal gross efficiency (GE) and maximal 3.5 min time-trial (TT) performance, including measurements of VO2peak and maximal accumulated O-2-deficit (MAOD), were determined. Temporal patterns and kinematics were assessed using 2D video, while pole kinetics were obtained from pole force. Results: DIA(up) induced (mean, [95% confidence interval]) 13% [4, 22] better 3.5-min TT performance, 7%, [5, 10]) higher VO2peak and 3% points [1, 5] higher GE compared to DPup (all P < 0.05). DPup induced 120% higher MAOD compared to DPflat, while no significant differences were observed for VO2peak or GE between DPflat and DPup. There was a large correlation between performance and GE in DP and a large correlation between performance and VO2peak for DIA(up) (all r = 0.7-0.8, P < 0.05). No correlations were found between performance and VO2peak for any of the DP conditions, nor between performance and GE for DIA(up) (r = 0.0-0.2, P > 0.1).Conclusion: At 8o uphill roller skiing, DIA(up) induce higher VO2peak, GE, and superior time-trial performance than DPup in elite male skiers. There was no difference between VO2peak or GE between DPflat and DPup. A large correlation was observed between DIA(up) performance and DIA(up)VO(2peak), while DP performance was best correlated to submaximal GE.

Rizzato, A., Verdel, N., Paoli, A., Supej, M., & Marcolin, G. (2023). Sport-specific balance tests account for youth alpine skiers' ranking. Frontiers in Physiology, 14.

ABSTRACT

Objective: Alpine skiing requires complex motor skills and fine adjustments to maintain balance in dynamic and challenging conditions. This study aimed to understand whether the balance ability in unspecific (UST) and sport-specific (SST) tasks could depend on the skiers' ranking level. The balance performance of the dominant and non-dominant limbs in the SST was also investigated. Methods: Twenty-five skiers (14.96 +/- 1.61 yrs; 1.69 +/- 0.69 m; 59.9 +/- 9.52 kg) were divided into high-ranking (position < 50) and low-ranking (position > 50) groups. Subjects performed three balance conditions: static (ST), dynamic UST, and dynamic SST. Subjects stood on an unstable board over a force platform during UST. During SST, subjects wore ski boots, grasped ski poles, and each foot was clipped to an unstable board over two force plates. From the center-of-pressure (CoP) trajectory the area of the 95th percentile ellipse and the CoP mean velocity were calculated. Angular displacements were recorded by a 12-camera system, to calculate the full balance (FB), fine (FiB), and gross (GB) balance in UST and SST. Results: Balance control was higher ($p < 0.01$) in high-ranking than low-ranking skiers only in the SST. Kinematic parameters (i.e., FB, FiB, and GB) showed a higher ($p < 0.001$) balance performance in SST than UST independently from the group. Dominant and non-dominant limbs motion was similar (Pearson correlation, $r = 0.97$) in SST independently from the skiers' ranking. Conclusion: High-ranking skiers showed better balance control and performance than low-ranking skiers only when the task was sport-specific. Therefore, we suggest testing balance under sport-specific conditions to discriminate the youth skiers' abilities.

体育工程

本期体育工程学术研究共检索到英文相关文献197篇，研究热点主要集中在人工智能的应用、体育产业数字化改革、手机应用的开发、可穿戴传感器、计算机智能算法等在体育方面的应用。检索结果如下：1）关键词共词分析。提取关键词297个，经过数据清洗后关键词有295个，词频为2及以上的关键词有21个，累计百分比为20.68%，高频关键词为机器学习、物联网、人工智能、体育、可穿戴技术等，生成可视化知识图谱（见下图）。2）来源期刊分析。涉及期刊58种，其中载文2篇及以上的期刊有9种，累计百分比为48.28%，刊载体育工程前两位的期刊分别为：soft computing（JCR学科分区Q2、Q2），Preventive medicine（JCR学科分区Q1、Q1）。3）交叉学科分析。引用文献总计2385篇，最多的频次为4次，并列排名第一的文献分别是：*A practical study of active disturbance rejection control for rotary flexible joint robot manipulator*、*Pruning filters with L1-norm and capped L1-norm for CNN compression*、*Jerk-bounded trajectory planning for rotary flexible joint manipulator: an experimental approach*、*Wearable sensors for monitoring the physiological and biochemical profile of the athlete*。4）学术关注度分析。文献级别用量最多的是36次，排名前两位的文献分别为：*Channel-Equalization-HAR: A Light-weight Convolutional Neural Network for Wearable Sensor Based Human Activity Recognition*、*Chinese sports basketball teaching tactics training system combined with multimedia interactive model and virtual reality technology*。
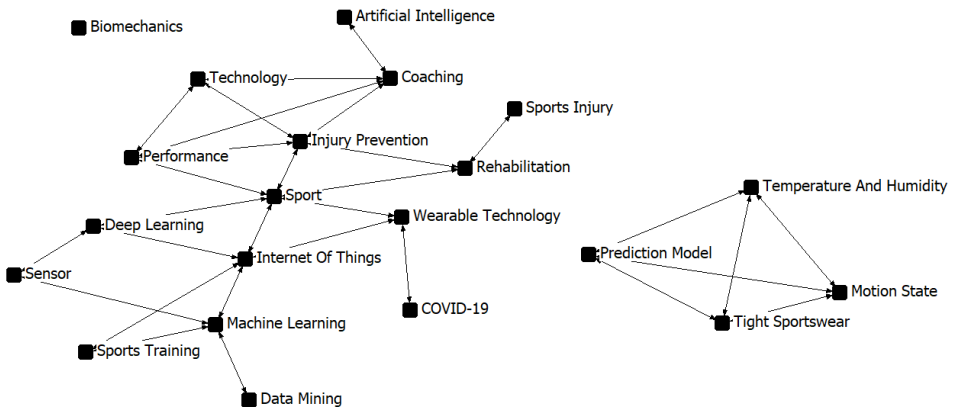
Ghosh, I., Ramasamy Ramamurthy, S., Chakma, A., & Roy, N. (2023). Sports analytics review: Artificial intelligence applications, emerging technologies, and algorithmic perspective. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, e1496.

ABSTRACT

The rapid and impromptu interest in the coupling of machine learning (ML) algorithms with wearable and contactless sensors aimed at tackling real-world problems warrants a pedagogical study to understand all the aspects of this research direction. Considering this aspect, this survey aims to review the state-of-the-art literature on ML algorithms, methodologies, and hypotheses adopted to solve the research problems and challenges in the domain of sports. First, we categorize this study into three main research fields: sensors, computer vision, and wireless and mobile-based applications. Then, for each of these fields, we thoroughly analyze the systems that are deployable for real-time sports analytics. Next, we meticulously discuss the learning algorithms (e.g., statistical learning, deep learning, reinforcement learning) that power those deployable systems while also comparing and contrasting the benefits of those learning methodologies. Finally, we highlight the possible future open-research opportunities and emerging technologies that could contribute to the domain of sports analytics.

Contreras, M. M., Garcia, A. I. P., Ramos-Jimenez, A., Torres, R. P. H., & Chavez-Guevara, I. A. (2023). Applications of Maximum Fat Oxidation and FATmax in the evaluation of sports performance in endurance-athletes: a narrative review [Review]. Retos-Nuevas Tendencias En Educacion Fisica Deporte Y Recreacion(47), 806-816.

ABSTRACT

The differential use of energy substrates (lipids and carbohydrates) during sports competitions has been proposed to de-termine sports performance. Therefore, this

review has the objectives: (i) describe the association of maximum oxidation of fats (MFO) and its corresponding intensity (Fatmax) with indicators of sports performance in resistance athletes, (ii) report the Metabolic athlete phenotype belonging to different sports disciplines. Both FATmax and MFO have been studied in a few sports disciplines. Results: Fatmax and MFO are directly associated with each other; however, only the MFO was positively associated with the career time in triathlon athletes, professional skiers with a mischievous field, and ultramarathon runners. In these populations, the maxi-mum oxygen consumption (VO(2)max) positively correlates with the MFO, while age is inversely associated with MFO. Although the MFO reported in handball, volleyball, and basketball athletes (0.59 +/- 0.24 g.min(-1)), as well as in professional players (0.69 +/- 0.15 g.min(-1)), MFO is superior to the values observed in long-distance corridors and elite skiers. On the other hand, the MFO differs between athletes from different sports disciplines, being superior in long-distance corridors and professional skiers vs. cyclists (0.55 +/- 0.09 vs. 0.48 +/- 0.05 g.min(-1)), despite similarities in the VO2max and fat-free mass. Conclusion: The relationship of the MFO and the Fatmax with sports performance varies according to age, sports discipline, and the sex of athletes, observing a particular metabolic phenotype for each sports discipline. Therefore, in addition to measuring the VO(2)max and the work intensity correspond-ing to the lactate threshold or second ventilatory threshold, it is recommended to incorporate the MFO and Fatmax in the physiolog-ical evaluations of the athletes to optimize their physical performance.

Téllez, A. M., Castro, L. A., & Tentori, M. (2023). Developing and Evaluating a Virtual Reality Videogame Using Biofeedback for Stress Management in Sports. Interacting with Computers, iwad025.

ABSTRACT

Stress is a reaction of the body to external challenges, whether physical or psychological. In sports, there are stress factors that affect the athlete's performance, especially in team

sports that involve short, high-intensity exercise cycles followed by short recovery periods, such as American football. The lack of stress regulation mechanisms can be detrimental to the individual and collective performance of athletes. Biofeedback systems have shown promising clinical results in regulating stress for sports competitions. However, there is a lack of scientific evidence to support their efficacy, and technologies, such as virtual reality videogames, have not been extensively explored. In this article, we present the development and pilot testing of Virtual Autonomic Nervous System (VANS), a virtual reality videogame using biofeedback that supports stress management training in athletes. VANS uses an optical heart rate sensor and aims at keeping the heart rate below a given threshold to control features within the game. We evaluated the usability and user experience of VANS through a 1-week deployment study with 10 American footballers. Our results show that VANS outperformed a commercial videogame used for biofeedback training and considerably reduced stress in our participants. Therefore, VANS could provide stress management training for future matches and competitions. Finally, we reflect on aspects of our design and discuss future directions of our work.

De Fazio, R., Mastronardi, V. M., De Vittorio, M., & Visconti, P. (2023). Wearable Sensors and Smart Devices to Monitor Rehabilitation Parameters and Sports Performance: An Overview. Sensors, 23(4), 1856.

ABSTRACT

A quantitative evaluation of kinetic parameters, the joint's range of motion, heart rate, and breathing rate, can be employed in sports performance tracking and rehabilitation monitoring following injuries or surgical operations. However, many of the current detection systems are expensive and designed for clinical use, requiring the presence of a physician and medical staff to assist users in the device's positioning and measurements. The goal of wearable sensors is to overcome the limitations of current devices, enabling the acquisition of a user's vital signs directly from the body in an

accurate and non-invasive way. In sports activities, wearable sensors allow athletes to monitor performance and body movements objectively, going beyond the coach's subjective evaluation limits. The main goal of this review paper is to provide a comprehensive overview of wearable technologies and sensing systems to detect and monitor the physiological parameters of patients during post-operative rehabilitation and athletes' training, and to present evidence that supports the efficacy of this technology for healthcare applications. First, a classification of the human physiological parameters acquired from the human body by sensors attached to sensitive skin locations or worn as a part of garments is introduced, carrying important feedback on the user's health status. Then, a detailed description of the electromechanical transduction mechanisms allows a comparison of the technologies used in wearable applications to monitor sports and rehabilitation activities. This paves the way for an analysis of wearable technologies, providing a comprehensive comparison of the current state of the art of available sensors and systems. Comparative and statistical analyses are provided to point out useful insights for defining the best technologies and solutions for monitoring body movements. Lastly, the presented review is compared with similar ones reported in the literature to highlight its strengths and novelties.

ABSTRACT

Background: Virtual reality (VR) has been explored to improve baseline and postinjury assessments in sport-related concussion (SRC). Some experience symptoms related to VR, unrelated to concussion. This may deter use of vestibular/ocular motor screening (VOMS) using VR. Baseline VR VOMS symptomatology differentiates baseline from overall symptomatology. Hypothesis: There will be no difference between current clinical manual VOMS (MAN), a clinical prototype (PRO), and VR for symptom

provocation change score (SPCS) and near point of convergence (NPC) average score in a healthy population and sex differences among the 3 modes of administration. Study Design: Cohort study. Methods: A total of 688 National Collegiate Athletic Association Division I student-athletes completed VOMS using 3 methods (MAN, N = 111; female athletes, N = 47; male athletes, N = 64; average age, 21 years; PRO, N = 365; female athletes, N = 154; male athletes, N = 211; average age, 21 years; VR, N = 212; female athletes, N = 78; male athletes, N = 134; average age = 20 years) over a 3-year period (2019-2021) during annual baseline testing. Exclusion criteria were as follows: self-reported motion sickness in the past 6 months, existing or previous neurological insult, attention deficit hyperactivity disorder, learning disabilities, or noncorrected vision impairment. Administration of MAN followed the current clinical protocols, PRO used a novel prototype, and VR used an HTC Vive Pro Eye head mounted display. Symptom provocation was compared using Mann-Whitney U tests across each VOMS subtest with total SPCS and NPC average by each method. Results: MAN had significantly ($P < 0.01$) more baseline SPCS (MAN = 0.466 +/- 1.165, PRO = 0.163 +/- 0.644, VR = 0.161 +/- 0.933) and significantly ($P < 0.01$) and more SPCS (MAN = 0.396 +/- 1.081, PRO = 0.128 +/- 0.427, VR = 0.48 +/- 0.845) when compared with PRO and VR. NPC average measurements for VR (average, 2.99 +/- 0.684 cm) were significantly greater than MAN (average, 2.91 +/- 3.35 cm; $P < 0.01$; Cohen's d = 0.03) and PRO (average, 2.21 +/- 1.81 cm; $P < 0.01$; Cohen's d = 0.57). For sex differences, female athletes reported greater SPCS with PRO (female athletes, 0.29 +/- 0.87; male athletes, 0.06 +/- 0.29; $P < 0.01$) but not in VR or MAN. Conclusion: Using a VR system to administer the VOMS may not elicit additional symptoms, resulting in fewer false positives and is somewhat stable between sexes.

Dindorf C, Bartaguiz E, Gassmann F, Fröhlich M. Conceptual Structure and Current Trends in Artificial Intelligence, Machine Learning, and Deep Learning Research in Sports: A Bibliometric Review. International Journal of Environmental Research and Public Health. 2023; 20(1):173.

ABSTRACT

Artificial intelligence and its subcategories of machine learning and deep learning are gaining increasing importance and attention in the context of sports research. This has also meant that the number of corresponding publications has become complex and unmanageably large in human terms. In the current state of the research field, there is a lack of bibliometric analysis, which would prove useful for obtaining insights into the large amounts of available literature. Therefore, the present work aims to identify important research issues, elucidate the conceptual structure of the research field, and unpack the evolutionary trends and the direction of hot topics regarding key themes in the research field of artificial intelligence in sports. Using the Scopus database, 1215 documents (reviews and articles) were selected. Bibliometric analysis was performed using VOSviewer and bibliometrix R package. The main findings are as follows: (a) the literature and research interest concerning AI and its subcategories is growing exponentially; (b) the top 20 most cited works comprise 32.52% of the total citations; (c) the top 10 journals are responsible for 28.64% of all published documents; (d) strong collaborative relationships are present, along with small, isolated collaboration networks of individual institutions; (e) the three most productive countries are China, the USA, and Germany; (f) different research themes can be characterized using author keywords with current trend topics, e.g., in the fields of biomechanics, injury prevention or prediction, new algorithms, and learning approaches. AI research activities in the fields of sports pedagogy, sports sociology, and sports economics seem to have played a subordinate role thus far. Overall, the findings of this study expand knowledge on the research situation as well as the development of research topics regarding the use of

artificial intelligence in sports, and may guide researchers to identify currently relevant topics and gaps in the research.

Brognara, L., Mazzotti, A., Rossi, F., Lamia, F., Artioli, E., Faldini, C., & Traina, F. (2023). Using Wearable Inertial Sensors to Monitor Effectiveness of Different Types of Customized Orthoses during CrossFit® Training. Sensors, 23(3), 1636.

ABSTRACT

Background: Dynamic balance plays a key role in high-impact sports, such as CrossFit, where athletes are required to maintain balance in various weightlifting exercises. The loss of balance in these sport-specific movements may not only affect athlete performance, but also increase the risk of injuries. Objectives: The aim of the study is to achieve greater insight into the balance and athlete position during the CrossFit training by means of inertial sensors, with a particular focus on the role of different custom foot orthoses (CFOs) in order to detect correlations with the role of the cavus foot. Methods: A total of 42 CrossFit((R)) athletes, aged 25 to 42 years, were enrolled in this study. One-way ANOVA tests with post-hoc analysis of variance were used to compare foot posture groups and effects of different types of customized foot orthoses. Results: When comparing the effects of CFOs with the respective balance basal level during the pistol squat exercise, we observed a significant ($p = 0.0001$) decrease in the sway area, antero-posterior displacement (APD) and medio-lateral displacement (MLD) compared to the basal using both types of CFOs. Conclusion: No significant positive effects of CFOs were observed in some static tests. On the contrary, positive effects of CFOs and, in particular, postural insoles, are relevant to dynamic balance.

Lerebourg, L., Saboul, D., Clémençon, M., & Coquart, J. B. (2023). Prediction of marathon performance using artificial intelligence. International Journal of Sports Medicine.

ABSTRACT

Although studies used machine learning algorithms to predict performances in sports activities, none, to the best of our knowledge, have used and validated two artificial intelligence techniques: artificial neural network (ANN) and k-nearest neighbor (KNN) in the running discipline of marathon and compared the accuracy or precision of the predicted performances. Official French rankings for the 10-km road and marathon events in 2019 were scrutinized over a dataset of 820 athletes (aged 21, having run 10 km and a marathon in the same year that was run slower, etc.). For the KNN and ANN the same inputs (10-km race time, body mass index, age and sex) were used to solve a linear regression problem to estimate the marathon race time. No difference was found between the actual and predicted marathon performances for either method ($p > 0,05$). All predicted performances were significantly correlated with the actual ones, with very high correlation coefficients ($r > 0,90$; $p < 0,001$). KNN outperformed ANN with a mean absolute error of 2,4 vs 5,6%. The study confirms the validity of both algorithms, with better accuracy for KNN in predicting marathon performance. Consequently, the predictions from these artificial intelligence methods may be used in training programs and competitions.

Shan, S., Sun, S., & Dong, P. (2023). Data driven intelligent action recognition and correction in sports training and teaching. Evolutionary Intelligence, 1-9.

ABSTRACT

With the development of world economy, sports development has also become a symbol of national strength. Nowadays, sports competition has become an important activity for all countries to show their strength, and also an important bridge to connect all countries

and build friendship. In the process of challenging the limit, human beings gradually master the action essentials of various sports, and the action difference of athletes directly affects the grades of the competition. Therefore, in the process of sports training, athletes of various countries will focus on the standard of action of each athlete. In traditional sports training, veteran athletes with rich experience are usually used as coaches to guide athletes empirically. However, the difference of coaches will also lead to the difference of sports effects. At the same time, coaches' grasp of athletes' action standards is more based on subjective observation, which cannot be accurately measured, so there may be large differences and errors in their grasp of action standards. In this paper, we propose an intelligent action recognition and correction system to assist coaches to measure and evaluate athletes' actions more accurately, and give correction suggestions according to standard actions. Our system uses RGB-D sensors to analyze athletes' skeleton key points in real time. The different between the athlete's action and the standard action is calculated through the connection between the joint key points. In this paper, we also use the timing tracking algorithm to comprehensively evaluate the consistency of the action with the standard. We verified the feasibility of the recognition correction system through the actual movement and measurement of athletes. The experiment shows that our system can accurately measure the movements of athletes, and has more accurate measurement results and correction suggestions than the traditional coach naked eye measurement.

Dindorf, C., Bartaguiz, E., Dully, J., Sprenger, M., Becker, S., Fröhlich, M., & Ludwig, O. (2023). In Vivo Monitoring of Acute and Intermittent Fatigue in Sport Climbing Using Near-Infrared Spectroscopy Wearable Biosensors. Sports, 11(2), 37.

ABSTRACT

The objectification of acute fatigue (during isometric muscle contraction) and cumulative fatigue (due to multiple intermittent isometric muscle contractions) plays an important role in sport climbing. The data of 42 participants were used in the study.

Climbing performance was operationalized using maximal climbing-specific holding time (CSHT) by performing dead hangs. The test started with an initial measurement of handgrip strength (HGS) followed by three intermittent measurements of CSHT and HGS. During the test, finger flexor muscle oxygen saturation (SmO2) was measured using a near-infrared spectroscopy wearable biosensor. Significant reductions in CSHT and HGS could be found (p < 0.001), which indicates that the consecutive maximal isometric holding introduces cumulative fatigue. The reduction in CSHT did not correlate with a reduction in HGS over multiple consecutive maximal dead hangs (p > 0.35). Furthermore, there were no significant differences in initial SmO2 level, SmO2 level at termination, SmO2 recovery, and mean negative slope of the SmO2 saturation reduction between the different measurements (p > 0.24). Significant differences were found between pre-, termination-, and recovery- (10 s after termination) SmO2 levels (p < 0.001). Therefore, monitoring acute fatigue using athletes' termination SmO2 saturation seems promising. By contrast, the measurement of HGS and muscle oxygen metabolism seems inappropriate for monitoring cumulative fatigue during intermittent isometric climbing-specific muscle contractions.

Yu, H., & Mi, Y. (2023). Application Model for Innovative Sports Practice Teaching in Colleges Using Internet of Things and Artificial Intelligence. Electronics, 12(4), 874.

ABSTRACT

The Internet of Things (IoT) and artificial intelligence (AI) have promoted teaching reform while improving people's lives. Under the new teaching environment, the position of physical education (PE) teaching in the teaching work has become increasingly prominent. At present, there are some problems in the PE teaching mode of most colleges and universities, such as poor teaching environment, unstable teaching data, and lack of technical support for the teaching system. This also leads to the low quality of PE teaching and unsatisfactory teaching results. In this paper, IoT and AI are

combined to study the application mode of innovative practical teaching in college PE. This paper first constructs a physical education teaching system based on the Internet of Things, then summarizes the necessity of artificial intelligence technology participating in the reform of physical education classroom teaching, and gives a specific teaching application model. Finally, based on the golden sine algorithm-optimization neural network, the application model of college physical education in this paper is evaluated. Through experiments and investigations, the new teaching mode improves the teaching efficiency by 14.7%, improves the teaching quality, and provides reference for the next development of IoT and AI in teaching.

反兴奋剂

本期反兴奋剂学术研究共检索到英文相关文献53篇,研究热点主要集中在兴奋剂的检测、兴奋剂相关认知、反兴奋剂教育等方面。检索结果如下:1)关键词共词分析。提取关键词124个,经过数据清洗后关键词有122个,词频为2及以上的关键词有13个,累计百分比为27.42%,高频关键词为兴奋剂、反兴奋剂、世界反兴奋剂机构、生物护照等,生成可视化知识图谱(见下图)。2)来源期刊分析。涉及期刊23种,其中载文2篇及以上的期刊有3种,所载文献累计百分比为60.87%,刊载反兴奋剂研究前三位的期刊分别为:Drug testing and analysis(JCR学科分区Q3、Q2、Q3),International Sports Law Journal,Frontiers in sports and active living。3)学科交叉分析。引用文献总计1018篇,最多的频次为3次,排在第一位的文献为 *Prevalence of Doping Use in Elite Sports: A Review of Numbers and Methods*。4)学术关注度分析。文献级别用量最多的是5次,排名前三位的文献分别为:*An observational human study investigating the effect of anabolic androgenic steroid use on the transcriptome of skeletal muscle and whole blood using RNA-Seq*、*Ergogenic Aids and Testing in Pediatric Athletes*、*Biosynthesis of Salbutamol-4′-O-sulfate as Reference for Identification of Intake Routes and Enantiopure Salbutamol Administration by Achiral UHPLC-MS/MS*、*Benfluorex metabolism complemented by electrochemistry-mass spectrometry*。
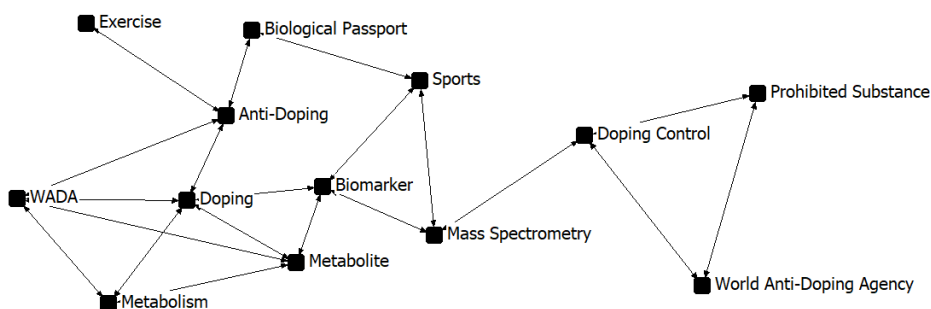
Viscotel, C. G., Rotariu, M., Turnea, M., Arotaritei, D., Mereuta, C., Ilea, M., ... & Gheorghita, A. (2023). Mathematical models applied to the prediction of doping in male athletes. Journal of Men's Health, 19(7), 93-100.

ABSTRACT

The compartmental model is a mathematical model (usually described by a set of differential equations) that describes how individuals from different compartments (or groups) that represent a population, interacts. The model is suitable especially for epidemic model, modeling spread of disease but also in simulation of interaction among social groups. The compartmental model has few assumptions to be feasible: "the infection/contamination rate" can be a function of many parameters (seasonality, epidemic waves, dependence of social distancing, policy of awareness, policy, and so one). The main assumption is that the population is homogeneous but, in reality, the heterogeneity of population (spatial localization, seasonal, demography) plays an important role in accuracy of models. Our approach was based on another method that has been used in the last years, the inclusion of a temporal function including heterogeneity in the influence that conduct to doping similar to rate of infection from epidemic models. In this paper, a new model is proposed for quantitative analysis of doping in a particular selected sport. Almost all the models in doping use the biological markers and effect of doping in declared by athletes involved in use of banned substances in a quantitative analysis over a group of high-performance athletes. The proposed compartmental model SEDRS (Susceptible-Exposed-Doped-RecoveredSusceptible) includes the heterogeneity shaped by awareness, due to social interaction that transmit the anti-doping policy. These measures are patterned by social interaction, especially during competitions and training, and this approach is included in system of integrodifferential equations. A heterogeneous (SEDRS) model is numerically solved and the solutions show how the social factor can contribute to decay of doping phenomenon of male athletes and the

quantifiable influence in a healthier atmosphere in sport. The scope of the paper is the prediction of doping cases based on SEDRS model.

Nordsborg, N. B., Bonne, T. C., Sørensen, H., & Bejder, J. (2023). Glucocorticoids accelerate erythropoiesis in healthy humans-should the use in sports be reevaluated?. Medicine and Science in Sports and Exercise.

ABSTRACT

Purpose：The World Anti-Doping Agency prohibits glucocorticoid administration in competition but not in periods out of competition. Glucocorticoid usage is controversial as it may improve performance, albeit debated. A hitherto undescribed but performance-relevant effect of glucocorticoids in healthy humans is accelerated erythropoiesis. We investigated whether a glucocorticoid injection accelerates erythropoiesis, increases total hemoglobin mass, and improves exercise performance.

Methods ：In a counterbalanced, randomized, double-blinded, placebo-controlled crossover design (3 months washout), 10 well-trained males (peak oxygen uptake, 60 & PLUSMN; 3 mL O-2 & BULL;min(-1)& BULL;kg(-1)) were injected with 40 mg triamcinolone acetonide (glucocorticoid group) or saline (placebo group) in the gluteal muscles. Venous blood samples collected before and 7-10 h, 1, 3, 7, 14, and 21 d after treatment were analyzed for hemoglobin concentration and reticulocyte percentage. Hemoglobin mass and mean power output in a 450-kcal time trial were measured before as well as 1 and 3 wk after treatment. Results：A higher reticulocyte percentage was evident 3 d (19% & PLUSMN; 30%, P < 0.05) and 7 d (48% & PLUSMN; 38%, P < 0.001) after glucocorticoid administration, compared with placebo, whereas hemoglobin concentration was similar between groups. Additionally, hemoglobin mass was higher (P < 0.05) 7 d (glucocorticoid, 886 & PLUSMN; 104 g; placebo, 872 & PLUSMN; 103 g) and 21 d (glucocorticoid, 879 & PLUSMN; 111 g; placebo, 866 & PLUSMN; 103 g) after glucocorticoid administration compared with placebo. Mean power output was similar between groups 7 d (glucocorticoid, 278 & PLUSMN; 64 W; placebo, 275 &

PLUSMN; 62 W) and 21 d (glucocorticoid, 274 & PLUSMN; 62 W; placebo, 275 & PLUSMN; 60 W) after treatment. Conclusions：Intramuscular injection of 40 mg triamcinolone acetonide accelerates erythropoiesis and increases hemoglobin mass but does not improve aerobic exercise performance in the present study. The results are important for sport physicians administering glucocorticoids and prompt a reconsideration of glucocorticoid usage in sport.

Duffy, J., Henderson, T., & O'Brien, J. (2023). The regulation of threshold levels for prohibited substances in the world anti-doping program. The International Sports Law Journal, 23(2), 198-211.

ABSTRACT

Technological advancements in the equipment and laboratories used by anti-doping bodies means that minute levels of prohibited substances can be detected in an athlete's blood or urine. This had led to an increase in athletes testing positive for prohibited substances where the quantity of that substance in the athlete's sample is very low. This article will consider the role that decision limits and minimum reporting levels play with respect to prohibited substances identified in the World Anti-Doping Program. Recent CAS awards are analyzed to determine whether, and how, the issue of threshold requirements for prohibited substances should be further regulated.

Rana, I., & Parsai, A. (2023). Doping in eSports: need for a techno legal synchrony. The International Sports Law Journal, 23(2), 212-224.

ABSTRACT

Mankind has taken its due course of time to evolve to what we are today biologically, but technologically, we have advanced at a pace that cannot be matched. There is an ongoing debate as to whether eSports should even be considered as sports (Todt et al. in J Hum Sport Exerc, 2020, https://doi.org/10.14198/jhse.2020.15.Proc1.10) but with the

increase in number of professional tournaments being held and investments flowing, eSports are practically similar to physical sports. Recently Intel even announced a professional tournament for Street fighter V and Rocket league, in collaboration with the International Olympic association, called Intel World Open, which was supposed to be a pre-Olympic event for Tokyo 2020 (The tournament has now been shifted to 2021 due to the ongoing pandemic COVID-19). The field of eSports also suffer from problems that physical sports do, and one of the major problems is cheating by doping. Since there is a difference in physical sports and eSports in the way they are played, the doping methods are very different as in the former more strength and/or agility enhancing doping agents are used to cheat, while in the latter its mostly mental ability enhancing dopants. Along with such traditional doping, eSports also suffers from the problem of mechanical doping, as a participant in eSports is a combination of a machine and the human, thus, unlike physical sports, anti-doping regulations of WADA or NADA are not adequately efficient in eSports. Although there exists multinational organisations such as ESIC or the IeSF, there is a lack of uniformity that most physical sports enjoy. IeSF, the body with the greatest number of national federations as members, applies WADA regulations as a whole, even though many of those regulations can have zero effect on the performance of a player in eSports. There is a need for a single International eSports Regulatory authority/federation for which inspiration can be drawn from other regulatory authorities like FIDE or FIFA. The paper seeks to understand the impact of doping in eSports and suggest some solution(s) for the same.

Wong, K. S., Cheung, H. W., Choi, Y. C., To, N. S., Wan, T. S., & Ho, E. N. (2023). Screening and confirmation of recombinant human follistatin in equine plasma for doping control purposes. Drug Testing and Analysis.

ABSTRACT

Recombinant human follistatin (rhFST) is a potential performance-enhancing agent

owing to its stimulating effect on muscle growth. Administration of rhFST to athletes is prohibited in human sports by the World Anti-Doping Agency (WADA) and in horseracing according to Article 6 of the International Agreement on Breeding, Racing and Wagering published by the International Federation of Horseracing Authorities (IFHA). For effective control of the potential misuse of rhFST in flat racing, methods for screening and confirmatory analysis are required. This paper describes the development and validation of a complete solution for detecting rhFST and confirming its presence in plasma samples collected from racehorses. A high-throughput analysis of rhFST with a commercially available enzyme-linked immunosorbent assay (ELISA) was evaluated for the screening of equine plasma samples. Any suspicious finding would then be subjected to a confirmatory analysis using immunocapture, followed by nano-liquid chromatography/high-resolution tandem mass spectrometry (nanoLC-MS/HRMS). The confirmation of rhFST by nanoLC-MS/HRMS was achieved by comparing the retention times and relative abundances of three characteristic product-ions with those from the reference standard in accordance with the industry criteria published by the Association of Official Racing Chemists. The two methods achieved comparable limit of detection (~2.5–5 ng/mL) and limit of confirmation (2.5 ng/mL or below), as well as adequate specificity, precision and reproducibility. To our knowledge, this is the first report of the screening and confirmation methods for rhFST in equine samples.

Blank, C., Weber, K., Boardley, I. D., Abel, T., Schobersberger, W., & Patterson, L. B. (2023). Doping in Paralympic sport: perceptions, responsibility and anti-doping education experiences from the perspective of Paralympic athletes and parasport coaches. Frontiers in sports and active living, 5.

ABSTRACT

Introduction：Limited effort has been invested in understanding doping in Paralympic sport. The limited evidence that exists suggests that factors influencing doping in parasport are similar to Olympic sport. However, based on the design and nature of the

previous studies, where methods have been mostly limited to qualitative data and prevalence numbers, further research is warranted to extend previous findings.

Methods：Informed by current evidence from Paralympic and Olympic sport, we aimed to investigate (1) para-athletes' perceptions of Anti-Doping Rule Violations (ADRVs) and responsibility for them, (2) descriptive norms for doping in parasport (3) perceptions of anti-doping education and legitimacy of anti-doping authorities, and (4) coach engagement in doping prevention and levels of doping confrontation efficacy using a quantitative survey approach.

Results：In total, valid survey responses from 126 Paralympic athletes and 35 coaches from four countries (Germany, Austria, Switzerland, UK) were analysed for experience with anti-doping, descriptive norms, anti-doping education, perceived legitimacy, knowledge, and doping confrontation efficacy (coaches only). Across both athletes and coaches, the level of education was generally good and doping willingness was low. Classification cheating was considered a form of doping and seems to be an important issue for athletes and coaches, especially within the UK sample. For 33.3% of the athletes, doping control was their first experience with anti-doping. Coaches' engagement with doping prevention activities and their perceived efficacy to confront doping-related matters appears to be higher compared to Olympic coaches' samples.

Discussion：Sport organisations/NADOs in Paralympic sport could use synergies with those organisations in Olympic sport, adopting similar approaches to anti-doping education, also focusing on a balanced communication of doping prevalence numbers and testing figures. Efforts to ensure athletes are educated about anti-doping before they are tested should be upheld. It seems that in para sport, different compared to able-bodied coaches, anti-doping organizations do not have to convince the coaches about their roles (i.e., being responsible for anti-doping education) anymore but can directly build on these resources. Overall, it seems that there are few differences between parasport and able-bodied sports and thus responsible organisations could use the existing programmes in Olympic sport and only adapt special content (e.g., boosting) which is unique to Paralympic athletes.

Hostrup, M., Hansen, E. S., Rasmussen, S. M., Jessen, S., & Backer, V. (2023). Asthma and exercise‑induced bronchoconstriction in athletes: Diagnosis, treatment, and anti‑doping challenges. Scandinavian journal of medicine & science in sports.

ABSTRACT

Athletes often experience lower airway dysfunction, such as asthma and exercise-induced bronchoconstriction (EIB), which affects more than half the athletes in some sports, not least in endurance sports. Symptoms include coughing, wheezing, and breathlessness, alongside airway narrowing, hyperresponsiveness, and inflammation. Early diagnosis and management are essential. Not only because untreated or poorly managed asthma and EIB potentially affects competition performance and training, but also because untreated airway inflammation can result in airway epithelial damage, remodeling, and fibrosis. Asthma and EIB do not hinder performance, as advancements in treatment strategies have made it possible for affected athletes to compete at the highest level. However, practitioners and athletes must ensure that the treatment complies with general guidelines and anti-doping regulations to prevent the risk of a doping sanction because of inadvertently exceeding specified dosing limits. In this review, we describe considerations and challenges in diagnosing and managing athletes with asthma and EIB. We also discuss challenges facing athletes with asthma and EIB, while also being subject to anti-doping regulations.

Rahaman, K. A., Muresan, A. R., Hasan, M. L., Joung, Y. K., Min, H., Son, J., ... & Kwon, O. S. (2023). Detection and quantification of the metabolite Ac‑Tβ1‑14 in in vitro experiments and urine of rats treated with Ac‑Tβ4: A potential biomarker of Ac‑Tβ4 for doping tests. Drug Testing and Analysis.

ABSTRACT

Thymosin β4 (Tβ4) was reported to exert various beneficial bioactivities such as tissue

repair, anti-inflammation, and reduced scar formation, and it is listed on the prohibited substances in sports by the World Anti-Doping Agency. However, no metabolism studies of Tβ4 were reported yet. Previously, our lab reported in in vitro experiment that a total of 13 metabolites were found by using multiple enzymes, and six metabolites (Ac-Tβ31–43, Ac-Tβ17–43, Ac-Tβ1–11, Ac-Tβ1–14, Ac-Tβ1–15, and Ac-Tβ1–17) were confirmed by comparing with the synthetic standards. This study was aimed at identifying new metabolites of Tβ4 leucine aminopeptidase (LAP), human kidney microsomes (HKM), cultured huvec cells, and rats after administration of Tβ4 protein to develop biomarkers for detecting doping drugs in sports. A method for detecting and quantifying Ac-Tβ1–14 was developed and validated using Q-Exactive orbitrap mass spectrometry. The limit of detection (LOD) and limit of quantification (LOQ) of the Ac-Tβ1–14 were 0.19 and 0.58 ng/mL, respectively, and showed a good linearity (r2 = 0.9998). As a result, among the six metabolites above, Ac-Tβ1–14, as a common metabolite, was found in LAP, HKM, huvec cells exposed to Tβ4, and the urine of rats intraperitoneally treated with 20-mg/kg Tβ4. And the metabolite Ac-Tβ1–14 was quantitatively determined by 48 h in rats, with the highest concentration occurring between 0 and 6 h. Ac-Tβ1–14 was not detected in non-treated control groups, including human blank urine. These results suggest that Ac-Tβ1–14 in urine is a potential biomarker for screening the parent Tβ4 in doping tests.

Gameli, P. S., Taoussi, O., Basile, G., Carlier, J., & Busardò, F. P. (2023). Metabolism Study of Anamorelin, a GHSR1a Receptor Agonist Potentially Misused in Sport, with Human Hepatocytes and LC-HRMS/MS. Metabolites, 13(8), 949.

ABSTRACT

Anamorelin, developed for the treatment of cancer cachexia, is an orally active medication that improves appetite and food intake, thereby increasing body mass and physical functioning. It is classified as a growth hormone secretagogue and strictly monitored by

the World Anti-Doping Agency (WADA), owing to its anabolic enhancing potential. Identifying anamorelin and/or metabolite biomarkers of consumption is critical in doping controls. However, there are currently no data available on anamorelin human metabolic fate. The aim of this study was to investigate and identify biomarkers characteristic of anamorelin intake using in silico metabolite predictions with GLORYx, in vitro incubation with 10-donor-pooled human hepatocytes, liquid chromatography-high-resolution tandem mass spectrometry (LC-HRMS/MS) analysis, and data processing with Thermo Scientific's Compound Discoverer. In silico prediction resulted in N-acetylation at the methylalanyl group as the main transformation (score, 88%). Others including hydroxylation at the indole substructure, and oxidation and N-demethylation at the trimethylhydrazino group were predicted (score, ≤36%). Hepatocyte incubations resulted in 14 phase I metabolites formed through N-demethylation at the trimethylhydrazino group, N-dealkylation at the piperidine ring, and oxidation at the indole and methylalanyl groups; and two phase II glucuronide conjugates occurring at the indole. We propose four metabolites detected as specific biomarkers for toxicological screening.

Hopker, J. G., Griffin, J. E., Hinoveanu, L. C., Saugy, J., & Faiss, R. (2023). Competitive performance as a discriminator of doping status in elite athletes. Drug Testing and Analysis.

ABSTRACT

As the aim of any doping regime is to improve sporting performance, it has been suggested that analysis of athlete competitive results might be informative in identifying those at greater risk of doping. This research study aimed to investigate the utility of a statistical performance model to discriminate between athletes who have a previous anti-doping rule violation (ADRV) and those who do not. We analysed performances of male and female 100 and 800 m runners obtained from the World Athletics database using a Bayesian spline model. Measures of unusual improvement in performance were quantified by comparing the yearly change in athlete's performance (delta excess performance) to quantiles of performance in their age-matched peers from the database population. The discriminative

ability of these measures was investigated using the area under the ROC curve (AUC) with the 55%, 75% and 90% quantiles of the population performance. The highest AUC values across age were identified for the model with a 75% quantile (AUC = 0.78–0.80). The results of this study demonstrate that delta excess performance was able to discriminate between athletes with and without ADRVs and therefore could be used to assist in the risk stratification of athletes for anti-doping purposes.