



**1ST INTERNATIONAL CONGRESS
"HUMAN IN MOTION"**

**1. MEDNARODNI KONGRES
»ČLOVEK V GIBANJU«**

**The book of abstract
Zbornik povzetkov**

Editor/Urednica:

Kaja TERAŽ





**1ST INTERNATIONAL CONGRESS
"HUMAN IN MOTION"
1. MEDNARODNI KONGRES
»ČLOVEK V GIBANJU«**

**The book of abstract
Zbornik povzetkov**

Editor/Urednica:

Kaja TERAŽ



KOPER 2025

1ST INTERNATIONAL CONGRESS HUMAN IN MOTION

1. MEDNARODNI KONGRES ČLOVEK V GIBANJU

The Book of Abstracts
Zbornik povzetkov

Portorož, 28 September–1 October 2025

Portorož, 28. september–1. oktober 2025

Editor/Urednica: Kaja Teraž

Technical editors/Tehnični urednici: Kaja Teraž, Alenka Obid

Design and Typesetting/Oblikovanje in prelom: Kaja Teraž, Gal Vončina, Alenka Obid

Editor for Life Sciences / Urednik za področje ved o življenju: Boštjan Šimunič

Editor-in-Chief of Annales ZRS / Glavni urednik Annales ZRS: Tilén Glavina

Publisher/Izdajatelj: Znanstveno-raziskovalno središče Koper, Annales ZRS, Slovenija / Science and Research Centre Koper, Annales ZRS, Slovenia

Publisher represented by/Za izdajatelja: Rado Pišot

Address/Sedež: Garibaldijeva 1, 6000 Koper, Slovenia

Online publication, available at / Spletna publikacija, dostopna na:
<https://doi.org/10.35469/978-961-7195-98-9>

Koper, 2025

All abstracts were pre-screened and reviewed.
Vsi povzetki prispevkov so bili pregledani in recenzirani.

This publication is copyrighted © 2025 Science and research centre Koper, Annales ZRS./
Publikacija je zaščitená ©2025 Znanstveno-raziskovalno središče Koper, Annales ZRS.

Authors guarantee the authorship of their papers and take full responsibility for published abstracts of contributions and their translations./Avtorji jamčijo za avtorstvo prispevkov ter prevzemajo vso odgovornost za objavljene povzetke prispevkov in njihove prevode.

.....

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani
COBISS.SI-ID 254708483
ISBN 978-961-7195-98-9 (PDF)

ORGANISER/ORGANIZATOR



Science and Research Centre Koper / Znanstveno-raziskovalno središče Koper

In cooperation with/ v sodelovanju z:

Slovenian Pediatric Society

Healthcare Centre Dr. Adolf Drolc Maribor

University of Ljubljana, Faculty of Sport

University of Ljubljana, Biotechnical Faculty

University of Primorska, Faculty of Education

University of Maribor, Faculty of Education

Slovenian association of kinesiology

The community of Kindergartens of Slovenia

University of Zagreb, Faculty of Kinesiology

ALMA MATER Europea University

Euro-Mediterranean University

National Taiwan Sport University

Comprehensive Health Research Centre

University of Evora

University of Padua

University of Trieste

Otto von Guericke University Magdeburg

imFine Improvement of Health by Fitness, Nutrition and Exercise Research Group

Azerbaijan Sports Academy

Polytechnic University of Madrid



UNIVERSIDAD
POLITÉCNICA
DE MADRID



imFine^{LPM}
Improvement of Health
by Fitness, Nutrition and
Exercise Research Group



OTTO VON GUERICKE
UNIVERSITÄT
MAGDEBURG



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



UNIVERSIDADE DE ÉVORA
ESCOLA DE SAÚDE
E DESENVOLVIMENTO HUMANO

CHRC
COMPREHENSIVE HEALTH
RESEARCH CENTRE



National Taiwan Sport University

ASA
AZERBAIJAN
SPORTS
ACADEMY



University of Maribor

Faculty of Education



FŠ

UNIVERZA V LJUBLJANI
Fakulteta za šport



BF

UNIVERZA V LJUBLJANI
Biotehniška fakulteta



ALMA MATER
EUROPAEA
UNIVERSITY



Društvo Kineziologov Slovenije
Slovenian Association of Kinesiology
Associazione Slovena di Kinesiologia



ZDRAVSTVENI DOM
DR. ADOLFA DROLCA
MARIBOR

SCIENTIFIC COMMITTEE / ZNANSTVENI ODBOR

President/Predsednik

Prof. dr. Rado Pišot, Znanstveno-raziskovalno središče Koper, Slovenija

Members/Člani

Prof. Sandra Pais, PhD, University of Évora, Évora, Portugal.

Prof. Boštjan Šimunič, PhD, Science and Research Centre, Koper, Slovenia.

Prof. Uroš Marušič, PhD, Science and Research Centre, Koper, Slovenia.

Assoc. Prof. Saša Pišot, PhD, Science and Research Centre, Koper, Slovenia.

Assoc. Prof. Tadeja Volmut, University of Primorska, Faculty of Education.

Prof. Jurij Planinšec, PhD, University of Maribor, Faculty of Education, Maribor, Slovenia.

Prof. Maja Pajek, PhD, University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia.

Prof. Marcela González-Gross, PhD, Universidad Politécnica de Madrid, Spain.

Prof. Tony Dong-Jhy Hwang, PhD, National Taiwan Sport University, Taiwan.

Prof. Ulkar Babayeva, PhD, Azerbaijan State Academy of Physical Education and Sport, Azerbaijan.

Prof. Anita Hökelmann, PhD, Otto von Guericke University, Magdeburg, Germany.

Assoc. Prof. Sanja Šalaj, University of Zagreb, Faculty of Kinesiology, Zagreb, Croatia

ORGANISING COMMITTEE / ORGANIZACIJSKI ODBOR

President/Predsednik

Luka Šlosar, Znanstveno-raziskovalno središče Koper, Inštitut za kineziološke raziskave, Slovenija

Members/Člani

Prof. Armando Raimundo, PhD, University of Évora, Évora, Portugal.

Assist. Prof. Kaja Teraž, PhD, Science and Research Centre, Koper, Slovenia.

Assist. Prof. Črtomir Matejek, PhD, Faculty of Education, University of Maribor, Maribor, Slovenia.

Manca Peskar, Science and Research Centre, Koper, Slovenia.

Katarina Puš, Science and Research Centre, Koper, Slovenia.

Irena Tozan, Science and Research Centre Koper, Koper, Slovenia.

Matej Kleva, Science and Research Centre Koper, Koper, Slovenia.

Jure Urbanc, Science and Research Centre Koper, Koper, Slovenia.

Maša Kezunović, Science and Research Centre Koper, Koper, Slovenia.

Assoc. Prof. Vjekoslav Cigrovski, University of Zagreb, Faculty of Kinesiology, Zagreb, Croatia

REVIEW / RECENZIJJA

All abstracts were pre-screened and reviewed.

Vsi povzetki prispevkov so bili predhodno pregledani in recenzirani.

Recenzenti/Reviewers: Boštjan Šimunič, Luka Šlosar, Manca Peskar, Stojan Puhelj, Kaja Teraž, Črtomir Matejek, Saša Pišot, Uroš Marušič, Jurij Planinšec, Damir Zubac, Tadeja Volmut, Miloš Kalc, Katarina Puš, Rado Pišot, Ana Cikač, Cecil Meullenberg,

HONORARY PATRONAGE / ČASTNO POKROVITELJSTVO

The minister of Higher Education, Science, and Innovation, dr. Igor Papič

Minister za visoko šolstvo, znanost in inovacije, dr. Igor Papič

CONFERENCE SUPPORTERS / PODPORNICI KONFERENCE



projekt **ip**

Dear colleagues, esteemed speakers, and participants,

It is with great pride and anticipation that I welcome you to the 1st International Congress of Human in Motion (ICHM), taking place from 28 September to 1 October 2025 in the inspiring coastal setting of Bernardin, Slovenia.

For more than two decades, the Science and Research Centre Koper (ZRS Koper) has organized the Child in Motion conference, which has grown into a recognized international meeting point for exchanging knowledge on child development and healthy lifestyles. Building on this legacy, we are opening a new chapter with ICHM, broadening our focus to embrace the entire human lifespan.

The inaugural ICHM will explore the vital intersections of health, movement, and quality of life through four core themes:

- 1. Child in Motion** – advancing our understanding of how physical activity supports the holistic development of children and adolescents.
- 2. Healthy Ageing** – presenting innovative approaches to preserving function and independence throughout later life.
- 3. Physical Inactivity** – tackling one of today's most pressing global health challenges through an interdisciplinary lens.
- 4. Mobile Brain/Body Imaging and XR Technologies in Healthcare** – highlighting cutting-edge tools that are transforming prevention, rehabilitation, and performance.

This congress is more than a scientific gathering, it is a call to collaboration. The challenges of modern society, from sedentary lifestyles to age-related decline, demand evidence-based solutions, interdisciplinary dialogue, and translation of research into practice. ICHM is designed to foster exactly this: an environment where researchers, clinicians, educators, policymakers, and industry leaders can connect and co-create new pathways forward.

We are honoured to welcome distinguished plenary speakers and leading experts who will share their insights, inspire debate, and guide us toward actionable outcomes. We also look forward to the contributions of participants from diverse backgrounds, whose work will enrich our discussions and shape the congress into a truly international and multidisciplinary experience.

On behalf of the Organizing Committee, I thank you for being part of this exciting beginning. Together, let us set the foundations of ICHM and carry forward the mission of promoting health, performance, and quality of life through movement at every age, and for every human being.

We wish you a productive, inspiring, and memorable congress.

Sincerely,

Luka Šlosar, PhD
President of the Organising Committee
1st International Congress of Human in Motion (ICHM), Slovenia 2025

Spoštovane vabljene predavateljice/-i, drage/-i sodelavke/-ci, udeleženke/-ci konference!

Z velikim ponosom in pričakovanjem vas pozdravljam na 1. Mednarodnem kongresu Človek v gibanju (ICHM), ki bo potekal od 28. septembra do 1. oktobra 2025 v navdihujočem obmorskem okolju Bernardina v Sloveniji.

Že več kot dve desetletji Znanstveno-raziskovalno središče Koper (ZRS Koper) organizira konferenco Otrok v gibanju, ki je zrasla v prepoznano mednarodno stičišče za izmenjavo znanja o razvoju otrok in spodbujanju zdravega življenjskega sloga. Na tej dediščini gradimo novo poglavje z ICHM, pri čemer širimo fokus na celoten življenjski cikel človeka.

Uvodni kongres ICHM bo raziskoval ključna presečišča zdravja, gibanja in kakovosti življenja skozi štiri osrednje teme:

- 1. Otrok v gibanju** – raziskave o temeljni vlogi gibalne dejavnosti pri celostnem razvoju otrok in mladostnikov.
- 2. Zdravo staranje** – inovativni pristopi za preprečevanje upada gibalnih in kognitivnih funkcij zaradi staranja.
- 3. Gibalna aktivnost vs. Gibalna neaktivnost** – interdisciplinarni pristop k enemu največjih izzivov sodobnega javnega zdravja.
- 4. Mobilno slikanje možganov/telesa in XR tehnologije v zdravstvu** – predstavitev inovacij na področju diagnostike, preventive in zdravljenja.

Kongres presega okvire zgolj znanstvenega srečanja, predstavlja poziv h sodelovanju. Izzivi sodobne družbe, od razširjenosti sedečega načina življenja do procesov staranja prebivalstva, terjajo rešitve, utemeljene na znanstvenih dokazih, interdisciplinarni dialog in učinkovito prenosljivost raziskovalnih spoznanj v prakso. Poslanstvo ICHM je prav v tem: vzpostaviti okolje, v katerem se raziskovalci, zdravstveni strokovnjaki, odločevalci in predstavniki gospodarstva povezujejo ter soustvarjajo nove razvojne smernice.

V čast nam je pozdraviti ugledne plenarne predavatelje in vodilne strokovnjake, ki bodo z nami delili svoja spoznanja, spodbudili razpravo in nas usmerili k uresničljivim rešitvam. Prav tako se veselimo prispevkov udeležencev iz raznolikih okolij, katerih delo bo obogatilo naše razprave in oblikovalo kongres kot resnično mednarodno in multidisciplinarno izkušnjo.

V imenu organizacijskega odbora se vam zahvaljujem, ker ste del tega vznemirljivega začetka. Skupaj postavimo temelje ICHM in nadaljujmo poslanstvo spodbujanja zdravja, zmogljivosti in kakovosti življenja skozi gibanje v vseh življenjskih obdobjih in za vsakega človeka.

Želimo vam uspešen, navdihujoč in nepozaben kongres.

dr. Luka Šlosar
predsednik Organizacijskega odbora

Contents / Vsebina

PLENARY SESSION / PLENARNA PREDAVANJA

PHYSICAL ACTIVITY VS. INACTIVITY: METABOLIC STRATEGIES TO ATTENUATE MUSCLE DISUSE ATROPHY _____ 25

Gianni BIOLO, Filippo Giorgio DI GIROLAMO, Kaja TERAŽ, Martino FRANCHI,
Maira CAMARGO SCARPELLI, Lucrezia ZUCCARELLI, Giovanni BALDASSARRE,
Fabio SARTO, Filippo MEARELLI, Nicola FIOTTI, Saša PIŠOT, Alja IVETAC,
Teresa CANNITO, Bruno GRASSI, Bostjan ŠIMUNIČ, Mladen GASPARINI,
Luka ŠLOSAR, Miloš KALC, Manca PESKAR, Katarina PUŠ, Uros MARUSIC,
Marco NARICI, Rado PIŠOT

THE GLOBAL ALLIANCE FOR THE PROMOTION OF PHYSICAL ACTIVITY AND PRECISE PREVENTION: FROM HAMBURG TO THE WORLD _____ 27

Marcela GONZÁLEZ-GROSS

DANCE AS PREVENTION AND THERAPY FOR NEURO-DEGENERATIVE DISEASES _____ 28

Anita HOEKELMANN

DESTINED TO MOVE: A LIFELONG PRESCRIPTION FOR HEALTHY AGING _____ 30

Marco NARICI, Fabio SARTO, Eugenia MOTANOVA, Ornella CAPUTO, Martino FRANCHI, Bostjan ŠIMUNIČ
Mladen GASPARINI, and Rado PIŠOT

KEY NOTE SESSION / UVODNA PREDAVANJA V SEKCIJE

WHY SNOWSPORT SHOULD BE TAUGHT IN UNIVERSITIES AND SCHOOLS _____ 33

Dieter BUBECK

HEALTHY AGEING: OPTIMIZING THE INTERPLAY BETWEEN POLYPHARMACY, NUTRITION AND PHYSICAL ACTIVITY _____ 34

Filippo Giorgio DI GIROLAMO, Filippo MEARELLI, Gianni BIOLO, Chiara RONI

HEALTHY LONGEVITY: CONCEPT OR ILLUSION _____ 36

Branka JAVORNIK

HEALTH PROBLEMS OF YOUNG ATHLETES – THE ROLE OF THE PEDIATRICIAN _____ 38

Vlasta KUNAVER

BRIDGING BRAIN AND BEHAVIOR: MOBILE BRAIN AND BODY IMAGING FOR ADVANCED DIAGNOSTICS AND REHABILITATION OF POSTURAL DEFICIENCIES _____ **40**
Tim LEHMANN

NUTRITIONAL AND LIFESTYLE INTERVENTIONS TO COUNTERACT SARCOPENIA: FROM MICE MODELS TO HUMAN TRIALS _____ **42**
Mon-Chien LEE and Chi-Chang HUANG

BIOMECHANICAL SOLUTIONS AND STRATEGIES FOR SPACE AND EARTH: ARTIFICIAL GRAVITY AND RESISTANCE TRAINING _____ **44**
Konul Safar MAMMADOVA

GROWING OLD IN PORTUGAL: CHALLENGES FOR HEALTH AND SOCIAL SUPPORT SERVICES _____ **45**
Sandra PAIS

CONNECTING RESEARCH AND PRACTICE: IMPROVING THE QUALITY OF LIFE IN KIDNEY PATIENTS THROUGH PHYSICAL ACTIVITY _____ **47**
Maja PAJEK and Špela BOGATAJ

MOBILE BRAIN IMAGING IN EVERYDAY-LIKE TASKS: INSIGHTS INTO MOTOR-COGNITIVE INTERACTION IN AGING AND PARKINSON'S DISEASE _____ **49**
Robert STOJAN

THE IMPACT OF SPORTS PARTICIPATION ON LONG-TERM HEALTH _____ **51**
Tatjana TRIVIĆ

APPLICATIONS OF VIRTUAL REALITY TO SUPPORT SPORTS ACTIVITY _____ **53**
Kerstin WITTE

FOSTERING HEALTHY LIFESTYLES: THE IMPACT OF PHYSICAL EDUCATION TEACHERS AT THE SCHOOL ENVIRONMENT _____ **55**
Augusto G. ZAPICO

SCIENTIFIC PAPERS/ ZNANSTVENI POVZETKI

PHYSIOTHERAPEUTIC INTERVENTION FOR CHILDREN WITH ACHONDROPLASIA AND ITS IMPACT ON THEIR GAIT – A PILOT STUDY _____ **59**
Miriam ANSCHÜTZ, Mareike HERGENRÖTHER, Katja PALM, Klaus MOHNIKE,
Kerstin WITTE

SPORT MOTIVATION OF JUNIOR FOOTBALLERS – WITH AN INTERNATIONAL OUTLOOK _____ **61**
Zalán Mihály BÁCS

FITBACK TOOLKIT: EMPOWERING PE TEACHERS TO ENHANCE STUDENTS' PHYSICAL LITERACY THROUGH FITNESS MONITORING _____ **62**

Sara BESAL, Nadja ČERNE, Bojan LESKOŠEK, Gregor JURAK

SOCIO-PSYCHOLOGICAL FACTORS RELATED TO THE POTENTIAL RISK OF PSYCHOACTIVE SUBSTANCE USE AMONG PHYSICALLY ACTIVE STUDENTS AGED 17–24 IN AZERBAIJAN _____ **64**

Aynur R. BUNYATOVA

RAPID NEUROMUSCULAR ACTIVATION FOLLOWING BOX JUMPS: A POTENTIAL STRATEGY AGAINST SEDENTARY DECLINE _____ **66**

En-Yu CHANG, Chia-An HO, Pei-Hsuan WANG

THE POTENTIAL OF SEDENTARY METER IN EVERYDAY LIFE _____ **68**

Ana CIKA¹ and Saša PIŠOT

TISSUE AND CIRCULATING LOAD-SENSITIVE MUSCULOSKELETAL BIOMARKERS IN A 6° HEAD-DOWN BED-REST MODEL OF SIMULATED MICROGRAVITY (BIOMUSK) _____ **70**

Graziana COLAIANNI, Angela ORANGER, Onofrio TERREVOLI, Luisa PELLICANI, Patrizia PIGNATARO, Clelia SURIANO, Francesca FERRANTI, Uroš MARUŠIČ, Bostjan SIMUNIC, Rado PISOT, Marco NARICI, Silvia COLUCCI, Maria GRANO

SEX DIFFERENCES AND PERFORMANCE EVALUATION IN PRESCHOOL ATHLETIC EVENTS: A STUDY FROM THE OLYMPIC FESTIVAL OF KINDERGARTENS IN CROATIA _____ **72**

Josip CVENIĆ

TRAVELLING FOR HEALTH: RETHINKING TOURISM IN THE ERA OF ACTIVE AGEING _____ **75**

Goran DANKOVIC, Andjelina MARIC STANKOVIC, Marija BRATIC, Danijel PAVLOVIC

THE EFFECT OF INDIVIDUALIZED HIGH-VELOCITY RESISTANCE TRAINING ON FUNCTIONAL, NEUROMUSCULAR ADAPTATION, AND HEALTH OUTCOMES IN OLDER ADULTS _____ **77**

Itai HAR-NIR, Ayelet DUNSKY, Jana PELCLOVÁ

DEVELOPMENT OF VO₂MAX PREDICTION MODELS USING A SPECIFIC 35-CM STEP TEST IN TAIWANESE ADULTS _____ **79**

Chia-An HO, Hei-Tung LAU, Pei-Hsuan WANG, Chin-Shan HO

ENHANCING LEARNING MOTIVATION THROUGH PROBLEM-BASED INSTRUCTION AND MOTIVATIONAL DESIGN IN ELEMENTARY PHYSICAL EDUCATION _____ **81**

Mei-Yao HUANG, Yung-Kuan HUANG² and Yueh-Er CHEN

DIFFERENCE IN ACUTE RESPONSES OF MICROVASCULAR REACTIVITY AND ARTERIAL STIFFNESS TO MODERATE-INTENSITY AND HIGH-INTENSITY INTERVAL TRAINING: A PILOT STUDY _____ **83**

Simon ISKRA, Gašper TURNŠEK, Kristina DROLE, Armin PARAVLIĆ

COMPARISON OF VISUAL-MOTOR REACTION IN HANDBALL PLAYERS OF DIFFERENT POSITIONS AND PHYSICALLY INACTIVE WOMEN	85
Saša JOVANOVIĆ, Dragana VUKOSAVLJEVIĆ, Željko SEKULIĆ, Boštjan ŠIMUNIČ	
DUAL-TASKING DISRUPTS FORCE STABILITY AND MOTOR UNIT BEHAVIOUR IN PARKINSON'S DISEASE	87
Miloš KALC, Aleksandar MILADINOVIĆ, Miloš AJČEVIĆ, Aleš HOLOBAR, Matej KRAMBERGER, Paolo MANGANOTTI, Manca PESKAR, Uroš MARUŠIČ	
DANCE INTERVENTION FOR PARKINSON'S DISEASE: PRELIMINARY RESULTS OF THE SLOVENIAN NEURODANCE COHORT	89
Tajda KOCUVAN and Manca PESKAR	
EVALUATING MATERIALS FOR SPORTS SMART PATCHES: TOWARDS ENHANCED WEARABLE MONITORING	91
Jaka KOVŠE, Shavini STUART, Klas HJORT, Matej SUPEJ	
REACTION AND INHIBITION BEHAVIOR TO MOVING OBJECTS IN THE PERIPHERAL VISION IN A VIRTUAL REALITY BALL CATCH SCENARIO	93
German KRÄMER, Dan BÜRGER, Stefan PASTEL and Kerstin WITTE	
IMPORTANCE OF HEALTHY LIFESTYLE FOR HEALTHY AGEING IN SLOVENIAN ADULTS	95
Jerneja KRAMPELJ, Katja ZDEŠAR KOTNIK and Matej GREGORIČ	
ACUTE ARTERIAL STIFFNESS RESPONSE TO HIGH-INTENSITY EXERCISE IN OLDER ADULTS ACROSS PHYSICAL ACTIVITY LEVELS	97
Hei-Tung LAU, Chia-An HO, En-Yu CHANG, Chin-Shan HO	
FUNCTIONAL FITNESS AND BODY COMPOSITION IN OLDER TAIWANESE ADULTS: A CROSS-SECTIONAL STUDY ON THE IMPACT OF MUSCLE, BONE, AND FAT ON AGE-RELATED DECLINE-	99
Mon-Chien LEE and Chi-Chang HUANG	
COMPARING BODY COMPOSITION OF CHILDREN AGED 9 TO 12 BEFORE AND AFTER SUMMER HOLIDAYS, BASED ON LIVING ENVIRONMENT	101
Lea LOBENWEIN	
LONGEVITY AND PHYSICAL ACTIVITY: HOW EFFECTIVE ARE WHO PHYSICAL ACTIVITY RECOMMENDATIONS IN TERMS OF LONGEVITY?	103
Matej MAJERIČ, Martin ANDONOVSKI, Goran NIKOVSKI	
ADVANCES AND CURRENT CHALLENGES IN MOBILE NEUROIMAGING FOR BALANCE AND LOCOMOTION CONTROL	105
Uros MARUSIC	

LIFESTYLE PATTERNS AND BODY COMPOSITION DIFFERENCES AMONG UNIVERSITY STUDENTS ACROSS WEIGHT CATEGORIES	107
Črtomir MATEJEK and David KUKOVICA	

ASSESSING ADHERENCE TO WHO PHYSICAL ACTIVITY GUIDELINES IN HEALTHY SLOVENE ADULTS USING ACCELEROMETERS AND SELF-REPORT QUESTIONNAIRES	109
Kaja MEH and Gregor JURAK	

ADAPTING BODY MASS INDEX CRITERIA AND HANDGRIP STRENGTH AS A STRATEGY TO IMPROVE HEALTH EVALUATION IN OLDER ADULTS LIVING IN MADRID REGION (SPAIN). EXERNET 3.0	111
Javier MODREGO, Germán VICENTE-RODRÍGUEZ ² , Ignacio ARA-ROYO, Jorge PÉREZ-GÓMEZ, Raquel PEDRERO-CHAMIZO, Marcela GONZÁLEZ-GROSS, Eva GESTEIRO.	

CORTICO-MUSCULAR PHASE CONNECTIVITY IN EARLY-STAGE PARKINSON'S DISEASE: INSIGHTS FROM AN ISOMETRIC MOTOR TASK	113
Nina OMEJC, Tomislav STANKOVSKI, Manca PESKAR, Miloš KALC, Paolo MANGANOTTI, Klaus GRAMANN, Sašo DŽEROSKI, Uros MARUSIC	

COMPREHENSIVE CLINICAL AND LABORATORY EVALUATION OF THE EFFECTS OF FUNCTIONAL TRAINING IN OLDER ADULTS	115
Gábor PAPP, Ádám DIÓS, Ágnes GYETVAI, Attila CSABA ARANY, Márta NAGY, Andrea NAGY, László BALOGH	

RELIABILITY AND CONCURRENT VALIDITY OF THE 30-15 INTERMITTENT FITNESS TEST FOR ASSESSING CARDIORESPIRATORY FUNCTION IN PREHYPERTENSIVE INDIVIDUALS	117
Armin PARAVLIĆ, Gašper TURNŠEK, Simon ISKRA, Kristina DROLE	

TREATMENT WITH IRISIN IN AGED MICE MIMICS THE EFFECTS OF EXERCISE BY INCREASING THE SIZE OF THE HIPPOCAMPUS AND THE CELLULARITY OF THE DENTATE GYRUS THROUGH THE ENHANCEMENT OF KEY FACTORS OF NEUROPLASTICITY	119
Luisa PELLICANI, Manuela DICARLO, Patrizia PIGNATARO, Onofrio TERREVOLI, Michela TAURINO, Roberta ZERLOTIN, Clelia SURIANO, Angela ORANGER, Graziana COLAIANNI, Silvia COLUCCI, Maria GRANO	

SPECTRAL POWER AND EVENT-RELATED POTENTIALS ASSOCIATED WITH COGNITIVE-MOTOR DUAL-TASK BALANCING IN EARLY PARKINSON'S DISEASE	121
Manca PESKAR, Paolo MANGANOTTI, Klaus GRAMANN, Uros MARUSIC	

DYNAMIC BALANCE AND LATERAL ASYMMETRY IN PRESCHOOL CHILDREN: DIFFERENCES BETWEEN CONTINENTAL AND COASTAL REGIONS OF CENTRAL EUROPE	123
Vilko PETRIĆ, Sanja LJUBIČIĆ, Donata VIDAKOVIĆ SAMARŽIJA	

CORRELATION BETWEEN IRISIN, AN EXERCISE-INDUCED MYOKINE, AND MULTI-DOMAIN COGNITION IN DEMENTIA PATIENTS _____ 125

Patrizia PIGNATARO, Manuela DICARLO, Chiara ZECC, Daniele URSO, Maria Teresa DELL'ABATE, Davide VILELLA, Onofrio TERREVOLI, Luisa PELLICANI, Michela TAURINO, Clelia SURIANO, Angela ORANGER, Graziana COLAIANNI, Silvia COLUCC, Maria GRANO, Giancarlo LOGROSCINO

EXERGAMING REJUVENATES RESTING-STATE BRAIN COMPLEXITY AND MODULATES ADAPTABILITY DURING GAMEPLAY IN OLDER ADULTS: AN EEG MULTISCALE ENTROPY STUDY _____ 127

Daghan PISKIN, Helen MÜLLER, Nina SKJÆRET-MARONI, Beatrix VEREIJKEN, Jochen BAUMEISTER

THE POWER OF GRAVITY: FROM EVOLUTIONARY NECESSITY TO HUMAN HEALTH _____ 129

Rado PIŠOT, Boštjan ŠIMUNIČ, Gianni BIOLO, Uroš MARUŠIČ, Marco NARICI

GENDER DIFFERENCES IN PHYSICAL ACTIVITY AS AN ADAPTATION TO THE COVID-19 CRISIS IN OLD AGE _____ 131

Saša PIŠOT and Kaja TERAŽ

MOVING BEYOND PAIN: EFFECTS OF INDIVIDUALIZED EXERCISE AND WALKING PROGRAM IN LUMBAR SPINAL STENOSIS PATIENTS _____ 133

Katja PLASKAN, Maja PAJEK, Miha VODIČAR

ADHERENCE TO THE MEDITERRANEAN DIET AND RISK OF LOW MUSCULAR STRENGTH IN CHILDREN: THE ASOMAD STUDY _____ 135

Alicia PORTALS-RIOMAO, Asmaa NEHARI, Jaime LÓPEZ-SEOANE, Lisset PANTOJA-ARÉVALO, Marcela GONZÁLEZ-GROSS, Carlos QUESADA-GONZÁLEZ, Eva GESTEIRO, Augusto G. ZAPICO

PROMOTING PHYSICAL AND COGNITIVE HEALTH THROUGH MUSIC-BASED EXERCISE PROGRAMS IN PEOPLE WITH DEMENTIA – DEVELOPMENT AND EVALUATION _____ 137

Alexander PRINZ and Kerstin WITTE

50TH ANNIVERSARY OF THE ANALYSIS OF METRIC PROPERTIES OF COMPOSITE MOTORIC TESTS – WHAT MADE AN INTEGRATIVE LEAP IN DEVELOPMENT OF KINESIOMETRICS _____ 139

Franjo PROT

EFFECTS OF A 6-MONTH RHYTHMIC GYMNASTICS TRAINING ON HIP AND SHOULDER ACTIVE FLEXIBILITY AND FUNCTIONAL ASYMMETRY IN YOUNG GIRLS _____ 141

Tijana PURENOVIĆ-IVANOVIĆ, Katarzyna STERKOWICZ-PRZYBYCIEŃ, Saša JOVANOVIĆ

ASSOCIATION BETWEEN MUSCLE CONTRACTILITY AND STRUCTURAL FEATURES IN SLOVENIAN OLDER ADULTS _____ 143

Katarina PUS, Diana A Madrid Fuentes, Ashley Weaver, Jeannette R Mahoney, Boštjan Šimunič

IMPACT OF SPORTS BIOGRAPHY ON COGNITIVE AND MOTOR FUNCTION IN OLDER ADULTS	145
Kathrin REHFELD, Alexander PRINZ, Luise STÖSSEL, Anita HÖKELMANN, Kerstin WITTE	
EFFECTIVENESS AND SUSTAINABILITY OF A MULTIDIMENSIONAL EXERCISE PROGRAM FOR HEALTHY BUT PHYSICALLY INACTIVE OLDER ADULTS AGED 60+	147
Anneke SCHUMACHER, Marlene KRUMPOLT, Kerstin WITTE	
(NON)CONGRUENCE BETWEEN DATA ON BODY COMPOSITION, SOMATOTYPE, PHYSICAL ACTIVITY AND CARDIORESPIRATORY FITNESS IN YOUNG ADULTS	149
Žana SOTELŠEK and Tatjana ROBIČ PIKEL	
THE ROLE OF SPORT IN SUPPORTING CHILDREN WITHOUT PARENTAL CARE: RESIDENTIAL AND SCHOOL CONTEXTS	151
Petar Mihail SPAIĆ, Radenko M. MATIĆ, Ivana M. MILOVANOVIĆ	
ENHANCING LONG-TERM PHYSICAL ACTIVITY ENGAGEMENT THROUGH PERSONALITY-BASED PSYCHOLOGICAL INTERVENTIONS: A HEXACO MODEL	153
Arzu SULEYMANOVA	
ACUTE EFFECTS OF HIGH-INTENSITY INTERVAL TRAINING ON OXIDATIVE STRESS MARKERS AND BRAIN-DERIVED NEUROTROPHIC FACTOR LEVELS IN YOUNG PROFESSIONAL ATHLETES AND NON-ATHLETE UNIVERSITY STUDENTS	155
Eszter SZKLENÁR, Zalán BÁCS, Tibor PÖSZMET, Eszter BÍRÓ, József MÁRTON PUCSOK, Ágnes GYETVAI, Ádám DIÓS, Gábor PAPP, László BALOGH	
ALTERATIONS IN SKELETAL MUSCLE PROPERTIES AFTER HABITUAL AND EXPERIMENTAL DISUSE	157
Boštjan ŠIMUNIČ, Fabio SARTO, Martino FRANCHI, Elena MONTI, Rado PIŠOT, Marco V NARICI	
ASSOCIATION BETWEEN PATIENT-REPORTED OUTCOMES AND OBJECTIVE MEASURES OF FUNCTION IN PATIENTS AFTER TOTAL HIP ARTHROPLASTY - SECONDARY ANALYSIS OF DATA FROM A RANDOMIZED CONTROLLED TRIAL	159
Iva ŠKLEMPE KOKIĆ, Matko VUKSANIĆ, Tomislav KOKIĆ	
PREVALENCE OF ENERGY DRINK CONSUMPTION AMONG PRIMARY SCHOOL CHILDREN IN SLOVENIA	161
Tjaša ŠVIGELJ, Gregor JURAK, Petra GOLJA	
ASSOCIATIONS BETWEEN PHYSICAL FITNESS AND COGNITION IN FORMER ATHLETES AND SEDENTARY ADULTS: PRIMARY FINDINGS FROM THE MINA STUDY	163
Songxin TANG, Marta SUÁREZ-PINILLA, Ivan Kholokholov FILYK, Javier MODREGO, Bryan STRANGE, Marcela GONZÁLEZ-GROSS, Raquel PEDRERO-CHAMIZO	
ACTIVE AGEING - THE IMPACT OF PHYSICAL ACTIVITY AND NUTRITION ON HEALTH IN LATER LIFE	165
Kaja TERAŽ, Saša PIŠOT, Katarina PUŠ, Boštjan ŠIMUNIČ, Rado PIŠOT	

MOVING SMARTER: THE IMPACT OF COMPETENCY-BASED PHYSICAL EDUCATION ON YOUTH FITNESS AND ENGAGEMENT _____ **167**

Meng-Chieh TSENG, Mei-Yao HUANG

FLOW-MEDIATED SLOWING AS A TOOL FOR DETECTING ACUTE VASCULAR RESPONSES TO HIGH- AND MODERATE-INTENSITY AEROBIC EXERCISE: PRELIMINARY FINDINGS _____ **169**

Gašper TURNŠEK, Simon ISKRA, Kristina DROLE, Armin PARAVLIĆ

CORTICAL DYNAMICS DURING RESISTANCE EXERCISE - EFFECTS OF DIFFERENT INTENSITY LEVELS ON BRAIN ACTIVATION PATTERNS _____ **171**

Anton VISSER, Tim LEHMANN, Jochen BAUMEISTER

IMMEDIATE EFFECTS OF DIFFERENT RECOVERY STRATEGIES ON POST-EXERCISE FATIGUE _____ **173**

Pei-Hsuan WANG, En-Yu CHANG, Hei-Tung LAU, Chi-Chang HUANG

BODY COMPOSITION CHANGES OVER THE SUMMER IN FOURTH-GRADE PUPILS WITH DIFFERENT LEVELS OF PHYSICAL FITNESS _____ **175**

Klemen ZUPET

**PROFESSIONAL ABSTRACTS/
STROKOVNI POVZETKI**

POBEG IZ RAZREDA _____ **179**

ESCAPE FROM CLASS

Tanja BOHINC

ŠPORTNA PODROČJA – VSAK MESEC NOVA IZKUŠNJA V 1. RAZREDU _____ **181**

SPORTS AREAS – A NEW EXPERIENCE IN 1ST CLASS EVERY MONTH

Eva BOŽIČ

VIKEND SMUČARSKA ŠPORTNA ŠOLA V OSNOVNI ŠOLI _____ **183**

WINTER SPORTS SCHOOL IN PRIMARY SCHOOL

Nika COX

OBLIKOVANJE GIBALNIH IGER SKOZI SPEKTER STILOV POUČEVANJA _____ **185**

CREATING THE MOVEMENT GAMES THROUGH SPECTRUM OF TEACHING STYLES

Nadja ČERNE in Tjaša ROJKO

GOZDNA POT TELESA IN ČUTA _____ **187**

FOREST PATH OF THE BODY AND THE SENSES

Damjana DEBENEČ

S PRAVLJIČNO JOGO LAHKO RAZVIJAMO RAVNOTEŽJE	189
YOGA PROVIDES AN OPPORTUNITY TO CULTIVATE PHYSICAL BALANCE	
Azra DUKIĆ	
GIBANJE NE POZNA MEJA: INOVATIVNI PRISTOPI H GIBANJU V BOLNIŠNIČNI ŠOLI	191
NO LIMITS TO MOVEMENT: INNOVATIVE APPROACHES TO PHYSICAL ACTIVITY IN HOSPITAL SCHOOL	
Ana DOBOVIČNIK	
TEK ZA ZDRAV TELESNI RAZVOJ	193
RUNNING FOR HEALTHY BODY DEVELOPMENT	
Ana FERRARI	
VKLJUČEVANJE GIBALNIH DEJAVNOSTI V POUK ANGLEŠČINE V PRVEM VZGOJNO-IZOBRAŽEVALNEM OBDOBJU	195
INTEGRATING PHYSICAL ACTIVITIES INTO ENGLISH LESSONS IN THE FIRST TRIAD	
Mirjana Fras	
NADGRADNJA ŠPORTNE VZGOJE Z DEJAVNOSTMI V NARAVI	197
EXTENDING PHYSICAL EDUCATION WITH OUTDOOR ACTIVITIES	
Irena GAAL	
SPROSTITVENE GIBALNE AKTIVNOSTI MED PODALJŠANIM BIVANJEM IN VARSTVOM KOT POMEMBEN DEJAVNIK ZA BOLJŠE POČUTJE IN KREPITEV SOCIALNIH VEZI MED UČENCI	199
RELAXING PHYSICAL ACTIVITIES DURING EXTENDED STAYS AND CARE AS AN IMPORTANT FACTOR FOR BETTER WELL-BEING AND STRENGTHENING SOCIAL TIES AMONG STUDENTS	
Jasmina GUJTMAN	
MEDSEBOJNO SPOZNAVANJE DIJAKOV SKOZI GIBANJE	201
BUILDING INTERPERSONAL RELATIONSHIPS AMONG HIGH SCHOOL STUDENTS THROUGH MOVEMENT-BASED ACTIVITIES	
Marko JANŽIČ	
KO LUČKE ZAŽARIJO, OTROCI ZAŽIVIJO	203
WHEN THE LIGHTS SHINE, KIDS COME ALIVE	
Petra JELENC	
LOGAŠKIH 7 – VSAK MESEC NA NOV VRH	205
THE LOGATEC SEVEN – A NEW PEAK EACH MONTH	
Katja JUG	
DAN ŠPORTA	207
SPORTS DAY	
Tomaž KARČE	

**KEKČEV IZZIV KOT ORODJE ZA SPODBUJANJE SAMOREGULACIJE IN NOTRANJE
MOTIVACIJE PRI PREDŠOLSKIH OTROCIH_____209**

USING THE, KEKEC CHALLENGE, TO ENCOURAGE SELF-REGULATION AND INNER MOTIVATION IN
PRESCHOOL CHILDREN

Maja KLJAJIĆ

GIBALNA/ŠPORTNA AKTIVNOST MED URO ŠPORTA Z VSEBINO ELEMENTARNIH IGER____211
PHYSICAL ACTIVITY DURING PHYSICAL EDUCATION CLASSES WITH ELEMENTARY GAMES

Sara KNEZ in Tadeja VOLMUT

**NEZAINTERESIRANOST IN RAVNODUŠNOST DIJAKINJ
DO ŠPORTNE VZGOJE-_____213**

DISINTEREST AND INDIFFERENCE OF STUDENTS TO SPORTS EDUCATION

Ingrid KODARIN

**AKTIVNI ODMORI V OSNOVNI ŠOLI – S PLESOM DO BOLJŠEGA POČUTJA,
UČENJA IN ZDRAVJA _____215**

ACTIVE SCHOOL BREAKS WITH DANCE - IMPROVING CHILDREN'S WELLBEING, LEARNING AND
HEALTH

Neža KOKALJ

**INTERESNA DEJAVNOST "PLANINEC TONČEK" – SPODBUDA ZA MLADE PLANINCE
V PRVI TRIADI _____217**

EXTRACURRICULAR ACTIVITY "PLANINEC TONČEK" – ENCOURAGEMENT FOR YOUNG HIKERS IN
THE FIRST GRADE

Neža KOKALJ

**POVEZOVANJE GIBANJA IN GLASBE KOT SPODBUDA ZA UČENJE
PRI UČENCIH DRUGEGA RAZREDA _____219**

INTEGRATING MOVEMENT AND MUSIC AS A STIMULUS FOR LEARNING IN SECOND GRADE
STUDENTS

Stanka KOLENKO

POMEN GIBANJA PRI POUKU V 1. RAZREDU _____221

THE IMPORTANCE OF MOVEMENT IN 1ST GRADE TEACHING

Nataša KREBELJ REJA

OTROK Z RAKOM IN VZDRŽEVANJE TELESNE KONDICIJE SKOZI POUK _____223

CHILDREN WITH CANCER AND MAINTAINING PHYSICAL FITNESS THROUGH LESSONS

Darja KREK

MEDKULTURNO UČENJE SKOZI GIB IN GLASBO _____225

INTERCULTURAL LEARNING THROUGH MOVEMENT AND MUSIC

Mojca KREVEL

**UPORABA SODOBNE TEHNOLOGIJE, KOT SO INTERAKTIVNI ZIDOVI ALI VR OČALA
PRI POUČEVANJU ŠPORTA – KORAK NAPREJ ALI KORAK NAZAJ? _____ 227**

THE USE OF MODERN TECHNOLOGY, SUCH AS INTERACTIVE WALLS OR VR HEADSETS IN
PHYSICAL EDUCATION – A STEP FORWARD OR A STEP BACK?

Maja KUGONIČ

SODELOVANJE MED ŠOLAMI V ČASU POUKA IZ ŠPORTNE VZGOJE _____ 229
COOPERATION BETWEEN SCHOOLS IN PE LESSONS

Nino LEGNAR

**VARNOST OTROK PRI ŠPORTNI VADBI Z UPORABO POSTOPNE VKLJUČITVE:
PREDHODNE UGOTOVITVE PROJEKTA SAFESPORT _____ 231**

CHILDREN'S SAFETY IN SPORTS TRAINING THROUGH GRADUAL INCLUSION: PRELIMINARY
FINDINGS OF THE SAFESPORT PROJECT

Arnela LIHIĆ, Samo MASLEŠA in Slavisa BRADIC

POMEN ŠPORTNEGA PROGRAMA V OSNOVNI ŠOLI _____ 233
THE IMPORTANCE OF THE SPORTS PROGRAM IN PRIMARY SCHOOL

Nina LUŠA

**RAZLIKE V KAKOVOSTI ŽIVLJENJA MED DEČKI IN DEKLICAMI
V PODEŽELSKEM OKOLJU _____ 235**

DIFFERENCES IN QUALITY OF LIFE BETWEEN BOYS AND GIRLS IN A RURAL ENVIRONMENT

Eva MATEJEK

Z MATEMATIKO V GIBANJE – UČNA URA NA PROSTEM _____ 237
WITH MATHEMATICS IN MOTION – AN OUTDOOR LESSON

Mojca MEZEG DRMOTA

MALI ANGLEŠKI KNJIŽNI MOLJI NA GOZDNIH PRAVLJIČNIH URICAH _____ 239
LITTLE ENGLISH BOOKWORMS IN FOREST FAIRYTALE LESSONS

Mateja NOVAK

MOTIVACIJA ZA ŠPORT V TRETJEM TRILETJU OSNOVNE ŠOLE _____ 241
MOTIVATION IN PHYSICAL EDUCATION IN THIRD TRIENNIUM OF PRIMARY SCHOOLING

Nina OBERSTAR HORVAT

DAN ŠPORTA- GIBANJE IN DOBRODELNOST ZDRUŽITA MOČI _____ 243
SPORTS DAY- MOVEMENT AND CHARITY HAND IN HAND

Tevž PAVŠEK

**MOČ GRAVITACIJE – OD VZVODA EVOLUCIJE
DO DETERMINANTE ZDRAVJA ČLOVEKA _____ 245**

THE POWER OF GRAVITY – FROM A LEVER OF EVOLUTION TO A DETERMINANT OF HUMAN
HEALTH

Rado PIŠOT, Uroš MARUŠIČ, Boštjan ŠIMUNIČ

POVEZANOST GIBALNE DEJAVNOSTI IN SEDEČEGA VEDENJA Z AKADEMSKIMI DOSEŽKI ŠTUDENTOV	247
RELATIONSHIP BETWEEN PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, AND STUDENTS' ACADEMIC PERFORMANCE	
Jurij PLANINŠEC, Samo FOŠNARIČ, Stojan PUHALJ	
GIBANJE, MOTIVACIJA PRI POUKU MATEMATIKE	249
MOTIVATION THROUGH MOVEMENT IN MATHEMATICS CLASS	
Darja PLEŠKO	
POVEČANA GIBALNA AKTIVNOST V JUTRANJEM VARSTVU	251
ENHANCED PHYSICAL ACTIVITY DURING SCHOOL MORNING CARE	
David PLEVNIK	
SODELOVANJE Z LOKALNO SKUPNOSTJO PRI ZASNOVI IN PRIPRAVI UČNE POTI NA PROSTEM	253
COOPERATION WITH THE LOCAL COMMUNITY IN DESIGNING AND PREPARING AN OUTDOOR LEARNING ROUTE	
Tanja PLEVNIK PETERNELJ	
UČITELJEVA SPODBUDA UČENCEM ZA AKTIVNO PREŽIVLJANJE POČITNIC	255
TEACHER'S ENCOURAGEMENT TO STUDENTS TO SPEND THEIR HOLIDAYS ACTIVELY	
Tanja PLEVNIK PETERNELJ	
VPLIV KONTAKTNIH ŠPORTOV NA UM OTROK	257
THE IMPACT OF CONTACT SPORTS ON THE CHILD'S MIND	
Adolf RAJTMAJER	
RAZVIJANJE GIBALNIH NAVAD V PREDŠOLSKEM OBDOBJU Z NAMENOM RAZVOJA GIBALNE PISMENOSTI	259
THE DEVELOPMENT OF MOTOR HABITS IN THE PRESCHOOL PERIOD FOR THE PURPOSE OF ENHANCING PHYSICAL LITERACY	
Vanja ROGIČ	
SPORTBRIDGE: SPODBUJANJE VKLJUČUJOČEGA ŠPORTNEGA OKOLJA ZA MANJŠINSKE SKUPNOSTI	261
SPORTBRIDGE: PROMOTING INCLUSIVE SPORT ENVIRONMENTS FOR MINORITY COMMUNITIES	
Valentina SERDINŠEK, Maurizio TREMUL, in Marin CORVA	
VKLJUČEVANJE GIBALNIH DEJAVNOSTI V VSAKODNEVNI POUK	263
INTEGRATING PHYSICAL ACTIVITY INTO EVERYDAY TEACHING	
Teja SVETELŠEK	

AKTIVNO UČENJE MATEMATIKE SKOZI GIBANJE IN MEDGENERACIJSKO SODELOVANJE MED UČENCI 1. IN 8. RAZREDA	265
ACTIVE LEARNING OF MATHEMATICS THROUGH MOVEMENT AND INTERGENERATIONAL COLLABORATION BETWEEN 1ST AND 8TH GRADE STUDENTS Sandra STARC	
MEDGENERACIJSKA VADBA: REZULTATI PROJEKTA NEUROPLAY	267
INTERGENERATIONAL ACTIVITY PROGRAMS: OUTCOMES OF THE NEUROPLAY PROJECT Luka ŠLOSAR, Saša PIŠOT, Uros MARUSIC, Rado PIŠOT	
POMEN GIBANJA PRI RAZVIJANJU SOCIALNIH IN JEZIKOVNIH VEŠČIN V RAZREDU	269
THE IMPORTANCE OF MOVEMENT IN DEVELOPING SOCIAL AND LANGUAGE SKILLS IN THE CLASSROOM Petra ŠTRANCAR	
ŠTUDIJA PRIMERA: GIBALNI RAZVOJ UČENCA Z ZMERNIMI MOTNJAMI V DUŠEVNEM RAZVOJU OD VSTOPA V ŠOLO DO ADOLESCENCE	271
CASE STUDY: MOTOR DEVELOPMENT OF A STUDENT WITH MODERATE INTELLECTUAL DISABILITIES FROM SCHOOL ENTRY TO ADOLESCENCE Nika ŠUC	
KJER SE GIBANJE, IGRA IN ZNANJE SREČAJO	273
WHERE MOVEMENT, GAME AND KNOWLEDGE MEET Barbara UŠAJ	
UČENKA POSTANE UČITELJICA	275
THE STUDENT BECOMES THE TEACHER Petra VERŠNJAK	
TRIM STEZA V VRTCU	277
KINDERGARTEN JOGGING TRACK Katja VIDMAR	
VIKEND POHODNIŠKA ŠPORTNA ŠOLA V OSNOVNI ŠOLI	278
WEEKEND HIKING SPORTS SCHOOL IN PRIMARY SCHOOL Jasmina VRH	
DODATNI POHODI V OSNOVNI ŠOLI	280
ADDITIONAL HIKES IN PRIMARY SCHOOL Jasmina VRH	
GIBALNA POPESTRITEV POUČEVANJA TUJEGA JEZIKA PRI SREDNJEŠOLCIH	282
ENHANCING FOREIGN LANGUAGE TEACHING FOR SECONDARY SCHOOL STUDENTS Mojca ŽVOKE LJ	

PHYSICAL ACTIVITY VS. INACTIVITY: METABOLIC STRATEGIES TO ATTENUATE MUSCLE DISUSE ATROPHY

Gianni BIOLO¹, Filippo Giorgio DI GIROLAMO^{1,2}, Kaja TERAŽ^{1,3}, Martino FRANCHI^{4,5},
Maira CAMARGO SCARPELLI⁴, Lucrezia ZUCCARELLI⁶, Giovanni BALDASSARRE⁶,
Fabio SARTO^{4,7}, Filippo MEARELLI¹, Nicola FIOTTI¹, Saša PIŠOT³, Alja IVETAC¹,
Teresa CANNITO¹, Bruno GRASSI⁶, Bostjan ŠIMUNIČ³, Mladen GASPARINI⁸,
Luka ŠLOSAR³, Miloš KALC³, Manca PESKAR³, Katarina PUŠ³, Uros MARUSIC³,
Marco NARICI^{3,4,5}, Rado PIŠOT³

¹ Department of Medical, Surgical and Health Sciences, Clinica Medica, University of Trieste, Trieste, Italy

² Azienda Sanitaria Universitaria Giuliano Isontina (ASUGI), Clinical Pharmacy Unit, Trieste, Italy.

³ Science and Research Center Koper, Institute for Kinesiology Research, Koper, Slovenia

⁴ Department of Biomedical Sciences, University of Padova, Padova, Italy

⁵ CIR-MYO Myology Center, University of Padova, Padova, Italy

⁶ Department of Medicine (DMED), University of Udine, Udine, Italy..

⁷ Centre of Studies and Activities for Space "Giuseppe Colombo," University of Padova, Padova, Italy

⁸ Izola General Hospital, Izola, Slovenia

Presenting author: Gianni Biolo

INTRODUCTION: Physical inactivity induces disuse atrophy and skeletal muscle dysfunction, characterized by reduced strength, impaired performance, and insulin resistance. **METHODS:** Bed rest in patients with acute or chronic disease is a common cause, while experimental bed rest in healthy volunteers serves as a controlled model to study inactivity independent of disease. Nutritional strategies have been widely investigated in this context. **RESULTS:** Both overfeeding and energy restriction accelerate muscle atrophy during bed rest, highlighting the importance of maintaining near-neutral energy balance to avoid changes in fat mass. Protein metabolism is particularly affected. Bed rest and ageing reduce the efficiency of dietary amino acid utilization, a phenomenon termed anabolic resistance, which increases protein requirements. Accordingly, protein needs in bedridden and inactive individuals (1.0–1.2 g/kg/day) exceed those of young, healthy adults. High-protein diets, often combined with essential amino acid supplementation, have been shown to stimulate protein synthesis and attenuate muscle protein loss. Among branched-chain amino acids (BCAAs), leucine exerts the strongest effect on muscle protein synthesis via mTOR pathway activation. A 60-day bed rest study in healthy women tested a leucine-enriched, high-protein diet (1.6 g/kg/day, 11.4 g leucine/day). Lean mass loss was reduced by 42% during the first 15 days, though the benefit waned over time; final lean mass did not differ from controls, and strength was unaffected. Importantly, this intervention preserved insulin sensitivity, which declined by 50% in controls. More recently, the same diet was tested in older adults (~68 years) during 10 days of bed rest, combined with cognitive training and exercise prehabilitation. This multimodal approach effectively prevented muscle atrophy and functional decline, maintaining both strength and gait speed. Beyond protein, nutraceuticals may support muscle health during inactivity. Beta-hydroxy-beta-methylbutyrate (HMB), a leucine metabolite, has been shown in meta-analyses to help preserve muscle mass and strength in older adults and to mitigate bed rest-induced atrophy. Omega-3 fatty acids, due to their anti-inflammatory properties,

can reduce anabolic resistance and enhance the protein-synthetic response to amino acids. **CONCLUSIONS:** In summary, prevention of inactivity-induced muscle atrophy requires a multifaceted approach. Optimal energy balance, increased protein intake with leucine enrichment, cognitive training and prehabilitation may all contribute to preserving muscle mass, metabolic health, and functional capacity in bedridden individuals.

LITERATURE:

Biolo G, Agostini F, Simunic B, Sturma M, Torelli L, Preiser JC, Deby-Dupont G, Magni P, Strollo F, di Prampero P, Guarnieri G, Mekjavic IB, Pisot R, Narici MV. Positive energy balance is associated with accelerated muscle atrophy and increased erythrocyte glutathione turnover during 5 wk of bed rest. *Am J Clin Nutr.* Oct;88(4):950-8 (2008).

Biolo G, Ciocchi B, Stulle M, Bosutti A, Barazzoni R, Zanetti M, Antonione R, Lebenstedt M, Platen P, Heer M, Guarnieri G. Calorie restriction accelerates the catabolism of lean body mass during 2 wk of bed rest. *Am J Clin Nutr.* Aug;86(2):366-72 (2007).

Biolo G, Ciocchi B, Lebenstedt M, Barazzoni R, Zanetti M, Platen P, Heer M, Guarnieri G. Short-term bed rest impairs amino acid-induced protein anabolism in humans. *J Physiol.* Jul 15;558(Pt 2):381-8 (2004).

Vinci P, Di Girolamo FG, Mangogna A, Mearelli F, Nunnari A, Fiotti N, Giordano M, Bareille MP, Biolo G. Early lean mass sparing effect of high-protein diet with excess leucine during long-term bed rest in women. *Front Nutr.* Nov 24;9:976818 (2022).

Mangogna A, Di Girolamo FG, Fiotti N, Vinci P, Landolfo M, Mearelli F, Biolo G. High-protein diet with excess leucine prevents inactivity-induced insulin resistance in women. *Clin Nutr.* 42(12):2578-2587 (2023).

THE GLOBAL ALLIANCE FOR THE PROMOTION OF PHYSICAL ACTIVITY AND PRECISE PREVENTION: FROM HAMBURG TO THE WORLD

Marcela GONZÁLEZ-GROSS¹

¹ImFINE Research Group. Department of Health and Human Performance.
Universidad Politécnica de Madrid. Spain.

Presenting author: Marcela González-Gross

The Global Alliance for the promotion of Physical Activity is the response of many organisations, professional societies and sports associations to the increasing prevalence of inactivity and non-communicable diseases among the population world-wide. Physical inactivity is among the 5 leading factors of morbidity and mortality, and in spite of the efforts during the last 20 years, measurements has not been so effective as desirable. Under the leadership of the European Initiative for Exercise in Medicine, and with the support of the Government of the city of Hamburg, the International Olympic Committee, the American College of Sports Medicine, the Exercise is Medicine initiatives of several countries, scientific associations, professional associations, universities, stakeholders and patients' associations, up to 139 supporters, the Global Alliance was launched within the framework of the Sports, Medicine and Health Summit 2021 as the "Hamburg Declaration". The Hamburg Declaration has been countersigned during the Summits of 2023 and 2025, in a continuous process of calling on national and international policymakers to take concrete actions to promote daily physical activity and exercise at a population level and in healthcare settings. In 2025, The Global Alliance Framework for the Promotion of Physical Activity has been created, with a specific and novel approach on Precision Prevention for Health, as the experts agreed on the necessity to move forward and to put things into practice. The Hamburg Declaration is an open procedure; new supporters are welcome. The joint action should lead to the success.

LITERATURE

Institute for Health Metrics and Evaluation (IHME). Global Burden of Disease 2021: Findings from the GBD 2021 Study. Seattle, WA: IHME, 2024.

Lim, Stephen S et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet* 2012; 380(9859): 2224 – 2260.

Steinacker JM, et al. Global Alliance for the Promotion of Physical Activity. The Hamburg Declaration. *BMJ Open Sport & Exercise Medicine* 2023;0:e001626.

DANCE AS PREVENTION AND THERAPY FOR NEURO-DEGENERATIVE DISEASES

Anita HOEKELMANN¹

¹ Otto von Guericke University of Magdeburg, Germany

Presenting author: Anita Hoekelmann

INTRODUCTION: Dance is a complex form of human movement that activates our body and brain. Recent reviews summarizing epidemiological, cross-sectional and interventional studies support physical activity, especially dance as a propitious method to induce neuroplasticity, physical fitness and mental wellbeing in late adulthood. Cardiovascular fitness training combined with coordinative exercise and cognitive training have been shown to induce white and gray matter plasticity, enhance cognitive and physical functions in older adults. Therefore, we created three dance studies to analyze the effects of dance on 1) healthy seniors, 2) seniors with mild cognitive impairment (MCI) and 3) seniors with dementia.

METHODS: The studies were designed as an 18-month or a 6-month RCT intervention study. The studies were approved by the ethics committee of Otto-von-Guericke University, Magdeburg. Study 1: Dance as promotion for healthy ageing; Study 2: Dance prevention for dementia (Diadem); Study 3: Dance for people with dementia for emotional balance. Healthy elderly individuals (aged 63–80), individuals with MCI (aged 58–80) and patients with dementia (aged 75–84) were recruited via announcements in local newspapers and were screened for the study.

Participants attended a newly designed training program in which they were constantly asked to learn new movement sequences. These choreographies required the coordination of different body parts (i.e., legs, arms, trunk) under different conditions (physical strain, precision, situation and time pressure). The subjects had to learn choreographies independently or by following a model.

Cognitive and physical performance were assessed in pre-and posttest intervention design, including: an extensive battery of neuropsychological tests, CERAD test battery, MR images were acquired on a 3 Tesla Siemens MAGNETOM Verio (Syngo MR B17), balance master, spiroergometry, TMG measurements, fNirs, gait analysis and other tests.

RESULTS: As a main finding, we observed in the dancers that after 6 months of training, the volumes in the left precentral gyrus had increased, and after another 12 months of training, an additional volume increase was observed in the right parahippocampal gyrus. The volume increase came along with increasing and stabilization of cognitive functions. The cardiovascular fitness levels over the course remained constant.

DISCUSSION: In sum, our results so far demonstrate that sportive dancing training can improve and/or stabilize psycho-motor as well muscular and cardiorespiratory fitness in older peoples, in patients with MCI and with dementia.

Keywords: physical activity, sportive dancing, elderly, fitness and mental wellbeing, neuroplasticity

LITERATURE

Kattenstroth, J. C., Kalisch, T., Holt, S., Tegenthoff, M., & Dinse, H. R. (2013). Six months of dance intervention enhances postural, sensorimotor, and cognitive performance in elderly without affecting cardio-respiratory functions. *Frontiers in Aging Neuroscience*, 5, 5. <https://doi.org/10.3389/fnagi.2013.00005>

Rehfeld, K., Müller, P., Aye, N., Schmicker, M., Dordevic, M., Kaufmann, J., ... & Müller, N. G. (2017). Dancing or fitness sport? The effects of two training programs on hippocampal plasticity and balance abilities in healthy seniors. *Frontiers in Human Neuroscience*, 11, 305. <https://doi.org/10.3389/fnhum.2017.00305>

Karkou, V., Aithal, S., Zubala, A., & Meekums, B. (2019). Effectiveness of dance movement therapy in the treatment of adults with depression: A systematic review with meta-analyses. *Frontiers in Psychology*, 10, 936. <https://doi.org/10.3389/fpsyg.2019.00936>

DESTINED TO MOVE: A LIFELONG PRESCRIPTION FOR HEALTHY AGING

Marco NARICI^{1,2}, Fabio SARTO¹, Eugenia MOTANOVA¹, Ornella CAPUTO¹, Martino FRANCHI¹,
Bostjan ŠIMUNIČ² Mladen GASPARINI³, and Rado PIŠOT²

¹Department of Biomedical Sciences, University of Padova, Padova, Italy,

²Science and Research Center Koper, Institute for Kinesiology Research, Koper, Slovenia,

³Izola General Hospital, Izola, Slovenia

Presenting author: Marco Narici

Muscle atrophy is inexorable consequence of aging and chronic inactivity but, in both conditions, the associated loss of force largely exceeds that of muscle size, leading to a decrease in muscle force per cross-sectional area, known as a decrease in 'muscle quality'. Recent evidence suggests that neurodegenerative processes may account for this phenomenon. Indeed, neuromuscular junction instability (serum c-terminal agrin fragment accumulation), muscle denervation (neural cell-adhesion molecule expression in myofibres) and axonal damage (neurofilaments serum accumulation) have been found when comparing young with older individuals and following bed rest in young and older individuals. NMJ morphology of older vs younger individuals and in young men after 21-day bed rest, revealed a substantially reduced overlap between pre-synaptic terminal synaptic vesicles and post-synaptic ACh receptors, pointing to an ongoing muscle denervation (Sarto et al. 2025). This was corroborated by an increase in c-terminal agrin fragment in blood serum, indicative of NMJ damage, in older vs young individuals as well as following 21-day bed rest in young and older men.

In addition, NMJ transmission, assessed by intramuscular electromyography, was found to be significantly impaired in older individuals as well as in young and older men following bed rest. The morphological damage and functional impairment of the NMJ are closely associated with mitochondrial dysfunction and seem to be preceded by alterations in proteins related to mitochondrial morphological changes and dynamics. These findings strongly emphasise that inactivity has detrimental effects on neuromuscular health of young and older humans, leading to axonal damage, muscle denervation, failure of NMJ transmission, altered motor unit recruitment and loss of muscle quality. To stay healthy across the lifespan, humans are thus condemned to move.

LITERATURE:

Marusic U, Narici M, Simunic B, Pisot R, Ritzmann R. Nonuniform loss of muscle strength and atrophy during bed rest: a systematic review. *J Appl Physiol* 2021;131(1):194-206. doi: 10.1152/jappphysiol.00363.2020.

Monti E, Reggiani C, Franchi MV, Toniolo L, Sandri M, Armani A, Zampieri S, Giacomello E, Sarto F, Sirago G, Murgia M, Nogara L, Marcucci L, Ciciliot S, Šimunic B, Pišot R, Narici MV. Neuromuscular junction instability and altered intracellular calcium handling as early determinants of force loss during unloading in humans. *J Physiol.* 2021 Jun;599(12):3037-3061. doi: 10.1113/JP281365.

Sarto F, Kalc M, Motanova ES, Franchi MV, Stashuk D, Murks N, Valli G, Negro S, Prašnikar T, Gasparini M, Martino G, De Vito G, Holobar A, Simunič B, Pišot R, Narici MV. Twenty-one days of bed rest alter motor unit properties and neuromuscular junction transmission in young adults. *J Appl Physiol* (1985). 2025 Jun 1;138(6):1411-1424. doi: 10.1152/japplphysiol.00178.2025.

Motanova E, Sarto F, Negro S, Pirazzini M, Rossetto O, Rigoni M, Stashuk DW, Gasparini M, Šimunic B, Pišot R, Narici MV. Neuromuscular junction instability with inactivity: morphological and functional changes after 10 days of bed rest in older adults. *J Physiol*. 2025 Mar 17. doi: 10.1113/JP288448.

**KEYNOTE SESSION /
UVODNA PREDAVANJA V SEKCIJE**

WHY SNOWSPORT SHOULD BE TAUGHT IN UNIVERSITIES AND SCHOOLS

Dieter BUBECK¹

¹University of Stuttgart, Department of Sport- and Exercise Science, Germany

Presenting author: Dieter Bubeck

Snowsport represents a unique modality that offers extensive benefits across physical, mental, and social domains.

This presentation argues for the integration of snowsport education within universities and schools, drawing on a growing body of evidence that highlights its multifaceted value. Contemporary challenges - such as rising costs, climate change, and the gradual decline in traditional skiing participation - underscore the need for innovative educational approaches that democratize access to snowsport experiences and promote lifelong physical activity.

Empirical studies have demonstrated that snowsport activities offer significant improvements in cardiovascular fitness, musculoskeletal strength, motor coordination, and sensorimotor integration. In addition to these physical benefits, snowsport experiences contribute to enhanced mental health by reducing stress, boosting self-competence, and fostering a sense of well-being and flow. The inherent demand for navigating variable environmental conditions also cultivates active citizenship, environmental stewardship, and social inclusion. When implemented within formal education settings, snowsport acts as a powerful pedagogical tool that not only imparts sport-specific skills but also encourages interdisciplinary learning -integrating elements of geography, politics, economics, and environmental science.

This contribution examines the evidence supporting the inclusion of snowsport in academic curricula, discusses key benefits such as improved social interaction, team building, and risk management, and proposes structured strategies for overcoming existing barriers. By positioning snowsport as an invaluable component of holistic education, the presentation aims to stimulate dialogue on innovative methods to enrich physical education programs and ensure a sustainable future for winter sports.

Keywords: Snowsport education, physical health, mental well-being, active citizenship, interdisciplinary learning, sustainability

LITERATURE:

Burtscher, M., Gatterer, H., Flatz, M., Sommersacher, R., Woldrich, T., & Ruedl, G. (2013). Effects of modern ski training on exercise performance, balance, and reaction time. *Scandinavian Journal of Medicine & Science in Sports*, 23(3), e141–e145. <https://doi.org/10.1111/sms.12025>

Brunner, F., Ruedl, G., Kopp, M., Burtscher, M., & Kopp, W. (2018). Winter sports, health promotion, and preventive medicine: a systematic review. *Journal of Science and Medicine in Sport*, 21(6), 630–636. <https://doi.org/10.1016/j.jsams.2017.10.030>

Müller, E., Kornexl, E., Raschner, C., & Schwameder, H. (2000). Science and skiing. *E & FN Spon.*

HEALTHY AGEING: OPTIMIZING THE INTERPLAY BETWEEN POLYPHARMACY, NUTRITION, AND PHYSICAL ACTIVITY

Filippo Giorgio DI GIROLAMO¹, Filippo MEARELLI², Gianni BIOLO^{2,3}, Chiara RONI¹

¹Hospital Pharmacy, Cattinara Hospital, Azienda Sanitaria Universitaria Giuliano Isontina, Trieste, Italy

²Clinica Medica, Department of Medical Surgical and Health Sciences, ASUGI, University of Trieste, Trieste, Italy.

³Department of Medical Surgical and Health Sciences, ASUGI, University of Trieste, Trieste, Italy

Presenting author: Filippo Giorgio Di Girolamo

INTRODUCTION: European population is rapidly ageing, with older adults often managing multiple chronic conditions that require numerous medications. Polypharmacy (commonly defined as the concurrent use of five or more drugs) is highly prevalent in this group and is associated with adverse outcomes such as falls, hospitalization, and higher mortality. At the same time, age-related physiological changes can lead to malnutrition and reduced physical capacity, which themselves worsen health status. These domains are tightly interconnected: medication burdens, nutritional deficits, and physical inactivity form a complex feedback loop that challenges healthy ageing. Recognizing this interplay is critical for health professionals, underscoring the need to address medications, diet, and exercise in an integrated manner to improve geriatric care.

METHODS: We conducted a narrative review and synthesis of recent literature and clinical guidance on polypharmacy, nutrition, and physical activity in older adults. This structured abstract summarizes the evidence on these interactions and outlines strategies for integrated management.

RESULTS: Multiple studies demonstrate that polypharmacy is significantly associated with declines in physical function and nutritional status in older adults. A bidirectional relationship is evident: older patients on numerous medications often exhibit poorer physical performance (e.g. slower gait speed, weaker muscle strength), and those with low levels of physical activity are more likely to require multiple medications. Likewise, polypharmacy can exacerbate malnutrition through drug side effects (such as appetite loss or gastrointestinal disturbances), indicating that medication use may play a role in the development of nutritional deficits. Conversely, a healthy lifestyle appears to mitigate these issues—regular physical activity and high-quality diets are linked to a lower likelihood of polypharmacy. Notably, certain commonly prescribed drugs can directly impair older adults' exercise tolerance and muscle function. For instance, β -blockers have been shown to significantly reduce maximal (or submaximal) aerobic exercise capacity. Similarly, statin therapy has been linked to decreased aerobic performance and objective muscle weakness, particularly in older individuals. These findings illustrate the complex, reciprocal influences between medication regimens, nutritional well-being, and physical performance in the elderly.

DISCUSSION: Our review highlights that polypharmacy, nutrition, and physical activity are interdependent factors in healthy ageing, often creating a vicious cycle that can lead to frailty if unaddressed. The use of multiple medications for co-morbid diseases may aggravate the "anorexia of ageing" and diminish physical performance, thereby worsening malnutrition

and functional decline. Healthcare providers should adopt a multidisciplinary strategy that simultaneously optimizes pharmacotherapy, diet, and exercise. This means performing regular medication reviews and deprescribing unnecessary drugs, while also ensuring routine nutritional assessments and tailored physical activity programs for older patients. Such coordinated interventions – involving physicians, pharmacists, dietitians, and physiotherapists – are essential to manage the complexity of caring for older adults.

Keywords: polypharmacy, nutritional status, physical activity, older adults, multimodal intervention

LITERATURE:

Keller MS, Qureshi N, Mays AM, Sarkisian CA, Pevnick JM. Cumulative update of a systematic overview evaluating interventions addressing polypharmacy. *JAMA Netw Open*. 2024;7(1):e2350963.

Izquierdo M, Duque G, Morley JE. Physical activity guidelines for older people: knowledge gaps and future directions. *Lancet Healthy Longev*. 2021;2(6):e380–e383.

Rawle MJ, Cooper R, Kuh D, Richards M. Associations between polypharmacy and cognitive and physical capability: a British birth cohort study. *J Am Geriatr Soc*. 2018;66(5):916–923.

Meyer M, LeWinter MM. Heart rate and heart failure with preserved ejection fraction: time to slow beta-blocker use? *Circ Heart Fail*. 2019;12:e006213.

Lee DSH, Markwardt S, Goeres L, Lee CG, Eckstrom E, Williams C, et al. Statins and physical activity in older men: the Osteoporotic Fractures in Men Study. *JAMA Intern Med*. 2014;174(8):1263–1270.

HEALTHY LONGEVITY: CONCEPT OR ILLUSION

Branka JAVORNIK^{1,2}

¹Faculty of Active Wisdom, University of Ljubljana

²Gerontological Society of Slovenia

Presenting author: Branka Javnornik

This contribution focuses on the biological aspects of ageing, interest in which has been experiencing extensive growth in the last decade, and we are witnessing new scientific discoveries and insights, which some call the “longevity revolution”. The science of ageing biology attempts to answer the questions of why and how we age at the molecular, cellular and organism levels, and whether it is possible to slow down the ageing process, primarily by preventing the development of age-related disorders and chronic diseases.

Global life expectancy has risen significantly in recent decades, and the achievements of the present civilisation have never before been seen. However, a fifth or even a quarter of this long life is still spent with age-related disabilities or chronic diseases. It is therefore not surprising to think that “science has extended life expectancy, but this merely means a longer old age”. Ageing cannot yet be escaped, but the science of ageing offers more than just “extending old age”!

What are the prospects for healthy ageing and vital longevity? Roughly speaking, there are three main aspects;

The first is a favourable genetic make-up, inherited from parents. Research on centenarians (95-110 years old) has confirmed the heritability of longevity. The contribution of genes is 60 to 75 percent, while the remaining percentages depend on environmental influences (lifestyle, exposures, macro and micro interactions, etc.). Unfortunately, no spectacular single genes for longevity in centenarians have yet been found!

In the second aspect of longevity, that is, of non-centenarians, the relationship between genetics and the environment is reversed, i.e., a smaller contribution of genes to longevity and a major impact of the environment (lifestyle). A significant leap has been made in this field in terms of understanding the biological mechanisms and processes that can be regulated and modified by physical activity, diet, quality sleep and emotional balance.

The third aspect of vital longevity is the use of medicinal substances (gerotherapeutics), cell therapies and gene therapies to maintain and prolong healthy aging; with appropriate approvals from regulatory agencies and ethical acceptance, of course. In this area, there are major efforts to discover new substances to slow down or even prevent aging or encourage rejuvenation. Today, we know of tested active ingredients that extend lifespan in experimental organisms (mice) or active ingredients that target individual symptoms of ageing. In the field of cell therapy, in addition to the successful use of stem cells to “repair” damaged tissues, much attention is being paid to the reprogramming (rejuvenation) of somatic cells, although a lot of research will be needed before this technology can be used in practice. The same applies to gene therapy, with which some experiments are being carried out to extend (healthy) life.

Keywords: longevity, ageing biology, centenarians, lifestyle, gerotherapeutics, cell therapies, gene therapies

LITERATURE:

Kennedy, B. K., Berger, S. L., Brunet, A., Campisi, J., Cuervo, A. M., Epel, E. S., ... & Sierra, F. (2014). Geroscience: linking aging to chronic disease. *Cell*, 159(4), 709–713. <https://doi.org/10.1016/j.cell.2014.10.039>

Campisi, J., Kapahi, P., Lithgow, G. J., Melov, S., Newman, J. C., & Verdin, E. (2019). From discoveries in ageing research to therapeutics for healthy ageing. *Nature*, 571(7764), 183–192. <https://doi.org/10.1038/s41586-019-1365-2>

Sebastiani, P., & Perls, T. T. (2012). The genetics of extreme longevity: Lessons from the New England Centenarian Study. *Frontiers in Genetics*, 3, 277. <https://doi.org/10.3389/fgene.2012.00277>

HEALTH PROBLEMS OF YOUNG ATHLETES – THE ROLE OF THE PEDIATRICIAN

Vlasta KUNAVER¹

¹Zdravstveni dom dr. Julija Polca, Kamnik, Slovenia

Presenting author: Vlasta Kunaver

INTRODUCTION: Regular and sufficient physical activity during childhood plays a crucial role in supporting healthy growth and development. It also serves as a preventative measure against future cardiovascular, metabolic, and musculoskeletal conditions. Despite the well-established benefits, World Health Organisation guidelines for children's physical activity are still largely unmet across the globe. Paediatricians are often the first point of contact for addressing concerns and challenges faced by young athletes and their families.

METHODS: This review highlights key areas of pediatric clinical practice in the context of youth sports. Topics were selected based on common clinical experiences and current pediatric recommendations related to sports-active children.

RESULTS: The most frequent topics discussed in pediatric settings include the selection of appropriate sports activities according to a child's individual needs and abilities. Paediatricians and dietitians play an essential role in guiding proper nutrition for young athletes. Additional areas of concern include the management of acute sports injuries and overuse injuries, as well as guidance during rehabilitation. There is an increasing need for early detection and treatment of relative energy deficiency in sport (REDs), along with recognition and management of overtraining syndrome and burnout.

DISCUSSION: Paediatricians are uniquely positioned to support young athletes holistically, from promoting safe participation to preventing long-term health issues. Close collaboration with families, coaches, and allied health professionals is vital to ensure that children benefit from physical activity while minimising risks. Raising awareness about specific health challenges such as REDs, overtraining, and sport-specific injury patterns is essential for effective pediatric care. Multidisciplinary approaches that combine medical, nutritional, and psychological support are recommended to optimise the well-being and performance of young athletes.

Keywords: young athletes, sports injuries, overuse injuries, nutrition in young athletes, pediatric sports care, relative energy deficiency.

LITERATURE:

Merkel D. Youth sport: positive and negative impact on young athletes. *Open Access J Sports Med.* 2013;4:151-160. <https://doi.org/10.2147/OAJSM.S33556>

Joel S. Brenner, COUNCIL ON SPORTS MEDICINE AND FITNESS; Sports Specialization and Intensive Training in Young Athletes. *Pediatrics* September 2016; 138 (3): e20162148. 10.1542/peds.2016-2148

Chaput et al. 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5–17 years: summary of the evidence *International Journal of Behavioral Nutrition and Physical Activity* (2020) 17:141. <https://doi.org/10.1186/s12966-020-01037-z>

Brenner JS; American Academy of Pediatrics Council on Sports Medicine and Fitness. Overuse injuries, overtraining, and burnout in child and adolescent athletes. *Pediatrics*. 2007 ;119(6):1242-5

Capra ME, Stanyevic B, Giudice A, Monopoli D, Decarolis NM, Eposito S et al. Nutrition for children and adolescents who practice sport: A narrative review. *Nutrients* 2024, 16, 2803. <https://doi.org/10.3390/nu16162803>

BRIDGING BRAIN AND BEHAVIOR: MOBILE BRAIN AND BODY IMAGING FOR ADVANCED DIAGNOSTICS AND REHABILITATION OF POSTURAL DEFICIENCIES

Tim LEHMANN¹

¹Exercise Science & Neuroscience Lab, Department Exercise & Health, Faculty of Science, Paderborn University

Presenting author: Tim Lehmann

Modern advances in mobile brain and body imaging (MoBI) technologies open new horizons in the landscape of clinical diagnostics and rehabilitation. By enabling high-resolution, real-time measurement of neural and behavioral dynamics in naturalistic situations, these portable systems facilitate novel insights into the mechanisms underlying human postural control. This is particularly impactful for clinical populations such as injured athletes or older adults, where deficits in postural control may pose a significant risk for re-injury or increased likelihood of falls. The application of MoBI allows for the simultaneous capture of brain and body dynamics during rehabilitative balance assessments or exercises, providing a holistic understanding of postural functions and dysfunctions. In this regard, recent studies have already demonstrated that MoBI approaches could detect subtle alterations in sensorimotor integration and compensatory postural strategies in various groups of patients, offering powerful tools for early diagnosis and risk stratification. Furthermore, MoBI may support the development of individualized, neurophysiologically-informed rehabilitation protocols by enabling direct monitoring of neurophysiological responses to targeted exercise interventions (Sherman *et al.*, 2021; Müller *et al.*, 2023). By bridging the gap between brain and behavior in real-world applications, it holds immense promise for advancing both preventative and therapeutic strategies in populations at risk of postural instability. However, while MoBI is offering substantial benefits, it is inherently associated with methodological limitations that need to be considered and systematically addressed in future research. Therefore, the invited lecture will highlight some emerging evidence as well as future directions for the use of MoBI in clinical diagnostics and rehabilitation of postural deficiencies.

Keywords: postural control, balance exercise & assessment, mobile brain & body imaging.

LITERATURE:

Lehmann, T., Büchel, D., Mouton, C., Gokeler, A., Seil, R., & Baumeister, J. (2021) Functional Cortical Connectivity Related to Postural Control in Patients Six Weeks After Anterior Cruciate Ligament Reconstruction. *Front. Hum. Neurosci.*, 15, 1–11.

Müller, H., Bardal, E.M., Vereijken, B., Skjæret-maroni, N., & Rudisch, J. (2023) Exergaming in older adults : the effects of game characteristics on brain activity and physical activity. *Front. Aging Neurosci.*,

Ozdemir, R.A., Contreras-Vidal, J.L., & Paloski, W.H. (2017) Cortical control of upright stance in elderly. *Sci. Rep.*, 1–26.

Sherman, D.A., Lehmann, T., Baumeister, J., Gokeler, A., Donovan, L., & Norte, G.E. (2021) External Focus of Attention Influences Cortical Activity Associated With Single Limb Balance Performance. *Phys. Ther.*, 101, 1–10.

Wittenberg, E., Thompson, J., Nam, C.S., & Franz, J.R. (2017) Neuroimaging of Human Balance Control: A Systematic Review. *Front. Hum. Neurosci.*, 11, 1–25.

NUTRITIONAL AND LIFESTYLE INTERVENTIONS TO COUNTERACT SARCOPENIA: FROM MICE MODELS TO HUMAN TRIALS

Mon-Chien LEE¹ and Chi-Chang HUANG¹

¹National Taiwan Sport University/Graduate Institute of Sports Science,

Presenting author: Huang Chi-Chang

Sarcopenia, the progressive loss of skeletal muscle mass and function with age, poses a significant threat to the independence and quality of life in older adults. This presentation summarises a translational research program that integrates findings from animal models and human clinical trials to explore effective nutritional and lifestyle strategies for mitigating age-related muscle decline. In a series of controlled mouse studies, dietary interventions including isolated soy protein, resveratrol, dehydroepiandrosterone, and probiotics such as *Lactiplantibacillus plantarum* strain TWK10 demonstrated significant improvements in muscle mass, strength, glycogen storage, and fatigue resistance. These effects were further enhanced when combined with resistance exercise or mechanical stimuli like whole-body vibration training. Building upon these preclinical results, human trials were conducted to assess the efficacy of similar interventions in elderly populations. In randomised, double-blind clinical trials, supplementation with TWK10 or *Lacticaseibacillus paracasei* strain PS23 led to significant gains in muscle strength, physical performance, and reduction in inflammatory markers in frail and older adults. Additionally, proteomic profiling revealed molecular differences between robust and frail individuals, providing a biological basis for individualised interventions. Collectively, these findings support a multimodal approach to counteract sarcopenia, combining targeted nutrition, appropriate physical activity, and emerging microbial strategies. Such integrative interventions offer practical and scalable solutions to promote functional independence and healthy ageing in the elderly population.

Keywords: sarcopenia, healthy ageing, probiotics intervention, resistance training, gut microbiota, translational research.

LITERATURE:

Lee MC, Hsu YJ, Yang HJ, Huang CC. (2025). Enhancement of lower limb muscle strength and reduction of inflammation in the elderly: A randomized, double-blind clinical trial comparing *Lacticaseibacillus paracasei* PS23 probiotic with heat-treated supplementation. *Nutrients*, 17(3), 463.

Lee MC, Chiu CH, Liao YC, Cheng YC, Lee CC, Ho CS, et al. (2024). Gut microbiota modulation and amino acid absorption by *Lactiplantibacillus plantarum* TWK10 in pea protein ingestion: TWK10 boosts gut microbiota, amino acid uptake. *Curr Res Food Sci*, 9, 100917.

Lee MC, Tu YT, Lee CC, Tsai SC, Hsu HY, Tsai TY, et al. (2021). *Lactobacillus plantarum* TWK10 improves muscle mass and functional performance in frail older adults: A randomized, double-blind clinical trial. *Microorganisms*, 9(7), 1466.

Lee MC, Hsu YJ, Wu FY, Huang CC, Li HY, Chen WC. (2022). Isolated soy protein supplementation combined with resistance training improves muscle strength, mass, and physical performance of aging female mice. *Front Physiol*, 13, 893352.

Chen YM, Lee HC, Chen MT, Huang CC, Chen WC. (2018). Dehydroepiandrosterone supplementation combined with weight-loading whole-body vibration training affects exercise performance and muscle glycogen storage in middle-aged C57BL/6 mice. *Int J Med Sci*, 15(6), 564–573.

BIOMECHANICAL SOLUTIONS AND STRATEGIES FOR SPACE AND EARTH: ARTIFICIAL GRAVITY AND RESISTANCE TRAINING

Konul Safar MAMMADOVA¹

¹Azerbaijan Sports Academy/Health sports and rehabilitation

Presenting author: Konul Safar Mammadova

The absence of a gravitational field during spaceflight significantly impairs the function of the musculoskeletal, cardiovascular, and ocular systems. Understanding the functional mechanisms of the musculoskeletal, cardiovascular, and nervous systems on Earth is essential for developing countermeasures to mitigate physiological deconditioning during long-term space missions. The primary objective of this study is to achieve an artificial gravity effect on space stations through biomechanical and strategies and to propose a specialized resistance training program as a functional solution. A 12-week training protocol was designed for a physically fit group of 10 individuals, with progressive changes in training loads and intervals implemented biweekly. Each session included 20-30 minutes of functional exercises performed three times per week, followed by a 30-minutes low-intensity treadmill walking phase and a 7-minute static stretching segment to support recovery.

Key resistance exercises such as the Nordic hamstring curl and eccentric calf raise were utilized to enhance muscle-tendon synchronization, significantly improving muscle strength and elasticity in the knee and ankle complexes. Improvements in both strength and endurance parameters were observed. Aerobic endurance was targeted through consistent cardiovascular training, while anaerobic capacity was developed via short-duration explosive power exercises. Specific protocols were implemented to activate the m. quadriceps femoris, m. gluteus maximus, and hamstring muscle groups, promoting neuromuscular activation and motor performance through the strength-velocity relationship. Additionally, resting heart rate and arterial blood pressure were normalised by the end of the program, indicating improved cardiovascular regulation.

LITERATURE:

Pavy-Le Traon, A., Heer, M., Narici, M. V., Rittweger, J., & Vernikos, J. (2007). From space to Earth: advances in human physiology from 20 years of bed rest studies (1986–2006). *European Journal of Applied Physiology*, 101(2), 143–194. <https://doi.org/10.1007/s00421-007-0474-z>

Rittweger, J., Bareille, M. P., Clément, G., Linnarsson, D., Paloski, W. H., Wuyts, F. L., & Zange, J. (2015). Short-arm centrifugation as a partial gravity countermeasure: Benefits and challenges. *European Journal of Applied Physiology*, 115(6), 1233–1246. <https://doi.org/10.1007/s00421-015-3110-3>

Trappe, S., Costill, D., Gallagher, P., Creer, A., Peters, J. R., Evans, H., ... & Fitts, R. H. (2009). Exercise in space: human skeletal muscle after 6 months aboard the International Space Station. *Journal of Applied Physiology*, 106(4), 1159–1168. <https://doi.org/10.1152/jappphysiol.91578.2008>

GROWING OLD IN PORTUGAL: CHALLENGES FOR HEALTH AND SOCIAL SUPPORT SERVICES

Sandra PAIS¹

¹Universidade de Évora, Portugal

Presenting author: Sandra Pais

Portugal is one of the most aged countries in Europe, with a rapidly growing proportion of people aged 65 and older, particularly concentrated in rural and interior regions. This demographic shift poses major challenges for health and social support services, already under pressure from limited resources, workforce shortages, and increasing demand for long-term care. The high prevalence of chronic diseases such as hypertension, diabetes, osteoarthritis, and cardiovascular conditions, combined with low levels of health literacy and persistent social inequalities, amplifies the risk of dependency, multimorbidity, and social isolation among older adults.

The reorganization of the Portuguese health system, including the creation of new Local Health Units (ULS), seeks to improve coordination across primary care, hospitals, and community services. However, gaps remain in ensuring equitable access, integrated care pathways, and effective support for family and informal caregivers. Innovation is urgently needed to move beyond fragmented, hospital-centered care models toward community-based, preventive, and person-centered approaches. Promising strategies include strengthening health literacy, deploying digital and telemonitoring tools, co-creating interventions with older adults and caregivers, and promoting active and healthy ageing through intersectoral collaboration.

This presentation will highlight the structural, demographic, and cultural factors shaping the ageing experience in Portugal, discuss ongoing reforms and their implications, and showcase innovative community-based initiatives. By addressing these challenges through integrated and participatory approaches, Portugal can better respond to the needs of its older population while building more resilient and sustainable health and social support systems.

Keywords: Ageing population, Health literacy, Integrated care.

LITERATURE:

Costa, A., Silva, A. R., Costa, D., & Sousa, P. (2023). Health literacy among older adults in Portugal and associated sociodemographic, health and healthcare-related factors. *International Journal of Environmental Research and Public Health*, 20(3), 2204. <https://doi.org/10.3390/ijerph20032204>

Lapão, L. V., Rocha, Á., & Gregório, J. (2021). Implementation of digital monitoring services during the COVID-19 pandemic: Portuguese primary health care context. *Journal of Medical Systems*, 45(8), 91. <https://doi.org/10.1007/s10916-021-01760-7>

Lopes, D. G., et al. (2023). Trajectories and determinants of ageing in Portugal. *BMC Public Health*, 23(1), 1429. <https://doi.org/10.1186/s12889-023-16370-8>

Peyroteo, M., Pimenta, C., & Lapão, L. V. (2025). Strategic scenarios for the digitalisation of chronic disease management in Portugal. *Technological Forecasting and Social Change*, 212, 122885. <https://doi.org/10.1016/j.techfore.2025.122885>

CONNECTING RESEARCH AND PRACTICE: IMPROVING THE QUALITY OF LIFE IN KIDNEY PATIENTS THROUGH PHYSICAL ACTIVITY

Maja PAJEK¹ and Špela BOGATAJ^{2,1}

¹Faculty of Sport, University of Ljubljana,

²University medical center, Ljubljana

Presenting author: Maja Pajek

INTRODUCTION: Due to the high prevalence of chronic kidney disease, the number of patients with end-stage renal disease requiring dialysis is steadily increasing. This patient group represents an excellent model for studying mobility impairments and deficits in health-related physical fitness among individuals with chronic non-communicable diseases.

METHODS: We performed observational and randomized controlled interventional trials in the field.

RESULTS: In our research, we found that the deficit in the 6-minute walk test attributable solely to dialysis dependence averaged 101.5 meters, after adjustment for multiple relevant variables, including body height, age, and body composition. Serum hemoglobin concentration, as long as it remains within the target range for mild anemia, does not significantly affect test performance, but it does have a statistically significant impact on the subjective perception of dyspnea during walking. When analyzing various physical fitness tests, we found that the sit-to-stand test was the most sensitive to the effects of kidney failure and showed the strongest association with daily functional ability in the home environment. Therefore, we propose its routine use for monitoring physical fitness in dialysis patients, alongside handgrip strength measurement. In general, dialysis patients exhibit the greatest deficits in balance, flexibility, and lower limb performance. Patients with sarcopenic obesity are particularly vulnerable, which is clinically important in preventing dependence on caregiver assistance. We also investigated approaches to improve current exercise interventions. At present, intradialytic cycling is the most widely used form of structured exercise in this population. Our findings show that adding supervised pre-dialysis functional exercise leads to greater improvements in physical fitness compared with intradialytic cycling alone. Moreover, patients successfully transferred the learned exercise routines to their home environment. When cognitive training was added to intradialytic exercise, we observed not only improvements in physical fitness but also in attention and spontaneous gait speed, preservation of brain-derived neurotrophic factor (BDNF) levels, and reduced frailty.

DISCUSSION: In addition to marked impairments in balance and flexibility, lower limb function is significantly compromised generally and especially so in dialysis patients with sarcopenic obesity, which is closely linked to the risk of developing dependency on caregiver assistance. The sit-to-stand test is therefore a valuable tool for monitoring this risk in daily clinical practice. Beyond intradialytic cycling, pre-dialysis functional exercise and cognitive training during dialysis offer effective, relatively simple, and accessible strategies to further enhance physical and cognitive functioning and improve quality of life in this patient group.

Keywords: health related physical fitness, end-stage renal disease, physical function tests, exercise intervention.

LITERATURE:

Bučar Pajek M, Čuk I, Leskošek B, Mlinšek G, Buturović Ponikvar J, Pajek J. (2016). Six-Minute Walk Test in Renal Failure Patients: Representative Results, Performance Analysis and Perceived Dyspnea Predictors. *PLoS One*, 16;11(3), e0150414.

Bučar Pajek M, Leskošek B, Vivoda T, Svilan K, Čuk I, Pajek J. (2016). Integrative Examination of Motor Abilities in Dialysis Patients and Selection of Tests for a Standardized Physical Function Assessment. *Ther Apher Dial*, 20(3), 286-94.

Bučar Pajek M, Pajek J. (2018). Characterization of deficits across the spectrum of motor abilities in dialysis patients and the impact of sarcopenic overweight and obesity. *Clin Nutr*, 37(3), 870-877.

Bogataj Š, Pajek J, Buturović Ponikvar J, Hadžić V, Pajek M. (2020). Kinesiologist-guided functional exercise in addition to intradialytic cycling program in end-stage kidney disease patients: a randomised controlled trial. *Sci Rep*, 10(1), 5717.

Bogataj Š, Pajek M, Mesarič KK, Kren A, Pajek J. (2023). Twelve weeks of combined physical and cognitive intradialytic training preserves alertness and improves gait speed: a randomized controlled trial. *Aging Clin Exp Res*, 35(10), 2119-2126.

Bogataj Š, Roelands B, Pajek M, Pajek J. (2024). Intradialytic cycling and cognitive training to mitigate decreased functional and physiological status in haemodialysis patients.

Nephrol Dial Transplant, 39(7), 1198-1200.

MOBILE BRAIN IMAGING IN EVERYDAY-LIKE TASKS: INSIGHTS INTO MOTOR–COGNITIVE INTERACTION IN AGING AND PARKINSON'S DISEASE

Robert STOJAN¹

¹Department of Movement Science, Institute of Sport Science,
Martin-Luther-University Halle-Wittenberg

Presenting author: Robert Stojan

Mobile brain imaging has opened exciting new possibilities for investigating how the brain supports complex motor–cognitive behaviour under conditions that closely resemble real life. By combining neuroimaging with motion capture, wearable sensors, and virtual environments, researchers can now study the neural mechanisms of walking, driving, and other everyday activities without restricting natural movement. Within this field, functional near-infrared spectroscopy (fNIRS) has proven particularly powerful. It allows monitoring of cortical hemodynamic activity during naturalistic movement and is relatively robust against physiological and non-physiological artefacts from bodily movements. fNIRS has therefore gained increasing attention for studying neurocognitive and neuromotor processes in ageing and disease.

In ageing and disease populations, investigating brain functional aspects of behavioural performance is especially important, as stable or non-differential behavioural outcomes between groups (e.g., younger vs. older adults) can conceal important neural mechanisms - such as differences in brain efficiency or the use of (in-)effective compensatory strategies. Training studies in particular benefit from this additional neuroimaging evidence, as it helps identify genuine markers of training success that might otherwise remain hidden behind unchanged performance outcomes. Previous findings from mobile brain imaging studies - many of them using fNIRS - suggest that neural efficiency can improve even when overt behaviour remains stable or declines, indicating reduced cortical effort for the same task demands. At the same time, the concept of functional compensation has received increasing attention, with growing evidence that it is more nuanced than previously assumed. Together, these insights highlight the added value of mobile brain imaging for understanding the functional bases of human movement and its interaction with cognitive processes, while advancing both basic science and clinical applications.

Building on these advances, the presentation will also introduce the ongoing EU InterregVI-funded project *Parkinson Vibrating Socks*. In this project, fNIRS and EEG are combined with virtual reality walking paradigms to investigate freezing of gait in Parkinson's disease, and the effectiveness of vibrotactile cueing to counteract freezing. Overall, this presentation emphasises how embedding neuroimaging into naturalistic settings allows us to uncover neural mechanisms underlying control of complex motor-cognitive behaviour in everyday life, opening new perspectives for both fundamental neuroscience and clinical translation.

Keywords: mobile brain imaging, functional near-infrared spectroscopy, virtual reality, everyday life motor-cognitive tasks, ageing and disease, neurocognitive and neuromotor ageing.

LITERATURE:

Cabeza, R., Albert, M., Belleville, S., Craik, F. I. M., Duarte, A., Grady, C. L., Lindenberger, U., Nyberg, L., Park, D. C., Reuter-Lorenz, P. A., Rugg, M. D., Steffener, J., & Rajah, M. N. (2018). Maintenance, reserve and compensation: The cognitive neuroscience of healthy ageing. *Nature Reviews Neuroscience*, 19(11), 701–710. <https://doi.org/10.1038/s41583-018-0068-2>.

Dehais, F., Karwowski, W., & Ayaz, H. (2020). Brain at work and in everyday life as the next frontier: Grand field challenges for neuroergonomics. *Frontiers in Neuroergonomics*, 1, 583733. <https://doi.org/10.3389/fnrgo.2020.583733>

Gramann, K., Ferris, D. P., Gwin, J., & Makeig, S. (2014). Imaging natural cognition in action. *International Journal of Psychophysiology*, 91(1), 22–29. <https://doi.org/10.1016/j.ijpsycho.2013.09.003>.

Marušić, U., Taube, W., Morrison, S. A., Biasutti, L., Grassi, B., De Pauw, K., Meeusen, R., Pisot, R., & Ruffieux, J. (2019). Aging effects on prefrontal cortex oxygenation in a posture–cognition dual task: A functional near infrared spectroscopy pilot study. *European Review of Aging and Physical Activity*, 16(1). <https://doi.org/10.1186/s11556-018-0209-7>.

Stojan, R., Mack, M., Bock, O., & Voelcker-Rehage, C. (2023). Inefficient frontal and parietal brain activation during dual task walking in a virtual environment in older adults. *NeuroImage*, 273, 120070. <https://doi.org/10.1016/j.neuroimage.2023.120070>

THE IMPACT OF SPORTS PARTICIPATION ON LONG-TERM HEALTH

Tatjana TRIVIĆ¹

¹Faculty of Sport and Physical Education, University of Novi Sad, Serbia

Presenting author: Tatjana Trivić

INTRODUCTION: Just a few decades ago, a noticeable discrepancy was observed between the interest of the professional and scientific communities in the psychological and physiological functioning of athletes during and after their sports careers. Since then, there has been a global increase in research addressing the adjustment of athletes to life after their sports careers. Engaging in high-intensity training and exercise during youth is associated with several health benefits later in life. Elite athletes train for many years to reach high-performance levels, and the removal of the sports training affects them both physiologically and psychologically. The general objective of the research is to determine the effects of long-term sports participation on the prevalence of metabolic syndrome (MetS).

METHODS: The of the presented study comprised 150 participants from Serbia, divided into two groups: 75 former athletes who had practiced combat sports and 75 former athletes of various other sports who did not practice RWL. The following parameters related to the MetS were evaluated: waist circumference, systolic blood pressure, diastolic blood pressure, lipid profile, fasting glucose, and oral glucose tolerance test (OGTT).

RESULTS: Within the RWL group, the most common individual MetS component was abdominal obesity (62.67%), followed by hypertension (54.67%, 53.33%), hypertriglyceridemia (38.67%), and hyperglycemia (37.33%). In the control group, the same pattern was observed, though at lower rates: abdominal obesity (60%), hypertriglyceridemia (29.33%), and hyperglycemia (26.67%). The metabolic syndrome parameters were significantly different between groups, confirming that former combat sport athletes who practiced RWL are at higher risk for developing MetS later in life.

DISCUSSION: Former athletes, while benefiting from a highly active lifestyle, are not immune to metabolic diseases like metabolic syndrome. Factors like intensive training, rapid weight loss, and post-retirement inactivity can increase the risk of these conditions. However, ongoing physical activity and healthy lifestyle choices are crucial for mitigating these risks. Public health interventions and collaboration with healthcare providers can effectively promote healthier lifestyles and healthy aging and prevent metabolic diseases.

LITERATURE:

Artioli GG, Gualano B, Franchini E, Scagliusi FB, Takesian M, Fuchs M, Antonio Herbert Lancha, JR. (2010). Prevalence, magnitude, and methods of rapid weight loss among judo competitors. *Medicine & Science in Sports & Exercise*, 42(3), 436-442.

Altowerqi ZM, bin Zainuddin ZA, Hashim HBM. (2020). Metabolic syndrome and its components in former athletes: a review. *International Journal of Psychosocial Rehabilitation*, 24(06), 8819-8835.

Altowerqi ZM, Zainuddin ZAB, Hashim AHBM, Almarwaey AO. (2020). Are former athletes protected against obesity after retirement. *Indian J Public Health Res Dev*, 11(02), 1995-2000.

Baranauskas M, Kupčiūnaitė I, Stukas R. (2022). The Association between Rapid Weight Loss and Body Composition in Elite Combat Sports Athletes. *Healthcare*, 10(4), 665.

Drid P, Figlioli F, Lakicevic N, Gentile A, Stajer V, Raskovic B, Bianco A. (2021). Patterns of rapid weight loss in elite sambo athletes. *BMC Sports Science, Medicine and Rehabilitation*, 13, 1-7.

APPLICATIONS OF VIRTUAL REALITY TO SUPPORT SPORTS ACTIVITY

Kerstin WITTE¹

¹Otto-von-Guericke-University, Institute III: Sports Science, Department of Sports Engineering and Movement Science, Magdeburg, Germany

Presenting author: Kerstin Witte

Sports Training in Virtual Reality

There is an increasing endeavor to use virtual reality (VR) technologies in sports training and to support sporting activities. VR offers many opportunities to visually support motor learning, training of visual perception, decision-making processes, and anticipation skills, as well as many sport-specific trainings. It has been shown that training in VR, although it is mostly based on visual perception, can be successful in many sports and sports areas. The following visualisation options are often used: different viewing perspectives, variation of the speed of movement shown, use of virtual mirrors, visualisation of only the necessary body parts, visual manipulation to identify important stimuli, representation of movement sequences and other graphic aids.

Motor learning

From the literature research by Witte et al. (2025), it is concluded that VR can be used in the motor learning of complex movements at the beginner level with visual aids, using visual feedback on posture and movement, using a virtual trainer for repeated visualisation and the three-dimensional visualisation of one's own movement at different speeds and perspectives. Pastel et al. (2022), which demonstrates the learning of a karate technique under VR conditions, show this in the study. Another example concerns learning gymnastic elements on a balance beam. Here, VR was used to simulate the height of the beam.

Anticipation

Some studies have shown that VR tools can also be used to train anticipation skills. This particularly applies to the following sports: boxing, softball, cricket, and karate. Two examples will be used to demonstrate this: boxing and karate kumite.

The use of virtual reality in nursing homes for people with dementia

To begin with, it should be stated that serious games can be used for people with dementia. The study by Prinz et al. (2025) was able to prove this and show that such games can be used to train balance and thus prevent falls. It has been established that a virtual environment has no influence on the motor, cognitive and emotional parameters of dementia patients. This should make it possible in future to use VR training tools specifically for people with dementia in order to increase their physical and cognitive activities.

Training and analysis of motor skills and abilities

Dual tasks present a particular challenge both in everyday life and in sport. This can also be trained in VR, as shown in the study by Pastel, Schwadtke et al. (2025) using the example of walking/dribbling and throwing a basketball with disturbance by an opponent. The fact that

certain motor skills and abilities can be trained and analysed in VR was demonstrated using the example of a jump and reach test, a reaction test and a parkour test.

Keywords: sports training, motor learning, motor skills and abilities, dual task.

LITERATURE:

Bürger, D., Ritter, Y., Pastel, S., Sprich, M., Lück, T., Hacke, M., Stucke, C., Witte, K. (2022). The impact of Virtual Reality Training on Learning Gymnastic Elements on a Balance Beam with simulated Height. *IJCSS – Volume 20/2021/Issue 2*. DOI: 10.2478/ijcss-2022-0005

Limballe, A., Kulpa, R., Vu, A., Mavromatis, M., Bennett, S.J. (2022). Virtual reality boxing: Gaze-contingent manipulation of stimulus properties using blur. *Front Psychol* 2022; 13:902043.

Pastel, S., Petri, K., Chen, Ch.-H., Wiegand Cáceres, A.M., Stirnatis, M., Schlotter, L. & Witte, K. (2022). Training in virtual reality enables learning of a complex sports movement. *Virtual Reality*. DOI: 10.1007/s10055-022-00679-7

Pastel, S., Schwadtke, A., Krahmer, A., Altrogge, K., Bürger, D., Heilmann, F., and Witte, K. (2025). Determining dual-task costs and exploring interindividual responsiveness to an opponent using virtual reality. *Front. Virtual Real.* 6:1523022. doi: 10.3389/frvir.2025.1523022

Prinz A, Buerger D, Krafft J, Bergmann M, Woll A, Barisch-Fritz B, Witte K. Use of Immersive Virtual Reality in Nursing Homes for People With Dementia: Feasibility Study to Assess Cognitive, Motor, and Emotional Responses. *JMIR XR Spatial Comput* 2024;1:e54724. doi: 10.2196/54724

Prinz, A., Orlowski, K., Beck, E., and Witte, K.(2025). Serious Games for Seniors with dementia - A pilot study. *Journal of Applied Gerontology* 2025, Vol. 0(0) 1–11. <https://doi.org/10.1177/07334648251350846>

Witte, K., Bürger, D., and Pastel, St. (2025). Sports Training in Virtual Reality with a Focus on Visual Perception: A Systematic Review. *Front. Sports Act. Living* 7:1530948. DOI: 10.3389/fspor.2025.1530948

Witte, K., Droste, M., Ritter, Y., Emmermacher, P., Masik, S., Bürger, D. and Petri, K. (2022), Sports training in virtual reality to improve response behavior in karate kumite with transfer to real world. *Front. Virtual Real.* 3:903021. DOI: 10.3389/frvir.2022.903021

FOSTERING HEALTHY LIFESTYLES: THE IMPACT OF PHYSICAL EDUCATION TEACHERS AT THE SCHOOL ENVIRONMENT

Augusto G. ZAPICO¹

¹Universidad Politécnica de Madrid/Department of Health and Human Performance, ImFINE Research Group

Presenting author: Augusto G. Zapico

The school setting plays a crucial role in shaping lifelong health habits, and Physical Education (PE) teachers are key agents in this process. Their influence extends beyond teaching sports skills; they foster environments that promote active, healthy lifestyles and reduce health inequalities from childhood.

One of the main challenges addressed is the alarming rise in sedentary behaviour, often referred to as the “pandemic of the 21st century.” Physical inactivity, poor nutrition, and inadequate sleep are major contributors to childhood obesity and chronic diseases. The National Strategic Plan for Reducing Childhood Obesity in Spain (PENROI) emphasizes the need for multisectoral action to ensure equitable access to healthy environments, particularly for socioeconomically vulnerable groups.

PE teachers have three core responsibilities:

- Develop Healthy Habits – Educate students on physical activity, nutrition, posture, and self-care.
- Promote Active Lifestyles – Serve as role models and encourage daily movement.
- Create Health-Promoting Environments – Engage in transformative projects within and beyond the classroom.

Curricular content in the Spanish law, as an example, includes teaching the benefits of regular physical activity, healthy eating, and critical thinking about misleading food advertising. Students learn to self-regulate exercise, understand ergonomics, and debunk myths about fitness and body image.

We highlight that WHO recommendations for children and adolescent, aged 5–17, should engage in at least 60 minutes of moderate-to-vigorous physical activity daily. However, data from our studies like PASOS, PESCA and ASOMAD reveal a decline in physical fitness and increased sedentary time, worsened by the COVID-19 pandemic.

To counter these trends, schools must implement comprehensive strategies:

- Active Classrooms – Incorporating movement into lessons beyond PE.
- Recreational Spaces – Designing playgrounds and schoolyards that encourage activity.
- Nutrition Programs – Promoting healthy breakfasts, reducing sugar and salt intake, and improving school meal quality.
- Interdisciplinary Projects – Linking physical activity with subjects like math and language.
- Active Transport Initiatives – Encouraging walking or cycling to school.

Ultimately, PE teachers are catalysts for cultural change, transforming schools into health-promoting environments. By combining education, environmental design, and community engagement, they can significantly improve students' physical, emotional, and social well-being, laying the foundation for healthier future generations.

Keywords: Physical Education, Healthy Lifestyles, Health-Promoting Environments, Sedentary Behavior, Active Schools.

LITERATURE:

Aznar, S., Jiménez-Zazo, F., Romero-Blanco, C., Gómez, S. F., Homs, C., Wärnberg, J., Zapico, A. G., ... Molina-García, J. (2024). Walkability and socio-economic status in relation to walking, playing and sports practice in a representative Spanish sample of youth: The PASOS study. *PLoS ONE*, 19(3), e0296816. doi:10.1371/journal.pone.0296816

García-Hermoso, A. (2024). Promotion of physical activity and health in the school setting. In *Springer*.

Nehari, A., Portals-Rioma, A., Quesada-González, C., Zapico, A. G., Gesteiro, E., & González-Gross, M. (2025). Overweight, obesity, and lifestyle behaviors in immigrants and native children in Madrid-ASOMAD study. *Nutrients*, 17(12), 2041. doi:10.3390/nu17122041

Portals-Rioma, A., Nehari, A., González-Gross, M., Quesada-González, C., Gesteiro, E., & Zapico, A. G. (2025). The hidden effects of lockdown on child health: Evidence from Madrid's ASOMAD study. *Sci*, 7(1), 25. doi:10.3390/sci7010025

Zarate-Osuna, F., Quesada-Gonzalez, C., Zapico, A. G., & Gonzalez-Gross, M. (2024). Overweight Prevalence Changes Before and After COVID-19 in Spain: The PESCA Program Longitudinal Outcomes 2018-2021. *Nutrients*, 16(23). doi:10.3390/nu16233993

**SCIENTIFIC PAPERS/
ZNANSTVENI PRISPEVKI**

PHYSIOTHERAPEUTIC INTERVENTION FOR CHILDREN WITH ACHONDROPLASIA AND ITS IMPACT ON THEIR GAIT – A PILOT STUDY

Miriam ANSCHÜTZ¹, Mareike HERGENRÖTHER², Katja PALM¹, Klaus MOHNIKE¹,
Kerstin WITTE²

¹Children's Hospital, Otto-von Guericke University Magdeburg

²Sports & Technology/ Human Movement Sciences, Otto-von Guericke University Magdeburg

Presenting author: Mareike Hergenröther

INTRODUCTION: Physiotherapeutic interventions are known to strengthen musculature, support posture, and improve gait across various populations. However, such interventions remain rare for individuals with dwarfism, especially with achondroplasia, and no studies to date have examined their effect on gait patterns. Achondroplasia, a genetic condition affecting approximately 1 in 25,000–30,000 births, is characterised by disproportionate short stature, with specific skeletal features such as increased anterior pelvic tilt and leg malalignments. These musculoskeletal differences often lead to physical challenges, including pain, fatigue, and reduced mobility, particularly in adolescence and adulthood. This study aims to develop and evaluate a targeted physiotherapeutic intervention to strengthen trunk and lower limb musculature and assess its impact on gait in individuals with achondroplasia.

METHODS: A six-month physiotherapeutic intervention program was developed under the guidance of an experienced physiotherapist. The program is designed for individuals aged 6–25 years, however in this part of the work only children are presented and includes video-guided sessions focusing on lower back and leg strength, proprioception, and body awareness. Participants are instructed to perform the exercises three times per week, with each session lasting 8–12 minutes. Gait analysis will be conducted pre-intervention, mid-intervention (after three months), and post-intervention using a 13-camera Vicon system (200 Hz) and integrated force plates (1000 Hz), employing a modified Plug-in Gait model. Kinematic and kinetic parameters of the lower body will be evaluated throughout the study as well as questionnaires about the well-being and the pain level of the participants with a focus on knee and back problems using the Young Spine Questionnaire and Lysholm Score as well as the score of the Screening Tool for Everyday Mobility.

PRELIMINARY STATUS: Recruitment is ongoing. To date, six children aged 6–11 have completed baseline gait analysis and begun the intervention starting in June 2025. It is aimed to gain preliminary results in September 2025 through mid-intervention measurements. A total sample size of at least 15 participants is targeted, with a focus on including also juvenile participants.

DISCUSSION: While no results are available yet, initial engagement has been promising. The subjective perceptive motivation of the participants is high, and preliminary orally feedback from guardians has been positive regarding the feasibility and acceptability of the program. This project addresses a critical gap in clinical practice and aims to contribute valuable insights into physiotherapeutic strategies for individuals with achondroplasia.

Keywords: physiotherapeutic intervention, achondroplasia, gait analysis, children, motion capture.

LITERATURE:

Broström, E. W., Antonissen, L., Heideken, J. von, Esbjörnsson, A.C., Hagenäs, L., & Naili, J. E. (2022). Gait in children with achondroplasia - a cross-sectional study on joint kinematics and kinetics. *BMC Musculoskeletal Disorders*, 23(1), 397. <https://doi.org/10.1186/s12891-022-05343-4>

Felix Stief, Harald Böhm, Katja Michel, Ansgar Schwirtz, & and Leonhard Döderlein. Reliability and Accuracy in Three-Dimensional Gait Analysis: a Comparison of Two Lower Body Protocols.

Merino-Andrés, J., García de Mateos-López, A., Damiano, D. L., & Sánchez-Sierra, A. (2022). Effect of muscle strength training in children and adolescents with spastic cerebral palsy: A systematic review and meta-analysis. *Clinical Rehabilitation*, 36(1), 4–14. <https://doi.org/10.1177/02692155211040199>

Pauli, R. M. (2019). Achondroplasia: A comprehensive clinical review. *Orphanet Journal of Rare Diseases*, 14(1), 1. <https://doi.org/10.1186/s13023-018-0972-6>

SPORT MOTIVATION OF JUNIOR FOOTBALLERS – WITH AN INTERNATIONAL OUTLOOK

Zalán Mihály BÁCS¹

¹University of Debrecen, Institute of Sport Science

Presenting author: Zalán Mihály Bács

INTRODUCTION: The primary aim of this research was to explore the motivational factors influencing junior footballers in Hungary and to compare the findings with international data. The study examined players at three competitive levels of the Hungarian youth football system: an amateur county team (DASE), a regional talent centre (DEAC), and a top-tier academy (DVSC-DLA). The research focused on identifying differences in motivation between age groups and competition levels, addressing questions such as: How do motivational patterns vary between players of the same age but different league levels? How do they differ across age groups within the same competition level? The study also examined the role of financial incentives, intrinsic versus extrinsic motivation, and the importance of academic studies among young footballers.

METHODS: A questionnaire-based survey was conducted using the Hungarian version of the Sport Motivation Scale (H-SMS; Paic et al., 2018). Data were collected from 117 respondents through targeted sampling. Participants completed the survey via QR codes distributed during team training sessions.

RESULTS: Findings indicate that Hungarian junior footballers are predominantly driven by introjected regulation—an internalized form of external motivation—followed by intrinsic motivation. Compared to Serbian/Montenegrin and Russian peers, Hungarian players demonstrate stronger extrinsic than intrinsic motives, although their level of amotivation is the lowest among these groups. Financial incentives were found to be particularly relevant at the academy level.

DISCUSSION: Overall, young players in Debrecen exhibit a healthy lifestyle and value education alongside sport, suggesting promising conditions for pursuing a dual career pathway.

Keywords: sports motivation, youth football, development.

LITERATURE

Paic, R., Kajos, A., Meszler, B., & Prisztóka, Gy. (2018). A magyar nyelvű Sport Motivációs Skála (H-SMS) validációja és eredményei [Validation and results of the Hungarian Sport Motivation Scale (H-SMS)]. *Magyar Pszichológiai Szemle*, 73(2), 159–182.

Pelletier, L. G., Rocchi, M. A., Vallerand, R. J., Deci, E. L., & Ryan, R. M. (2013). Validation of the revised Sport Motivation Scale (SMS-II). *Psychology of Sport and Exercise*, 14(3), 329–341. <https://doi.org/10.1016/j.psychsport.2012.12.002>

Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Tuson, K. M. (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The Sport Motivation Scale (SMS). *Journal of Sport and Exercise Psychology*, 17(1), 35–53.

FITBACK TOOLKIT: EMPOWERING PE TEACHERS TO ENHANCE STUDENTS' PHYSICAL LITERACY THROUGH FITNESS MONITORING

Sara BESAL¹, Nadja ČERNE¹, Bojan LESKOŠEK¹, Gregor JURAK¹

¹Faculty of Sport, University of Ljubljana, Ljubljana, Slovenia

Presenting author: Sara Besal

INTRODUCTION: The FitBack network is a leading European initiative supporting the development of physical fitness monitoring systems. In 2023, it launched the FitBack4Literacy (Fit4Lit) project to promote using physical fitness monitoring to enhance physical literacy among children and youth across Europe and beyond. Physical literacy encompasses the physical, social, cognitive, and emotional domain, encouraging individuals to embrace and maintain physical activity throughout their lives. The main goal of the project was to develop an open-access digital Toolkit for educators, coaches, and students, integrated into the FitBack platform. The Toolkit presents a variety of engaging scenarios and topics focused on physical literacy, physical fitness, and exercise, enriched with dynamic animations.

METHODS: The FitBack Toolkit is clearly and logically structured to guide users through its practical applications. It begins with real-life scenarios that illustrate how the Toolkit can be implemented across various educational and sport settings, followed by concise explanations of key concepts such as physical literacy, physical fitness, and exercise. The chapter on exercise introduces essential themes that bridge the gap between fitness assessment and the practical application of exercise to enhance physical fitness. These sections support educators and coaches in interpreting fitness data and using it to inform effective lesson planning and evidence-based training decisions. The site offers detailed guidance on how to assess various components of physical fitness and how to use these results to design exercise programs that support the development of physical literacy. To enhance understanding and engagement, special educational animations have been created, making the content both accessible and visually engaging for users.

RESULTS: After engaging with the FitBack Toolkit, by reading the materials and watching the educational animations, users gain a clear understanding of its practical value across multiple domains. The Toolkit supports the entire process: from conducting fitness testing and planning effective physical education lessons, to understanding the importance of feedback and designing individualized exercise interventions based on personal fitness goals. It also contributes to the implementation of broader strategies aimed at promoting physical fitness monitoring and enhancing physical literacy in fitness exercising. Serving as a comprehensive and evidence-based resource, the Toolkit empowers educators and coaches to make purposeful, data-driven decisions in physical education and sport-related practice. A recent enhancement of the Toolkit is the inclusion of subtitle translations in more than 16 world languages, significantly increasing its worldwide accessibility and usability for educators, coaches, and students from diverse cultural and linguistic backgrounds.

DISCUSSION: The FitBack digital Toolkit empowers PE teachers with a solid understanding of physical literacy and its close connection to physical fitness monitoring. Beyond that, it offers a practical and accessible resource to help foster a school culture that values and promotes

physical literacy. In doing so, it supports adolescents in developing the motivation, confidence, and competence for lifelong engagement in physical activity.

Keywords: FitBack, Toolkit, Physical Literacy, PE teachers, students.

LITERATURE:

FitBack. (n.d.). *Toolkit: Introduction*. Retrieved June 3, 2025, from <https://www.fitbackeurope.eu/en-us/Toolkit/Introduction>

SOCIO-PSYCHOLOGICAL FACTORS RELATED TO THE POTENTIAL RISK OF PSYCHOACTIVE SUBSTANCE USE AMONG PHYSICALLY ACTIVE STUDENTS AGED 17–24 IN AZERBAIJAN

Aynur R. BUNYATOVA¹

¹Department of Social Sciences, Azerbaijan Sport Academy, Azerbaijan

Presenting author: Anyur R. Bunyatova

INTRODUCTION: Although these students are regularly engaged in sports training, many remain vulnerable to risky behaviour due to emotional, environmental, and informational stressors. This is particularly concerning given the assumed protective effect of physical activity. Similar patterns have been reported internationally, including in Europe and North America, where young athletes also exhibit elevated levels of substance experimentation when emotional support is lacking. This study aims to examine socio-psychological factors related to the potential risk of psychoactive substance use among physically active students aged 17–24 at the Azerbaijan Sports Academy.

METHODS: The research was conducted as part of the National Program on Drug Prevention and Control (2019–2024), supported by the Azerbaijan National Anti-Doping Agency. A total of 1503 students completed a culturally adapted and psychometrically validated survey in October 2024. The instrument assessed behavioural risk, emotional resilience, peer influence, family conflict, perceived stress, and awareness of long-term health consequences. Quantitative data were analysed using descriptive and inferential statistics. Qualitative responses were thematically analysed, with particular attention to support figures such as coaches and peers.

RESULTS: Peer pressure, unresolved family issues, academic and athletic overload, and limited structured leisure were significant predictors of substance use. Over 30% of respondents reported low awareness of the psychological and physical risks associated with substance use, despite their engagement in health-focused activities. Coaches were rarely involved in education or dialogue on lifestyle health. A lack of coordinated mental health and prevention services was frequently reported.

DISCUSSION: Findings highlight the need for integrated prevention models that address student-athletes' psychological and social needs. Multi-level strategies should engage coaches, psychologists, educators, and peer mentors. Institutions must promote emotional literacy, stress regulation, and communication around health behaviours. These initiatives can bridge the gap between physical training and psychological resilience. Policy implications include embedding health education in athletic curricula and fostering collaboration among health, education, and sport institutions. The international relevance of these findings supports the global call for integrated mental health strategies within athletic environments.

Keywords: psychoactive substances, student athletes, prevention strategies, emotional risk, sports education, health behaviour.

LITERATURE:

Gustafsson H., Sagar S.S., & Stenling A. (2017). Fear of failure, psychological stress, and burn-out among adolescent athletes. *J Sports Sci*, 35(8), 718–726.

Ntoumanis N., Ng J.Y.Y., Barkoukis V., & Backhouse S. (2014). Personal and psychosocial predictors of doping use in physical activity settings. *Sports Med*, 44(11), 1603–1624.

Breslin, G., Shannon, S., Haughey, T., Donnelly, P., & Leavey, G. (2017). Mental health and well-being interventions in sport: a review. *Sport and Exercise Psychology Review*, 13(1), 25–36.

RAPID NEUROMUSCULAR ACTIVATION FOLLOWING BOX JUMPS: A POTENTIAL STRATEGY AGAINST SEDENTARY DECLINE

En-Yu CHANG¹, Chia-An HO¹, Pei-Hsuan WANG¹

¹Graduate Institute of Sports Science, National Taiwan Sport University, Taoyuan City, Taiwan

Presenting author: En-Yu Chang

INTRODUCTION: Prolonged sedentary behavior has been demonstrated to be associated with neuromuscular degeneration, consequently diminishing muscle responsiveness and elevating health risks. The present study aimed to investigate the acute effects of short-term plyometric jump exercises on neuromuscular characteristics, employing tensiomyography (TMG) as a non-invasive assessment tool.

METHODS: Eight healthy males (age: 19–25 years) were recruited to participate in this study. Each participant performed 12 consecutive plyometric box jumps at a height of 30 cm as a plyometric stimulus. Neuromuscular properties of the bilateral rectus femoris (RF) and biceps femoris (BF) muscles were assessed using tensiomyography (TMG S2, Slovenia) both prior to and immediately following the intervention. Measured parameters included delay time (Td), contraction time (Tc), relaxation time (Tr), sustain time (Ts), and maximum displacement (Dm). Statistical analyses were conducted using paired-sample t-tests with SPSS software (IBM Corp, New York, USA), and the significance level was set at $\alpha < .05$.

RESULTS: The results indicated significant decreases in muscle contraction-related parameters following plyometric box jump intervention. Specifically, the right rectus femoris (RF) exhibited significant reductions in delay time (Td decreased by 2.51 ms, $p = .009$) and contraction time (Tc decreased by 5.95 ms, $p = .041$). Similar outcomes were observed in both sides of the biceps femoris (BF): the right BF demonstrated significant decreases in Td (reduced by 4.35 ms, $p < .001$) and Tc (reduced by 9.71 ms, $p = .004$), while the left BF also showed significant reductions in Td (reduced by 1.99 ms, $p = .005$) and Tc (reduced by 8.42 ms, $p = .043$). No significant changes were found in relaxation time (Tr), sustain time (Ts), or maximum displacement (Dm) across most muscle groups.

DISCUSSION: The findings of this study demonstrate that brief plyometric box-jump exercise can acutely enhance muscular responsiveness, particularly with respect to temporal parameters related to explosive force production. Tensiomyography (TMG) effectively detected changes in muscle contraction characteristics, indicating its potential utility in monitoring athletic performance and promoting health. These results support the integration of short-duration, high-intensity jumping activities as a practical strategy to counteract sedentary lifestyles.

Keywords: Neuromuscular function, Tensiomyography, Plyometric Exercise.

LITERATURE:

Torres-Banduc, M., Chirisa-Ríos, L., Chirisa-Rios, I., & Jerez-Mayorga, D. (2024). Minimum effective plyometric training volume in sedentary individuals: Impact on lower limb viscoelas-

tic properties and functional performance in a randomised controlled trial. *Journal of Sports Sciences*, 42(19), 1794-1805.

Van Roie, E., Walker, S., Van Driessche, S., Delabastita, T., Vanwanseele, B., & Delecluse, C. (2020). An age-adapted plyometric exercise program improves dynamic strength, jump performance and functional capacity in older men either similarly or more than traditional resistance training. *PloS one*, 15(8), e0237921.

Martín-Rodríguez, S., Loturco, I., Hunter, A. M., Rodríguez-Ruiz, D., & Munguia-Izquierdo, D. (2017). Reliability and measurement error of tensiomyography to assess mechanical muscle function: A systematic review. *The Journal of Strength & Conditioning Research*, 31(12), 3524-3536.

THE POTENTIAL OF SEDENTARY METER IN EVERYDAY LIFE

Ana CIKAČ¹ and Saša PIŠOT¹

¹Science and Research Centre Koper, Institute for Kinesiology Research, Koper, Slovenia

Presenting author: Ana Cikač

INTRODUCTION: Everyday life is often taken for granted and characterised by the repetition of daily practises, making it difficult to change routines and habits, even if they pose long-term health risks. Sedentary behaviour (SB), one of the biggest global health threats, increases the likelihood of chronic diseases. In a pilot study, the *Sedentary Meter* tool was developed and publicly disseminated in the form of a quiz to measure SB and raise awareness of health risks. Although the World Health Organisation (WHO) has issued recommendations and guidelines for reducing SB, these are too general and not specific enough for effective implementation. The aim of this study is to theoretically explore the potential of the *Sedentary Meter* as a tool to promote positive sedentary-related behaviours and to encourage healthier everyday practices.

METHODS: Interventions aimed at sustainable health improvement are more effective when they are based on established behavioural theories and grounded in the principles of implementation science, which increases their relevance and practical applicability. In this context, a theoretical analysis of the potential of the *Sedentary Meter* as an intervention tool was conducted based on a review of selected literature from the fields of Implementation Science and Behavioural Theories.

RESULTS: Theoretical analysis shows that there are highly complex processes behind changing routines and habits that should not be oversimplified. It is important to consider both the individual and the systemic level, as personal behaviours and the wider social environment are interdependent and mutually reinforcing. It was found that the *Sedentary Meter*, with certain improvements, has the potential to become an intervention tool to promote positive health-related behaviours. Improvements on the individual level could be supported by social cognitive theory. The systemic level (organisation, community and public policy) could be developed on the basis of the socio-ecological model. An example of the integration of both levels is the ecological model of SB, which focuses on the construct of behavioural settings to account for the multiple determinants operating in the environments where SB is most prevalent.

DISCUSSION: The *Sedentary Meter* has the potential to become a practical, easily accessible tool to raise awareness of specific daily SB. Existing recommendations for reducing SB are not specific enough for effective implementation in everyday life. By providing personalised feedback based on individual routines, the *Sedentary Meter* helps to translate potential health risks into concrete behaviours. Within the ecological model of SB, which focuses on multilevel determinants, the tool can identify high-risk behavioural settings and promote individual change. Theoretical analysis suggests that its impact can be enhanced by behavioural approaches. If further developed and integrated into public health strategies, it could significantly help to reduce SB and potentially improve societal well-being.

Keywords: Sedentary behavior, Sedentary Meter, behavioural theories, implementation science

LITERATURE:

Cikač, A., Teraž, K., & Pišot, S. (2024). Subjective assessment of sedentary behavior between theory and practice: Pilot study using the "Sedentary meter". *Exercise and Quality of Life*, 16(2), 25–32. <https://doi.org/10.31382/eqol.241204>

Glanz, K., & Bishop, D. B. (2010). The Role of Behavioral Science Theory in Development and Implementation of Public Health Interventions. *Annual Review of Public Health*, 31(1), 399–418. <https://doi.org/10.1146/annurev.publhealth.012809.103604>

May, C. R., Mair, F., Finch, T., MacFarlane, A., Dowrick, C., Treweek, S., Rapley, T., Ballini, L., Ong, B. N., Rogers, A., Murray, E., Elwyn, G., Légaré, F., Gunn, J., & Montori, V. M. (2009). Development of a theory of implementation and integration: Normalization Process Theory. *Implementation Science*, 4(1), 29. <https://doi.org/10.1186/1748-5908-4-29>

Nastran-Ule, M., Kamin, T., & Švab, A. (Eds.). (2018). *Zasebno je politično: Kritične teorije vsakdanjega življenja*. Fakulteta za družbene vede, Založba FDV.

Owen, N., Sugiyama, T., Eakin, E. E., Gardiner, P. A., Tremblay, M. S., & Sallis, J. F. (2011). Adults' Sedentary Behavior. *American Journal of Preventive Medicine*, 41(2), 189–196. <https://doi.org/10.1016/j.amepre.2011.05.013>

TISSUE AND CIRCULATING LOAD-SENSITIVE MUSCULOSKELETAL BIOMARKERS IN A 6° HEAD-DOWN BED-REST MODEL OF SIMULATED MICROGRAVITY (BIOMUSK)

Graziana COLAIANNI¹, Angela ORANGER¹, Onofrio TERREVOLI¹, Luisa PELLICANI², Patrizia PIGNATARO², Clelia SURIANO², Francesca FERRANTI³, Uroš MARUŠIČ⁴, Bostjan SIMUNIC⁴, Rado PISOT⁴, Marco NARICI⁵, Silvia COLUCCI², Maria GRANO¹

¹Department of Precision and Regenerative Medicine and Ionian Area, University of Bari, Bari, Italy

²Department of Translational Biomedicine and Neuroscience, University of Bari, Bari, Italy

³Italian Space Agency (ASI), Rome, Italy.

⁴Institute of Kinesiology Research, Science and Research Centre, Koper, Slovenia

⁵Department of Biomedical Sciences, University of Padova, Padova, Italy

Presenting author: Graziana Colaianni

INTRODUCTION: Irisin, a myokine produced by skeletal muscle during physical activity, is widely recognized for its positive effect on health through pleiotropic effects. We have demonstrated that in animal models irisin and its precursor, the Fibronectin type III domain-containing protein 5 (FNDC5), are negatively affected by unloading. In our previous human BED REST (BR) study, we showed that after 10-day horizontal BR serum irisin levels were significantly reduced. Furthermore, the expression of the muscle atrophy marker, muscle ring finger-1 (*MuRF1*), was significantly lower in subjects with higher serum irisin levels, suggesting that this myokine may prevent the onset of muscle atrophy. By means of the NASA Task Load Index, we also found that in BR subjects with decreased irisin, mental demand and perceived time pressure were elevated, indicating that maintaining high irisin levels could be a countermeasure to help astronauts cope with mental stress and time pressure during space missions. Based on these results, in the current BIOMUSK project, related to the Italian Space Agency's ongoing BED REST campaign, we aim to identify the FNDC5/irisin system as a biomarker of musculoskeletal changes in a 6° head-down BR model that better simulates the inactivity associated with microgravity and the shift of fluids to the upper body experienced by astronauts during space flights. In addition, we intend to analyse irisin levels in saliva samples that could represent an alternative measurement method to blood sampling.

METHODS: Irisin concentration in serum, urine and saliva samples will be measured using a competitive ELISA kit, in parallel with other biomarkers involved in musculoskeletal tissue metabolism and inflammation. Muscle biopsy samples will be used for gene expression analysis of molecular markers and for the histological analysis of skeletal muscle. Immunohistochemistry will be performed to quantify the expression of FNDC5. Irisin serum levels will be correlated to results from the psychological questionnaires.

EXPECTED RESULTS: The BIOMUSK project aims to validate FNDC5 and irisin as load-sensitive musculoskeletal biomarkers in the human model of simulated microgravity. We expect that BR subjects with high levels of FNDC5 or circulating irisin will be protected from the development of muscle atrophy and osteopenia. Finally, we expect that in subjects undergoing BR there will be an inverse correlation between irisin and states of anxiety and depression.

DISCUSSION: By identifying irisin as a load-sensitive musculoskeletal biomarker, it could represent an early prognostic marker of muscle atrophy and bone loss associated with mechanical unloading. Furthermore, in the future, irisin could also become a food supplement for the prevention of musculoskeletal decline, not only limited to astronauts or BR individuals, but also to sarcopenic and osteoporotic patients and people who are bedridden, wheelchair-bound, or have mobility difficulties.

Keywords: irisin, FNDC5, microgravity, muscle atrophy, osteoporosis

LITERATURE:

Colaïanni G, et al. (2017). Irisin prevents and restores bone loss and muscle atrophy in hind-limb suspended mice. *Sci Rep.*, 7(1):2811.

Oranger A, et al. (2023). Impact of 10-day bed rest on serum levels of irisin and markers of musculoskeletal metabolism. *FASEB J.*, 37(1):e22668.

Sanesi L, et al. (2023). Time-dependent unloading effects on muscle and bone and involvement of FNDC5/irisin axis. *NPJ Microgravity*, 9(1):4.

Sanesi L, et al. (2025). Irisin Prevents the Effects of Simulated Microgravity on Bone and Muscle Differentiation Markers. *FASEB Bioadv.*, 7(7):e70032.

SEX DIFFERENCES AND PERFORMANCE EVALUATION IN PRESCHOOL ATHLETIC EVENTS: A STUDY FROM THE OLYMPIC FESTIVAL OF KINDERGARTENS IN CROATIA

Josip CVENIĆ¹

¹Faculty of kinesiology, University of Osijek, Osijek, Croatia

Presenting author: Josip Cvenić

INTRODUCTION: In 2002, the Croatian Olympic Committee, through the Office for Local Sport, launched the Olympic Festival of Kindergartens, a national event aimed at involving preschool children in sports activities. All kindergartens in the Republic of Croatia are eligible to participate. The Festival is held annually in May and brings together over 15,000 children from across the country. Under the slogan "I will be an Olympian too," the event promotes core Olympic values—friendship, respect for diversity, non-violence, and fair play—while simultaneously encouraging regular physical activity among children. Through participation in preparation and competition, children develop motor and functional abilities, which positively influence their proper growth, development, and overall health. The project also holds significant educational value, using sport as a tool to foster the balanced development of children's intellectual, emotional, and physical abilities. The goals of this research are: 1. to establish quantitative values of pre-school children in three athletic disciplines; 2. to determine the gender differences in all of the observed events and 3. to suggest marks for the evaluation of pre-school children's results in three athletic disciplines.

METHODS: Preschool boys and girls, with an average age of six, from kindergartens in Osijek-Baranja County, participated in this study. The participants competed in three athletic disciplines: standing long jump, 50-m sprint and throwing the ball (tennis ball) within the Olympic Festival of Kindergartens from 2007 to 2017. The sample consisted of 60 boys and 60 girls (best 10 results from 6 different events). Basic descriptive statistics were calculated for all variables. Sex differences in performance were assessed using the independent samples t-test. Individual results in each discipline were further evaluated using frequency tables and diagrams, dividing performance scores into five categories. These were graded on a scale from excellent (5) to poor (1), allowing for a standardized assessment of achievement levels. All statistical analyses were performed using the STATISTICA for Windows, version 14.1.0.8.

RESULTS: The results across all analyzed variables indicate that boys achieved higher average scores than girls. These findings are consistent with previous studies concerning sex-based differences in dynamic strength during early childhood. The most pronounced difference was observed in the tennis ball throw discipline. The superior performance of boys in this variable may be attributed to morphological differences typical for six-year-olds, as suggested in earlier research. Boys at this age generally exhibit greater upper body strength and coordination, which are critical for throwing tasks. Analysis using the independent samples t-test revealed statistically significant sex differences in two out of the three disciplines. However, in the standing long jump, the difference between boys and girls was not statistically significant, indicating comparable performance between sex differences in this specific motor task.

Table 1.

	N	AS	MIN	MAX	SD	SKEW	KURT	K-S D	t-value
	60	10,09	8,57	11,08	0,53	-0,75	0,33	0,10	
50(M)	60	9,88	8,36	11,00	0,58	-0,07	-0,25	0,07	0.04
	60	13,08	8,35	23,60	4,00	1,02	0,02	0,20	
BL(M)	60	19,78	9,00	39,33	6,89	1,02	0,37	0,16	0.00
	60	1,39	1,05	1,98	0,17	1,11	2,14	0,11	
SD(M)	60	1,41	1,20	1,96	0,17	1,08	0,45	0,15	0.49

DISCUSSION: The lower performance of girls in the tennis ball throw may be attributed to the complexity of the movement pattern, which requires coordination of the entire body. It can be assumed that in such movements, girls are more influenced by informational (neuromotor control) factors than by energetic (strength-related) factors, leading to reduced throwing efficiency. The broad range of minimum and maximum values observed across all disciplines highlights considerable variability in children's performance, suggesting challenges in consistently measuring motor achievements at this age. This variability may also be partly explained by early involvement in structured sports programs, with some children beginning as early as age four in certain preschool institutions.

These findings support the conclusion that children who engage in regular physical activity from an early age demonstrate higher motor proficiency compared to peers who are not involved in organized physical training. The proposed evaluation scale (marks) may serve as a valuable tool for kindergarten teachers and kinesiology professionals working in preschool settings, enabling comparisons of boys' and girls' performance during preparation for participation in the Festival. Furthermore, the use of point-based assessments, coupled with informing parents and children about specific motor tasks and the abilities being developed, can positively influence both children's motivation and parental engagement. Ultimately, this approach may contribute to promoting long-term participation in physical activity and sport from an early age.

Keywords: evaluation, standing long jump, throwing ball, 50m sprint.

LITERATURE:

Babić V, Caput-Jogunica R, Jelovčić I, De Privitellio S. (2008). Vrednovanje natjecateljske aktivnosti djece u atletskim disciplinama olimpijskog Festivala dječjih vrtića. Hrvatski športskomedicinski vjesnik, 23 (1), 25-29.

Cvenić, J. (2009). Vrednovanje rezultata 6. državnog olimpijskog festivala dječjih vrtića Republike Hrvatske u Rijeci 2007. Metodički organizacijski oblici rada u područjima edukacije, sporta, sportske rekreacije i kineziterapije. Zagreb: Hrvatski kineziološki savez (HKS), 396-399.

De Privitellio S, Babić V, Caput-Jogunica R. (2007). Olimpijski festival dječjih vrtića u Hrvatskoj; prijedlog nove discipline u atletici. U: Bala G, ur. Antropološki status i fizička aktivnost dece i omladine. Novi Sad Univerzitet u Novom Sadu Fakultet sporta i fizičkog vaspitanja, 309-317.

TRAVELLING FOR HEALTH: RETHINKING TOURISM IN THE ERA OF ACTIVE AGEING

Goran DANKOVIC¹, Andjelina MARIC STANKOVIC², Marija BRATIC², Danijel PAVLOVIC³

¹Faculty of Sports and Physical Education, University of Nis, Serbia,

²Department of Geography and Tourism, Faculty of Science and Mathematics, University of Nis, Serbia,

³Academy of Hospitality, Tourism and Wellness, Belgrade, Serbia

Presenting author: Andjelina Marić Stanković

Silver tourism in Serbia is emerging as a key tool for promoting healthy ageing and boosting domestic tourism. Based on a survey conducted in January and February 2025, this study explores the motivations, travel habits, and barriers faced by individuals over 65. Health and relaxation are the main travel drivers, while financial constraints, chronic illnesses, and lack of tailored services are the key barriers. The paper emphasizes the need for accessible, health-oriented tourism products and integration into public health strategies.

INTRODUCTION: Health tourism, an essential part of active ageing, promotes physical, mental health, and social inclusion. Spa and recreational tourism improve quality of life, mobility, and social interaction. In Serbia, participation by those over 65 is limited due to health, financial, and organizational barriers. Active ageing aims to extend healthy life expectancy, and the COVID-19 pandemic has worsened travel challenges. Accessible products, like subsidies, are essential.

METHODS: A mixed-methods approach was used, combining surveys and interviews with 310 participants, stratified by age group. The analysis covers demographic data, tourism preferences, and barriers, supplemented by in-depth interviews.

RESULTS: Older adults in Serbia engage in moderate recreational activities, with 30.3% active on weekends and 25.5% daily. Popular activities include walking (52.1%), sports, socializing, and reading. Only 36.4% travel regularly, with 63.3% preferring domestic destinations. Main travel motivations are rest (35.9%) and health (32.2%). Barriers include financial issues (48.9%) and health concerns (27.4%).

DISCUSSION: Financial difficulties, health, and family obligations are the primary travel barriers. Post-pandemic, interest in domestic tourism, especially weekend trips and spas, has risen. Tailored tourism products, better infrastructure, and market segmentation can improve offerings. This research highlights silver tourism's role in active ageing and stresses the need for age-friendly services and continued policy support in Serbia.

Keywords: healthy ageing, health tourism, Serbia, seniors as tourists, wellness and spa tourism.

LITERATURE:

Taloş, A. M., Lequeux-Dincă, A. I., Preda, M., Surugiu, C., Mareci, A., & Vijulie, I. (2021). Silver Tourism and Recreational Activities as Possible Factors to Support Active Ageing and the Resilience of the Tourism Sector. *Journal of Settlements & Spatial Planning*. Channer

Channer, N. S., Hartt, M., & Biglieri, S. (2020). Aging-in-place and the spatial distribution of older adult vulnerability in Canada. *Applied Geography*, 125, 102357. DOI: <https://doi.org/10.1016/j.apgeog.2020.102357>.

Buzulukova, E., & Lobova, E. (2023). Stimulating the growth of “silver” tourism through the development of relationships and the creation of targeted communications with travellers. *Population and Economics*, 7(4), 103-123.

Fernández Tschuikin, J. E., Robaina Calderín, L., & Melián Alzola, L. (2024). The Role of Information Technologies in Silver Tourism.

Kežman, M., & Goriup, J. (2022). Factors affecting tourism activity selection among silver hair tourists. *Academica Turistica-Tourism and Innovation Journal*, 15(3).

THE EFFECT OF INDIVIDUALIZED HIGH-VELOCITY RESISTANCE TRAINING ON FUNCTIONAL, NEUROMUSCULAR ADAPTATION, AND HEALTH OUTCOMES IN OLDER ADULTS

Itai HAR-NIR¹, Ayelet DUNSKY², Jana PELCLOVÁ¹

¹Palatcký University Olomouc, Czech Republic

²Levinsky-Wingate Academic College, Israel

Presenting author: Itai Har-Nir

INTRODUCTION: The world population is ageing, presenting many health challenges related to declines in muscle mass, strength, and power. Muscle power, regarded as a crucial component positively influencing functional performance- especially in balance perturbations- and well-being among older adults, is the product of Force * Velocity. Although improving muscle power through resistance training shows excellent promises in healthy and frail populations, the exact prescriptions and individualized power training loads remain unclear. Previous research in young adults and athletes showed that prescribing power training loads according to individual load-velocity curve characteristics might be more effective than using a generalized loading scheme (e.g., % of 1RM). However, findings in older adults may differ due to limited training protocols and equipment. The main aims of this Doctoral thesis are 1. to evaluate the neuromuscular responses to individualized power training prescription; 2. to assess the ability of functional tests to identify the promised benefits of Power training, and 3. to identify interaction between the proposed training protocol and health-related behavioral outcomes.

METHODS: A randomized controlled trial will be conducted with 80 healthy subjects aged 65-75. After the familiarization phase, subjects will be divided into three resistance training groups: 1. maximal velocity with loads adjusted by percentage of repetition maximum. 2. maximal velocity with loads adjusted by individual load-velocity curve (e.g. prone to "slow" or "weak" individuals) and 3. a control group which will perform traditional resistance training. All subjects will undergo a Short Physical Performance Battery testing and force velocity curve analysis (Smith Machine Bench press & Squat). Moreover, approximately 10 subjects from each group will undergo neurophysiological and morphological testing (Surface Electromyography, Dual X-ray Analysis, and Ultrasound). Furthermore, each subject will complete quality of life and fear of falling questioners, which will be used alongside a 24-hour physical behavior pattern.

EXPECTED RESULTS: It is anticipated that power training based on load-velocity will be superior in improving functional capabilities, neuromuscular adaptation, and health outcomes in older adults compared to the traditional training program. The current study's results might refine training prescription and clarify the neuromuscular and morphological adaptation characteristics needed to improve functional capacity and resist external balance perturbation.

Keywords: Load-Velocity, Resistance training, Power, Older-Adults.

LITERATURE:

el Hadouchi, M., Kiers, H., & de Vries, R. (2022). Effectiveness of power training compared to strength training in older adults: A systematic review and meta-analysis. *Eur Rev Aging Phys Act*, 19(1), 18. <https://doi.org/10.1186/s11556-022-00297-x>

Raj, I. S., Bird, S. R., & Shield, A. J. (2010). Aging and the force–velocity relationship of muscles. *Exp Gerontol*, 45(2), 81-90. <https://doi.org/10.1016/j.exger.2009.11.003>

Petrella, J. K., Kim, J.-S., Tuggle, S. C., Hall, M. L., & Bamman, M. M. (2007). Contributions of force and velocity to improved power with progressive resistance training in young and older adults. *Eur J Appl Physiol*, 99(4), 343-351. <https://doi.org/10.1007/s00421-006-0353-z>

Simpkins, C., & Yang, F. (2022). Muscle power is more important than strength in preventing falls in community-dwelling older adults. *J Biomech*, 134, 111018. <https://doi.org/10.1016/j.jbiomech.2022.111018>

Izquierdo, M., Barreto, P. S., Arai, H., Bischoff-Ferrari, H. A., Cadore, E. L., Cesari, M., ... Fiatarone Singh, M. A. (2025). Global consensus on optimal exercise recommendations for enhancing healthy longevity in older adults (ICFSR). *J Nutr Health Aging*, 29(1), 100401. <https://doi.org/10.1016/j.jnha.2024.100401>

DEVELOPMENT OF VO₂MAX PREDICTION MODELS USING A SPECIFIC 35-CM STEP TEST IN TAIWANESE ADULTS

Chia-An HO¹, Hei-Tung LAU¹, Pei-Hsuan WANG¹, Chin-Shan HO¹

¹Graduate Institute of Sports Science, National Taiwan Sport University, Taoyuan City, Taiwan

Presenting author: Chia-An Ho

INTRODUCTION: Maximal oxygen uptake is a key indicator of cardiorespiratory fitness and is closely linked to cardiovascular health, aging, and exercise capacity. However, direct measurement requires specialized equipment and maximal effort, making it impractical in many health settings. To address this limitation, submaximal exercise tests such as the step test offer a safe, efficient, and low-cost alternative. The step test is particularly suitable for diverse populations due to its simplicity and minimal equipment requirements. By analyzing heart rate responses during and after the test, this study aims to develop accurate predictive models of maximal oxygen uptake. In particular, unlike the conventional 30-cm step tests reported in prior studies, our protocol adopted a 35-cm step height based on the guideline of the Taiwan Sports Administration, which has not been applied in international VO₂max prediction research. These models are intended to provide practical tools for health monitoring, exercise prescription, and chronic disease management.

METHODS: Two hundred healthy adults aged 20 to 64 years participated in this study. Each participant completed both a maximal oxygen uptake test using a cycle ergometer and a three-minute step test. Heart rate during the step test was measured using a chest-worn heart rate monitor. Body composition, including percentage of body fat and body mass index, was assessed using a body composition analyzer. Participants' resting heart rate and heart rate during and after the step test were recorded at specific time points to capture cardiovascular responses. Based on the collected data, six predictive models were developed using multiple linear regression. The models incorporated combinations of age, sex, body composition, resting heart rate, and heart rate during the step test. The accuracy of each model was evaluated using explained variance and standard error. Cross-validation was applied to examine the models' stability and predictive performance.

RESULTS: Six prediction models were developed based on combinations of age, sex, body composition, resting heart rate, and step test heart rate responses. Among the models using body mass index, the most accurate model reached a coefficient of determination of 0.651 and a standard error of 4.99 milliliters per kilogram per minute. In contrast, the most accurate model using percentage of body fat achieved a higher explained variance of 0.689 and a lower standard error of 4.70 milliliters per kilogram per minute. Cross-validation confirmed that the differences between measured and predicted values were minimal across subgroups. These findings indicate that heart rate during and after the step test, when combined with appropriate body composition indicators, can significantly enhance the precision of maximal oxygen uptake prediction.

DISCUSSION: This study developed practical and accurate models for estimating maximal oxygen uptake using simple step test responses and basic physical information. Additionally, this work provides the first VO₂max prediction models developed using a 35-cm step test protocol, specifically validated in Taiwanese healthy adults, thereby offering both a novel

step height and a localized, population-specific tool. Among the six models, those using percentage of body fat showed higher predictive accuracy than models using body mass index. These findings highlight the importance of selecting appropriate body composition indicators when assessing cardiorespiratory fitness. The proposed models offer a low-cost and accessible solution for evaluating fitness in adults, especially in primary healthcare, cardiac rehabilitation, or home-based health monitoring settings. The step test protocol requires minimal space and equipment, making it suitable for large-scale fitness screening or remote evaluation. Individuals or clinicians can choose from simplified or more detailed models depending on resource availability, allowing flexible application across different populations. Overall, the models provide a reliable and scalable tool for promoting self-awareness and management of cardiovascular fitness in everyday environments.

Keywords: step-based fitness assessment, non-invasive health monitoring, predictive exercise modeling.

LITERATURE:

Ross, R, Blair, SN, Arena, R, et al. Importance of assessing cardiorespiratory fitness in clinical practice: a case for fitness as a clinical vital sign: a scientific statement from the American Heart Association. *Circulation*. 2016; 134(24): e653-e699.

Hong, SH, Yang, HI, Kim, DI, et al. Validation of submaximal step tests and the 6-min walk test for predicting maximal oxygen consumption in young and healthy participants. *International journal of environmental research and public health* 2019; 16(23): 4858.

Lee, O, Lee, S, Kang, M, et al. Prediction of maximal oxygen consumption using the Young Men's Christian Association-step test in Korean adults. *European Journal of Applied Physiology* 2019; 119: 1245-1252.

Li, F, Chang, CH, Ho, CA, et al. The Determination of Step Frequency in 3-min Incremental Step-in-Place Tests for Predicting Maximal Oxygen Uptake from Heart Rate Response in Taiwanese Adults. *International Journal of Environmental Research and Public Health* 2022; 19(1): 563.

Li, F, Chang, CH, Chung, YC, et al. Development and Validation of 3 Min Incremental Step-In-Place Test for Predicting Maximal Oxygen Uptake in Home Settings: A Submaximal Exercise Study to Assess Cardiorespiratory Fitness. *International Journal of Environmental Research and Public Health* 2021; 18(20): 10750.

ENHANCING LEARNING MOTIVATION THROUGH PROBLEM-BASED INSTRUCTION AND MOTIVATIONAL DESIGN IN ELEMENTARY PHYSICAL EDUCATION

Mei-Yao HUANG¹, Yung-Kuan HUANG² and Yueh-Er CHEN²

¹Graduate Institute of Physical Education, National Taiwan Sport University, Taiwan

²Department of Sport Promotion, National Taiwan Sport University, Taiwan

Presenting author: Mei-Yao Huang

INTRODUCTION: Learning motivation is a crucial role in determining student engagement and achievement in physical education. Although problem-based learning and motivational design models have been proposed to enhance learning motivation, empirical research on their combined effects in elementary physical education remains limited. This study aimed to rigorously evaluate the impact of an integrated problem-based learning and motivational design intervention on students' learning motivation using a quasi-experimental approach.

METHODS: A total of 64 fifth-grade students from two classes in a public elementary school in northern Taiwan participated. One class was assigned as the experimental group ($n = 32$), and the other as the control group ($n = 32$). The experimental group received a six-week intervention integrating problem-based learning with motivational design based on the ARCS model, while the control group received traditional direct instruction. The PBL activities in physical education involved students collaboratively solving movement-based challenges and designing game strategies, with ARCS elements applied to sustain Attention through engaging tasks, ensure Relevance by connecting skills to daily physical activity, build Confidence via progressive skill development, and foster Satisfaction through successful task completion and peer feedback. Teachers in the experimental group received prior training on PBL and ARCS-based motivational strategies to ensure consistent and effective delivery. Learning motivation was assessed pre- and post-intervention using the validated ARCS Learning Motivation Scale, which measures Attention, Relevance, Confidence, and Satisfaction. Data were analyzed using paired-sample and independent-sample t-tests to evaluate within-group changes and between-group differences.

RESULTS: Results demonstrated significant increases in all four motivation dimensions in the experimental group after intervention ($p < 0.05$), whereas the control group showed significant declines ($p < 0.05$). Between-group comparisons indicated that the experimental group outperformed the control group significantly across all dimensions at post-test ($p < 0.01$), confirming the effectiveness of the intervention in enhancing learning motivation.

DISCUSSION: This study provides empirical support for the efficacy of combining problem-based learning with motivational design in improving elementary students' motivation in physical education. The findings contribute to the theoretical understanding of motivation-enhancing instructional strategies and offer evidence-based implications for curriculum design. Future research should explore longitudinal effects and underlying psychological mechanisms to further advance the field.

Keywords: elementary physical education, intervention, Student-Centered Learning

LITERATURE:

Chung, J. C. C., & Chow, S. M. K. (2004). Promoting student learning through a student-centered problem-based learning subject curriculum. *Innovations in Education and Teaching International*, 41(2), 157-168.

Glen, S., & Wilkie, K. (2000). *Problem-based learning in nursing: A new model for a new context*. Basingstoke: Macmillan.

Keller, J. M. (1991). ARCS model modifications. Unpublished manuscript, Florida State University, Tallahassee, FL.

Keller, J. M. (1999). *Motivation by design*. Unpublished manuscript, Florida State University.

Siu, H. M., Laschinger, H. K. S., & Vingilis, E. (2005). The effect of problem-based learning on nursing students' perceptions of empowerment. *Journal of Nursing Education*, 44(10), 459-469.

DIFFERENCE IN ACUTE RESPONSES OF MICROVASCULAR REACTIVITY AND ARTERIAL STIFFNESS TO MODERATE-INTENSITY AND HIGH-INTENSITY INTERVAL TRAINING: A PILOT STUDY

Simon ISKRA¹, Gašper TURNŠEK¹, Kristina DROLE¹, Armin PARAVLIĆ^{1,2,3}

¹University of Ljubljana, Faculty of Sport

²Science and Research Centre Koper, Institute for Kinesiology Research, Koper, Slovenia

³Faculty of Sports Studies, Incubator of Kinanthropology Research, Masaryk University, Brno

Presenting author: Simon Iskra

INTRODUCTION: This pilot study aimed to determine the reliability and validity of different measures of vascular function, as well as the difference in acute response of these measures to moderate and high-intensity aerobic exercise.

METHODS: Ten healthy, physically active, normotensive participants (5M/5F, age: 24 ± 3 y) performed three visits on separate days that included different conditions: visit 1) supine rest, visit 2) moderate-intensity continuous cycling exercise, visit 3) high-intensity interval cycling exercise. Following supine rest and baseline measurements during visit 1, participants underwent an incremental cycling protocol to voluntary exhaustion to determine maximal oxygen uptake and subsequent exercise intensity. Blood pressure and vascular function measurements (systolic and diastolic blood pressure, brachial-radial arterial stiffness, carotid-femoral arterial stiffness, microvascular reactivity) were performed before and immediately after each condition. Arterial stiffness was assessed using oscillometry (Vicorder, 80 Beats Medical, United Kingdom) and microvascular reactivity was assessed using near-infrared spectroscopy (Portamon, Artinis Medical Systems, Netherlands).

RESULTS: All measures exhibited moderate within-day reliability ($ICC = 0.61-0.67$, $p < 0.05$). Arterial stiffness exhibited good between-day reliability ($ICC = 0.65-0.68$, $p < 0.05$), while microvascular reactivity exhibited poor reliability ($ICC = 0.35$, $p = 0.06$), as well as high variability ($CV = 23.8\%$). Significant moderate correlations were observed between central and peripheral measures of arterial stiffness ($r = 0.52$, $p < 0.05$), while no correlations were observed between arterial stiffness and microvascular reactivity. Significant moderate correlations were observed between measures of arterial stiffness and blood pressure ($r = 0.44-0.55$, $p < 0.05$). There was a significant increase in brachial-radial arterial stiffness following moderate-intensity exercise ($F = 9.25$, $p < 0.05$, $MD = 0.47$ m/s), while non-significant increases were observed in carotid-femoral arterial stiffness. Non-significant increases in microvascular reactivity were observed after moderate-intensity exercise ($MD = 0.43$ TSI/s). Finally, there were no significant alterations following high-intensity exercise.

DISCUSSION: Our results indicate moderate within- and between day reliability of arterial stiffness measures. Microvascular reactivity exhibited moderate within day reliability and poor between day reliability, consistent with some of the existing literature. Even though central (carotid-femoral) and peripheral (brachial-radial) measures of arterial stiffness exhibited moderate correlation, no correlation was found between microvascular reactivity and

arterial stiffness. Some studies have shown a connection between different measures of vascular function and microvascular reactivity, contrary to our results. We showed an increased peripheral arterial stiffness immediately following exercise, with more pronounced differences following moderate-intensity exercise, compared to high-intensity exercise. Although no significant differences in microvascular reactivity were observed between conditions, our results show a non-significant increase in microvascular function following aerobic exercise, indicative of enhanced microvascular reactivity. Beyond examining reliability and validity, this study highlights differential acute vascular responses to exercise stimuli. While large arteries exhibit an acute deterioration in arterial stiffness, microvasculature exhibits increased reactivity.

Acknowledgements: The authors would like to thank the participants for their involvement in this study.

Funding: The research is part of projects funded by the University of Ljubljana's Development Fund titled "The role of physical Activity in Cardiovascular disease risk reduction for Non-communicable diseases. Do non-responders to exercise really exist?" (Project ID: 005-1/2023) and "The role of physical Activity in Cardiovascular disease risk reduction – On the way to personalized exercise prescription (ACT-ON)" (project ID: 802-15/2023-5).

Keywords: vascular function, aerobic exercise, arterial stiffness, microvascular reactivity.

LITERATURE:

Desanlis, J., Gordon, D., Calveyrac, C., Cottin, F., & Gernigon, M. (2022). Intra- and Inter-Day Reliability of the NIRS Portamon Device after Three Induced Muscle Ischemias. *Sensors*, 22(14), 5165. <https://doi.org/10.3390/s22145165>

Dipla, K., Triantafyllou, A., Koletsos, N., Papadopoulos, S., Sachpekidis, V., Vrabas, I. S., Gkaliagkousi, E., Zafeiridis, A., & Douma, S. (2017). Impaired Muscle Oxygenation and Elevated Exercise Blood Pressure in Hypertensive Patients. *Hypertension*, 70(2), 444–451. <https://doi.org/10.1161/HYPERTENSIONAHA.117.09558>

Jeskanen, T., Ylinen, V., Valtonen, R. I. P., & Tulppo, M. P. (2024). Reproducibility and sex differences in muscle oxygenation during brachial artery occlusion in healthy participants. *Clinical Physiology and Functional Imaging*, 44(5), 388–395. <https://doi.org/10.1111/cpf.12886>

McLay, K. M., Fontana, F. Y., Nederveen, J. P., Guida, F. F., Paterson, D. H., Pogliaghi, S., & Murias, J. M. (2016). Vascular responsiveness determined by near-infrared spectroscopy measures of oxygen saturation. *Experimental Physiology*, 101(1), 34–40. <https://doi.org/10.1113/EP085406>

COMPARISON OF VISUAL-MOTOR REACTION IN HANDBALL PLAYERS OF DIFFERENT POSITIONS AND PHYSICALLY INACTIVE WOMEN

Saša JOVANOVIĆ¹, Dragana VUKOSAVLJEVIĆ¹, Željko SEKULIĆ¹, Boštjan ŠIMUNIČ²

¹Faculty of Physical Education and Sport, University of Banja Luka, Banja Luka, Republic of Srpska, Bosnia and Herzegovina.

²Institute for Kinesiology Research, Scientific Research Center Koper, Slovenia.

Presenting author: Saša Jovanović

INTRODUCTION: Handball as a team sport requires a high level of technical and physical abilities, with reaction speed being of crucial importance for all positions. Visual-motor reaction represents the ability to perceive space, ball movement, and opponents while responding in a timely manner. The aim of the study was to examine reaction speed in handball players of different positions and non-athletes using the Fitlight system as an innovative measurement instrument.

METHODS: The study included 15 participants divided into three groups: professional handball goalkeepers (n=5), handball players of other positions (n=5), and physically inactive women (n=5). The average age of participants was 21.53 years. The Fitlight system with four sensors was used to test simple and complex reaction time. Simple reaction time was measured through 4 series of 8 repetitions, while complex reaction time was tested through 4 series of 12 repetitions with a "decoy" signal. Descriptive parameters, ANOVA, and post hoc Mann Whitney test were used for statistical analysis.

RESULTS: For simple reaction time, statistically significant differences between groups were found for the "hands" variable (p=0.005). Post hoc analysis showed that handball players achieve statistically significantly better results compared to the control group. For complex reaction time, statistically significant differences were found for variables "legs" (p=0.024), "left hand" (p=0.018), and "right leg" (p=0.017). Goalkeepers showed better results than the control group, but no significant difference was found between goalkeepers and players.

DISCUSSION: The results confirm that sports training in handball develops visual-motor abilities. Better performance of goalkeepers can be explained by the specificity of their position which requires frequent and rapid reactions to different stimuli. The Fitlight system proved to be a reliable instrument for assessment and potential improvement of reaction speed. Study limitations include small sample size and cross-sectional study design.

Keywords: visual-motor reaction, handball, Fitlight system, reaction speed, sports performance, goalkeepers.

LITERATURE:

Katanić, B., Ilić, P., Stojmenović, A., & Vitasović, M. (2020). The application of Fitlight trainer system in sports. *Fizička kultura*, 74(2), 115-126. <https://doi.org/10.5937/fizkul74-27189>

Davids, K., Button, C., & Bennett, S. (2008). Dynamics of skill acquisition: A constraints-led approach. *Human Kinetics*. <https://psycnet.apa.org/record/2008-04551-000>.

Duda, H. (2020). Shaping motor activities of young football players in comprehensive training using the Fitlight system. *Journal of Kinesiology and Exercise Sciences*, 30(91), 43-51. <https://doi.org/10.5604/01.3001.0014.8126>.

Forni, F., Farinini, E., Leardi, R., & Rinaldo, A. (2022). Effects of visual training on motor performance in young tennis players using FitLight trainer. *The Journal of sports medicine and physical fitness*, 62(4), 585–592. <https://doi.org/10.23736/S0022-4707.21.12145-0>.

Vickers, J.N. (2007). *Perception, Cognition and Decision Training; The Quiet Eye in Action*. USA: Sheridan Books. <https://www.amazon.com/Perception-Cognition-Decision-Training-Action/dp/0736042563>.

DUAL-TASKING DISRUPTS FORCE STABILITY AND MOTOR UNIT BEHAVIOUR IN PARKINSON'S DISEASE

Miloš KALC¹, Aleksandar MILADINOVIC², Miloš AJČEVIĆ³, Aleš HOLOBAR⁴, Matej KRAMBERGER⁴, Paolo MANGANOTTI⁵, Manca PESKAR¹, Uroš MARUŠIČ¹

¹ Institute for Kinesiology Research, Science and Research Centre Koper, Slovenia,

² Institute for Maternal and Child Health-IRCCS "Burlo Garofolo", Trieste, Italy,

³ Faculty of Biomedical Engineering, University of Trieste, Italy,

⁴ Faculty of Electrical Engineering and Computer Science, University of Maribor, Slovenia,

⁵ Department of Neurology, University of Trieste, Italy,

Presenting author: Miloš Kalc

INTRODUCTION: Parkinson's disease is a progressive neurological disorder that impairs neuromuscular control, reducing mobility and functional independence. Alterations in motor unit recruitment and discharge contribute to irregular muscle activation, leading to poorer steadiness of force and greater variability of neural drive. Symptoms of Parkinson's disease are often asymmetric, and daily activities typically involve simultaneous motor and cognitive demands. However, the influence of cognitive–motor dual tasking on motor unit firing behavior has not been fully clarified. The aim of this study was to investigate the effects of dual tasking on force steadiness and motor unit activity in individuals with Parkinson's disease compared with healthy adults.

METHODS: Fifteen individuals with Parkinson's disease (six females, mean age 63.8 ± 6.2 years, motor severity score 14.7 ± 6.8) and fifteen healthy adults (seven females, mean age 63.7 ± 7.2 years) performed a 32-second force-tracking trapezoidal knee extension at thirty percent of maximal voluntary contraction on an isometric dynamometer. Two conditions were tested: (a) a visuomotor force-tracking task, and (b) a dual-task condition requiring simultaneous serial subtraction. High-density surface electromyography was recorded from the vastus lateralis with 32-electrode arrays, and motor unit discharge patterns were identified. Outcome variables included variability of force, tracking error, mean motor unit discharge rate, and thresholds of recruitment and derecruitment. Data were analyzed using linear mixed-effects models.

RESULTS: Participants with Parkinson's disease showed greater variability of force during the dual-task condition compared with healthy adults, indicating impaired steadiness under cognitive load. Tracking errors were consistently higher in Parkinson's disease across both conditions. Motor unit discharge rate increased from 8.96 pulses per second during the single-task condition to 9.35 pulses per second in the dual-task condition, while no such increase was observed in healthy adults. When task conditions were pooled, discharge rate was significantly higher in the dual-task condition than in the single-task condition. Recruitment thresholds tended to be lower in Parkinson's disease (17.2 percent of maximal voluntary contraction) compared with controls (18.3 percent), although this difference was not significant.

DISCUSSION: The findings demonstrate that dual tasking alters neuromuscular control in Parkinson's disease, increasing variability of force output and elevating motor unit discharge rates. These results support previous observations of irregular motor unit firing and reduced recruitment thresholds in Parkinson's disease. The combination of force steadiness measures and high-density surface electromyography provides a sensitive approach for detecting early impairments of motor control. Future investigations should explore underlying neuromodulatory mechanisms and examine the potential of this methodology for monitoring disease progression and optimizing rehabilitation strategies. This work was supported by the Horizon 2020 TwinBrain project (Grant No. 952401).

Keywords: Parkinson's disease, motor unit, dual tasking, electromyography, force steadiness.

LITERATURE:

Kalia, L. V., & Lang, A. E. (2015). Parkinson's disease. *The Lancet*, 386(9996), 896–912.

Nishikawa, Y., Watanabe, K., Holobar, A., Maeda, N., Maruyama, H., & Tanaka, S. (2021). Identification of the laterality of motor unit behavior in female patients with Parkinson's disease using high-density surface electromyography. *European Journal of Neuroscience*, 53(6), 1938–1949.

Milner-Brown, H. S., Fisher, M. A., & Weiner, W. J. (1979). Electrical properties of motor units in Parkinsonism and a possible relationship with bradykinesia. *Journal of Neurology, Neurosurgery & Psychiatry*, 42(1), 35–41.

DANCE INTERVENTION FOR PARKINSON'S DISEASE: PRELIMINARY RESULTS OF THE SLOVENIAN NEURODANCE COHORT

Tajda KOCUVAN¹ and Manca PESKAR^{2,3}

¹Physiotherapy, University Alma Mater Europaea, Slovenia

²Institute for Kinesiology Research, Science and Research Centre Koper, Slovenia

³Biological Psychology and Neuroergonomics, Department of Psychology and Ergonomics, Faculty V: Mechanical Engineering and Transport Systems, Technische Universität Berlin, Berlin, Germany

Presenting author: Tajda Kocuvan

INTRODUCTION: Parkinson's disease (PD) is a complex and the second most common neurodegenerative disorder. The disease involves the degeneration of dopaminergic neurons, primarily affecting the motor control and resulting in postural instability, bradykinesia, rigidity, and resting tremor. However, people with PD also experience non-motor symptoms such as sleep disturbances, mood changes, cognitive, and psychological problems. Medication is typically effective but fails to address the whole spectrum of the symptoms. Dance is becoming widely recognized as a promising complementary therapy, combining motor and cognitive engagement, social interaction, and emotional benefits. This study aimed to examine how a 12-week dance intervention influenced motor skills and subjective symptoms in people with PD. Data presented here are part of a multicentric international NeuroDance study.

METHODS: Fourteen participants (mean age = 68.6 ± 7.3 years; 5 men) were tested prior and after completing a 12-week dancing intervention (twice a week for 60 min). Intervention comprised various dance styles, including Country Dance, Greek Dance, Tango, and Polka. We assessed motor function using the timed-up and go test (normal speed – TUG-N, fast – TUG-F, fast with dual-tasking – TUG-F-DT), the 10-meter walk test (normal – WT-N, fast – WT-F), five times sit-to-stand test (FTSTS), four step square test (FSST), and 360 degree turn test (360), and quality of life using The Parkinson's Disease Questionnaire (PDQ-39).

RESULTS: From pre to post intervention, we observed significant improvement in TUG-F (pre: 8.0 ± 1.8 s; post: 7.7 ± 1.4 s; $p = .047$) and TUG-F-DT (pre: 9.6 ± 1.7 s; post: 8.2 ± 0.8 s; $p = .005$), while a slight but significant decline was observed in the walking speed in WT-F (pre: 5.2 ± 1.0 s; post: 5.5 ± 1.1 s, $p = .027$). The other measures did not change from pre to post-intervention.

DISCUSSION: These preliminary results indicate that the dancing intervention might have beneficial effects on some motor skills, like mobility as measured by the TUG test, but not all, as evidenced in the slower walking speed in the fast walking condition. To better understand the observed effects, the future endeavors of the NeuroDance consortium will comprise pooling multicentric data, separating participants into high- and low-attenders, and comparing results with healthy controls.

Keywords: Parkinson's disease, neurodegenerative disorder, dance intervention, quality of life

LITERATURE:

Bloemer A. (2024). Parkinson's Disease: Facing the Challenges of a Progressive Disorder. *Journal of Alzheimer's Disease and Parkinsonism*, 14: 620.

Earhart G.M. (2009). Dance as a therapy for individuals with Parkinson's disease. *European Journal of Physical and Rehabilitation Medicine*, 45: 231-238.

EVALUATING MATERIALS FOR SPORTS SMART PATCHES: TOWARDS ENHANCED WEARABLE MONITORING

Jaka KOVŠE¹, Shavini STUART², Klas HJORT³, Matej SUPEJ¹

¹Faculty of Sport, University of Ljubljana, Slovenia

²Holst Centre, TNO

³Department of Materials Science and Engineering, University of Uppsala, Sweden

Presenting author: Jaka Kovše

INTRODUCTION: Wearable technologies are becoming increasingly embedded in everyday life, with a growing role in health, wellness, and performance monitoring. In endurance sports, their ability to capture real-time, in-field data is valuable for injury prevention, training optimization, and performance analysis. Among various formats, self-adhesive devices that continuously measure physiological parameters, known as smartpatches, offer unique advantages: they are lightweight, flexible, comfortable, low-cost, adaptable to different body locations, and enable improved sensor-skin interaction, that can improve continuous signal quality in comparison to smartwatches. However, material selection must be carefully considered, as poor choices can reduce user compliance or lead to adverse effects on skin. This study evaluates the skin-material interface as part of developing a wearable patch platform tailored to meet the demands of endurance sports. Each patch consists of a silicone-encapsulated sensor affixed to the skin using a double-sided adhesive tape and covered with a stretchable, breathable patch material.

METHODS: An early-stage evaluation was conducted on 12 commercially available materials: 8 patch materials and 4 double-sided adhesive tapes. Materials were selected based on manufacturers' claims on long-term wear or comfort. Patch materials varied in moisture vapor transmission rate (MVTR), stretchability, adhesive type, and thickness. Double-sided tapes additionally differed in perforation diameter (0mm – 3mm). The goal was to identify materials suitable for affixing the sensor to the skin while maintaining comfort, durability, and functionality during high-intensity endurance activities. Three subjects (two male, one female; ages 24 – 50) wore the materials during 50 minutes of either high intensity cycling or running. Testing conditions simulated real-world athletic use, exposing the materials to mechanical stress, sweat, and continuous movement. Evaluation criteria included adhesion retention (patches to skin, tapes to skin and encapsulation), breathability, moisture resistance, stretchability, skin compatibility, and ease of application and removal.

RESULTS: Two of the eight patch materials demonstrated most reliable performance: they maintained secure adhesion without delamination, caused no skin irritation, and were easy to apply and remove. Other materials either lacked sufficient adhesion, breathability, comfort, or user-friendliness. Among the double-sided adhesives, two variants provided acceptable performance, showing strong adhesion to both skin and encapsulation while avoiding skin trauma.

DISCUSSION: Material selection is a critical step in the development of wearable smart patches for endurance sports. Based on observed performance and manufacturer specifications we conclude that an optimal combination of stretchability, MVTR, and adhesive thickness is

key to successful patch development. Matching the material stretchability to that of the skin helps reduce shear forces, while sufficiently high MVTR prevents moisture buildup, which can compromise adhesion. This study aims to inform future development of smart patches that are both wearable and reliable in demanding athletic conditions.

ACKNOWLEDGEMENTS: Development of the sport performance and health monitoring system PERSIMMON is funded by Horizon Europe (Grant No. 101129713).

Keywords: wearable technology, endurance sports, physiological monitoring.

LITERATURE:

Seçkin, A. Ç., Ateş, B., & Seçkin, M. (2023). Review on Wearable Technology in Sports: Concepts, Challenges and Opportunities. *Applied Sciences*, 13(18), 10399. <https://doi.org/10.3390/app131810399>

Stuart, S., de Kok, M., O'Searcoid, B., Morrisroe, H., Serban, I. B., Jagers, F., Dulos, R., Houben, S., van de Peppel, L., & van den Brand, J. (2024). Critical Design Considerations for Longer-Term Wear and Comfort of On-Body Medical Devices. *Bioengineering*, 11(11), 1058. <https://doi.org/10.3390/bioengineering11111058>

Verdel, N., Hjort, K., Sperlich, B., Holmberg, H.-C., & Supej, M. (2023). Use of smart patches by athletes: A concise SWOT analysis. *Frontiers in Physiology*, 14. <https://doi.org/10.3389/fphys.2023.1055173>

REACTION AND INHIBITION BEHAVIOR TO MOVING OBJECTS IN THE PERIPHERAL VISION IN A VIRTUAL REALITY BALL CATCH SCENARIO

German KRÄMER¹, Dan BÜRGER¹, Stefan PASTEL¹ and Kerstin WITTE¹

¹Department of Sport Science, Otto-von-Guericke-University Magdeburg, Germany

Presenting author: German Krämer

INTRODUCTION: The use of virtual reality (VR) in sport and sports science is constantly increasing. Virtual reality applications enable it to train from anywhere and with minimal use of equipment. Among other things, anticipation, orientation and reaction skills can be tested with virtual reality. The most important factor influencing these abilities is visual perception. Many studies have focused on foveal vision. However, although the perception of foveal stimuli accounts for a large part of visual attention, the visual perception of peripheral stimuli is an important skill, especially in sports. In sports in which many visual stimuli must be perceived simultaneously in order to assess game situations and react correctly, athletes utilise peripheral vision. In studies that inspect peripheral vision, the test subjects are mainly presented with static stimuli. The aim of this work is to investigate the visual peripheral perception of dynamic stimuli using a sports-related virtual reality scenario.

METHODS: In a study with 35 healthy young ($26,1 \pm 3.2$ years) test subjects, the reaction times to balls shot from different areas of the periphery with different speeds in virtual reality were analysed. In a second scene, the influence of a go/no-go condition on reaction times using an additional signal (green/red), was examined. The results were then analysed using a multifactorial analysis of variance according to the factors eccentricity, stimuli speed, and inhibitory additional signal.

RESULTS: It was found that the reaction time increases with increasing eccentricity ($p = 0.003$). The greatest influence on reaction time was exerted by the different speeds of the balls ($p < .001$). Test subjects reacted significantly faster to fast balls than to slow balls. In the scene with the additional signal (Go/No-Go condition), there was an increase in reaction time compared to the scene without the additional signal ($p < .001$).

DISCUSSION: Similar to real-life studies, the results show that reaction times increase with increasing eccentricity. An additional signal also increases the reaction time, as was observed in reality. The increase in reaction time for fast stimuli suggests that the response speed increases with higher task pressure, as the full cognitive capacity cannot be utilised. It is assumed that this is due to the shorter thinking time that the test subjects had, and thus saved unnecessary cognitive processes. Although the differences in factors were similar to those in reality, it was found that reaction times in this study were generally higher than in real-world studies. As the results showed similar tendencies to real-life studies, a systematic error due to software and hardware is suspected. The analysis of feedback questionnaires revealed that the use of haptic feedback could increase motivation, which should be considered in future studies.

Keywords: virtual reality, peripheral vision, reaction time

LITERATURE:

Bürger, D., Schley, M.-K., Loerwald, H., Pastel, S. & Witte, K. (2024). Comparative Analysis of Visual Field Characteristics and Perceptual Processing in Peripheral Vision Between Virtual Reality and Real World. *Human Behavior and Emerging Technologies*, 2024. <https://doi.org/10.1155/2024/2845190>

Herrera, V., Albusac, J., Angulo, E., Gzlez-Morcillo, C., de los Reyes, A., & Vallejo, D. (2024). Virtual Reality-Assisted Goalkeeper Training for Upper Limb Rehabilitation in a Safe and Adapted Patient Environment. *IEEE Access*, 12, 194256/194279. <https://doi.org/10.1109/ACCESS.2024.3519731>

Klatt, S., Noël, B. & Brocher, A. (2021). Pupil size in the evaluation of static and dynamic stimuli in peripheral vision. *PLOS ONE* 16(5). <https://doi.org/10.1371/journal.pone.0250027>

Rocabado, F., & Duñabeitia, J. A. (2022). Assessing Inhibitory Control in the Real World Is Virtually Possible: A Virtual Reality Demonstration. *Behavioral Sciences*, 12(11), 444. <https://doi.org/10.3390/bs12110444>

Vater, C., Wolfe, B. & Rosenholtz, R. (2022). Peripheral vision in real-world tasks: A systematic review. *Psychon Bull Rev* 29, pp. 1531–1557. <https://doi.org/10.3758/s13423-022-02117-w>

IMPORTANCE OF HEALTHY LIFESTYLE FOR HEALTHY AGEING IN SLOVENIAN ADULTS

Jerneja KRAMPELJ¹, Katja ZDEŠAR KOTNIK² and Matej GREGORIČ³

¹Department of Food Science and Technology, Biotechnical Faculty, University of Ljubljana, Slovenia

²Department of Biology, Biotechnical Faculty, University of Ljubljana, Slovenia

³Analysis and Health Development Centre, National Institute of Public Health, Slovenia

Presenting author: Jerneja Krampelj

INTRODUCTION: The Mediterranean diet (MD) is characterized by a high intake of plant-based foods, olive oil and fish, moderate intake of dairy products and low consumption of meat. MD is known for its protective effects against chronic non-communicable diseases, including cardiovascular disease, obesity, and neurodegenerative conditions. However, adherence is declining even in Mediterranean regions like Slovenia, where Westernized dietary patterns are becoming more common and can increase the risk of non-communicable chronic disease, particularly among younger, inactive and socioeconomically disadvantaged groups. Given the limited data, this study aimed to assess adherence to MD in Slovenian adults and explore associations with physical activity, hypertension, and hyperglycemia.

METHODS: We conducted a cross-sectional analysis on a nationally representative sample of Slovenian adults (N = 850), aged 18 to 74 years, from the SI.Menu 2017/18 dietary survey. Dietary intake was assessed using a food frequency questionnaire. Adherence to the MD was evaluated using the MedDietScore adapted from Panagiotakos et al. (2006), which rates intake across 11 food groups, with higher scores indicating greater adherence. Participants were categorised into two groups based on their adherence to the MD. Physical activity was self-reported and categorised as low (<7 hours/week) or high (≥7 hours/week). Data on hypertension and hyperglycemia were based on physician-confirmed diagnoses. Pearson's chi-squared test was used to examine associations between MD adherence and selected factors.

RESULTS: The findings indicated that 29.4% of participants had high adherence to MD, which is similar to most Mediterranean countries. Women demonstrated significantly higher adherence than men (39.9% vs. 17.8%, $p < 0.001$) and elderly participants (≥65 years) more than younger adults (36% vs. 21.7%, $p < 0.001$). Among the elderly, adherence was higher in Western Slovenia (42.8%) than Eastern Slovenia (31.2%) ($p < 0.05$). Among adults under 64 years, high physical activity was significantly associated with higher MD adherence ($p < 0.05$). Those without hypertension were more likely to follow the MD (41.7%) compared to those with hypertension (30.5%) in elderly ($p < 0.05$). Among elderly men, those with hypertension were less likely to follow MD compared to those without hypertension (17.9% vs. 29.6%, $p < 0.05$).

DISCUSSION: Our results suggest a generational shift away from the Mediterranean diet, with greater adherence observed among elderly. Given its protective role in preventing cardiovascular diseases such as hypertension, targeted efforts are needed to promote MD and physical activity, especially among younger populations. Future research should examine barriers like cost, accessibility, and cultural factors that influence MD adherence across age

groups. Investigating how MD and physical activity together affect cardiovascular health can help shape targeted public health strategies to lower chronic disease risk and support healthy ageing.

Keywords: Mediterranean diet, physical activity, hyperglycemia, hypertension, Slovenia.

LITERATURE:

Brlek A, Gregorič M. (2023). Diet quality indices and their associations with all-cause mortality, CVD and type 2 diabetes mellitus: an umbrella review. *British Journal of Nutrition*, 130(4), 709–718.

Georgoulis M, Damigou E, Derdelakou E, Kosti RI, Chrysoshoou C, Barkas F, Kravvariti E, Tsioufis C, Pitsavos C, Liberopoulos E, Sfrikakis PP, Panagiotakos DB. (2024). Adherence to the Mediterranean diet and 20-year incidence of hypertension: the ATTICA prospective epidemiological study (2002–2022). *European Journal of Clinical Nutrition*, 78(7), 630–638.

Obeid CA, Gubbels JS, Jaalouk D, Kremers SPJ, Oenema A. (2022). Adherence to the Mediterranean diet among adults in Mediterranean countries: a systematic literature review. *European Journal of Nutrition*, 61(7), 3327–3344.

Panagiotakos DB, Pitsavos C, Stefanadis C. (2006). Dietary patterns: A Mediterranean diet score and its relation to clinical and biological markers of cardiovascular disease risk. *Nutrition Metabolism and Cardiovascular Diseases*, 16(8), 559–568.

Soltani S, Jayedi A, Shab-Bidar S, Becerra-Tomás N, Salas-Salvadó J. (2019). Adherence to the Mediterranean Diet in Relation to All-Cause Mortality: A Systematic Review and Dose-Response Meta-Analysis of Prospective Cohort Studies. *Advances in Nutrition*, 10, 6: 1029–1039.

ACUTE ARTERIAL STIFFNESS RESPONSE TO HIGH-INTENSITY EXERCISE IN OLDER ADULTS ACROSS PHYSICAL ACTIVITY LEVELS

Hei-Tung LAU¹, Chia-An HO¹, En-Yu CHANG¹, Chin-Shan HO¹

¹Graduate Institute of Sports Science, National Taiwan Sport University, Taoyuan City, Taiwan

Presenting author: Hei-Tung Lau

INTRODUCTION: Arterial stiffness increases with age and low physical activity, thereby elevating the risk of cardiovascular disease. While exercise interventions can improve health outcomes in older adults, the acute vascular responses to exercise among individuals with different physical activity levels remain unclear. This study investigated the acute effects of high-intensity exercise on brachial-ankle pulse wave velocity and ankle systolic blood pressure in older adults with varying daily physical activity.

METHODS: Sixty healthy Taiwanese men were divided into three groups based on physical activity level: LOW (age: 69.9 ± 2.5 years, height: 167.8 ± 7.1 cm, weight: 66.5 ± 9.9 kg), MODERATE (age: 68.5 ± 2.7 years, height: 167.5 ± 4.9 cm, weight: 67.1 ± 9.5 kg), and HIGH (age: 70.0 ± 2.7 years, height: 167.9 ± 5.3 cm, weight: 66.8 ± 7.4 kg). All participants performed a maximal cardiopulmonary exercise test using a cycle ergometer. Pulse wave velocity and systolic/diastolic blood pressure of the brachial and posterior tibial arteries were measured before and after the test using an arterial stiffness monitor (Omron HBP-8000, Osaka, Japan). Data were analyzed using IBM SPSS 25.0 statistical software. A two-way mixed analysis of variance was conducted to compare the changes in brachial-ankle pulse wave velocity and ankle systolic blood pressure before and after exercise among the three physical activity groups. When a significant interaction effect was found, Bonferroni post hoc tests were applied for pairwise comparisons.

RESULTS: All groups showed significant reductions in brachial-ankle pulse wave velocity after exercise ($p = .001$): LOW -6.45% , MODERATE -10.01% , HIGH -8.15% ; However, no significant differences were observed between groups. In contrast, a significant interaction effect was found for ankle systolic blood pressure ($p = .001$). Post hoc comparisons revealed a significant decrease in ankle systolic blood pressure in the MODERATE ($p = .001$, $\Delta\% = -17.20$) and HIGH ($p = .001$, $\Delta\% = -20.65$) groups over time, while the LOW group showed no significant change.

DISCUSSION: This study found that a single bout of high-intensity exercise can improve indicators of arterial stiffness. Participants with moderate physical activity levels showed the greatest reduction in brachial-ankle pulse wave velocity, suggesting that their activity intensity may fall within the optimal range for healthy aging. High activity led to better ankle systolic blood pressure despite a smaller brachial-ankle pulse wave velocity change.

As a distal vascular site, the ankle is highly sensitive to changes in blood flow, making it a useful indicator of peripheral vascular regulation following exercise. These results suggest that regular physical activity not only benefits long-term health but also enhances acute vascular regulatory capacity after exercise. However, it is important to consider that acute

responses and long-term adaptations to exercise are interconnected and should be interpreted as cumulative benefits. Incorporating lifestyle physical activity into health strategies may offer a practical and appealing alternative for older adults.

Keywords: vascular regulation, acute exercise response, cardiovascular aging.

LITERATURE:

Perissiou M, Bailey TG, Windsor M, Nam MCY, Greaves K, Leicht AS, Golledge J, Askew CD. (2018). Effects of exercise intensity and cardiorespiratory fitness on the acute response of arterial stiffness to exercise in older adults. *Eur J Appl Physiol*, 118(8):1673–1688.

Zhou Z, He Z, Yuan M, Yin Z, Dang X, Zhu J, Zhu W. (2015). Longer rest intervals do not attenuate the superior effects of accumulated exercise on arterial stiffness. *Eur J Appl Physiol*, 115(10):2149–2157.

Zang Y, Ding X, Zhao MX, Zhang X, Zhang L, Wu S, Sun L. (2022). Arterial stiffness acute changes following aerobic exercise in males with and without hypertension. *J Clin Hypertens*, 24(4):430–437.

van der Sluijs K, Bakker E, Kerstens T, Stens N, de Koning I, Thannhauser J, Malik A, Reesink K, Nabeel P, Raj K, Joseph J, Eijssvogels T, Thijssen D. (2024). Association of objectively measured sedentary behavior with arterial stiffness: Findings from the Nijmegen Exercise Study. *Scand J Med Sci Sports*, 34(11): e14757.

Mohammedi K, Pigeire M, Bosch J, Yusuf S, Gerstein HC. (2024). Arm and ankle blood pressure indices, and peripheral artery disease, and mortality: a cohort study. *Eur Heart J*, 45(19):1738–1749.

FUNCTIONAL FITNESS AND BODY COMPOSITION IN OLDER TAIWANESE ADULTS: A CROSS-SECTIONAL STUDY ON THE IMPACT OF MUSCLE, BONE, AND FAT ON AGE-RELATED DECLINE

Mon-Chien LEE¹ and Chi-Chang HUANG¹

¹Graduate Institute of Sports Science, National Taiwan Sport University, Taiwan

Presenting author: Mon-Chien Lee

INTRODUCTION: Taiwan entered an “aged society” in 2018, and by October 2023 individuals aged ≥ 65 years accounted for 18.18% of the population. Population projections indicate Taiwan will reach “super-aged” status ($> 20\%$ aged ≥ 65 years) by 2025 and potentially exceed 40% by 2057. Age-related declines in muscle mass and bone mineral density increase the risk of sarcopenia, osteoporosis, falls, and functional impairment. Functional fitness tests—grip strength, 30-s chair-stand, 2.44 m/10 m walk, sit-and-reach, single-leg stance, and 6-min walk—are widely used to assess seniors’ daily activity capabilities. To investigate, in a community-dwelling cohort of Taiwanese elders, the cross-sectional relationships between bone mineral density (BMD), and, fat body mass and multiple functional fitness measures, as well as the moderating effects of age and sex.

METHODS: We recruited 197 healthy adults aged ≥ 65 years (58 men, 139 women). Whole-body dual-energy X-ray absorptiometry quantified BMD, LBM, and FBM. Standardized functional fitness tests measured upper-limb strength, lower-limb endurance, gait speed, flexibility, balance, and aerobic capacity. Pearson correlation coefficients examined pairwise associations, and sex-stratified analyses assessed gender differences.

RESULTS: LBM showed the strongest positive correlation with grip strength (right hand $r = 0.576$; left hand $r = 0.555$; both $p < 0.001$), followed by BMD (right $r = 0.508$; left $r = 0.522$; $p < 0.001$). FBM correlated negatively with grip strength ($r = -0.34$, $p < 0.001$). Lower-limb flexibility correlated inversely with BMD ($r = -0.202$, $p < 0.001$) and LBM ($r = -0.163$, $p = 0.001$). Age was positively associated with walking time and negatively with chair-stand ($r = 0.332$, -0.173 ; $p < 0.05$) and aerobic capacity ($r = -0.169$, $p = 0.013$). Sex-stratified analyses revealed broadly similar patterns for muscle and bone versus grip strength, but women exhibited stronger age-related declines in lower-limb endurance, balance, and aerobic capacity than men.

DISCUSSION: In community-dwelling older Taiwanese adults, LBM and BMD emerged as the strongest predictors of grip strength, reflecting both the mechanical load and reciprocal osteokine–myokine signaling that support musculoskeletal integrity. Conversely, higher fat mass correlated inversely with muscle strength and balance, consistent with myosteatosis-driven declines in muscle quality and inflammation-mediated neuromuscular impairment. Advancing age was associated with slower sit-to-stand times and reduced 6-minute walk distances, mirroring normative declines in lower-limb function and aerobic capacity. Women exhibited more pronounced reductions in lower-limb endurance and postural stability, likely exacerbated by postmenopausal hormonal shifts and sex-specific deficits in voluntary muscle activation. Our cross-sectional analysis shows that lean body mass and bone mineral density are the primary determinants of grip strength, excess fat mass undermines

muscle quality and balance, and advancing age—especially in women—exacerbates functional decline. Future longitudinal and intervention studies are warranted to validate these associations, elucidate underlying mechanisms, and test targeted exercise–nutrition strategies for preserving musculoskeletal health in older adults.

Keywords: Ageing, Bone Mineral Density, Lean Body Mass, Functional Fitness.

LITERATURE:

Chan, J., Lu, Y. C., Yao, M. M., & Kosik, R. O. (2022). Correlation between hand grip strength and regional muscle mass in older Asian adults: an observational study. *BMC geriatrics*, 22(1), 206.

Patalong-Wójcik, M., Golar, A., Zając, K., Sokołowska, A., Kozłowski, M., Tołoczko-Grabarek, A., Krzyścin, M., Brodowska, A., Janiec, A., Myszk, A., Cymbaluk-Płoska, A., & Sowińska-Przepiera, E. (2023). Influence of Muscle Mass and Strength on Bone Mineralisation with Consideration of Sclerostin Concentration. *Biomedicines*, 11(6), 1574.

Correa-de-Araujo, R., Addison, O., Miljkovic, I., Goodpaster, B. H., Bergman, B. C., Clark, R. V., Elena, J. W., Esser, K. A., Ferrucci, L., Harris-Love, M. O., Kritchevsky, S. B., Lorbergs, A., Shepherd, J. A., Shulman, G. I., & Rosen, C. J. (2020). Myosteatosis in the Context of Skeletal Muscle Function Deficit: An Interdisciplinary Workshop at the National Institute on Aging. *Frontiers in physiology*, 11, 963.

Letton, M. E., Macdonald, E. R., Thom, J. M., & Ward, R. E. (2024). Classical Ballet for Women Aged Over 50 Years: Investigating Balance, Strength, and Range of Motion. *Research quarterly for exercise and sport*, 95(1), 171–182.

Larsson, L., Degens, H., Li, M., Salviati, L., Lee, Y. I., Thompson, W., Kirkland, J. L., & Sandri, M. (2019). Sarcopenia: Aging-Related Loss of Muscle Mass and Function. *Physiological reviews*, 99(1), 427–511.

COMPARING BODY COMPOSITION OF CHILDREN AGED 9 TO 12 BEFORE AND AFTER SUMMER HOLIDAYS, BASED ON LIVING ENVIRONMENT

Lea LOBENWEIN¹

¹Faculty of Education, University of Maribor, Maribor, Slovenia

Presenting author: Lea Lobenwein

INTRODUCTION: Summer holidays represent a period of reduced structure and routine, during which children's physical activity levels and body composition may undergo significant changes. These effects may vary depending on the child's living environment, as urban and rural environments differ in access to sports infrastructure, outdoor space, and opportunities for movement. This study aims to compare changes in body composition among fourth-grade students before and after summer holidays, with a focus on differences between urban and rural settings.

METHODS: The research sample consisted of 70 children—32 boys and 38 girls—with a mean age of 9.56 years ($SD = .551$), from one rural and one urban primary school. The parents of the participating children were informed about the purpose of the study and gave consent for their participation. Body composition was measured before and after the summer holidays, using bioelectrical impedance analysis. The two measurements were compared using the independent variables of living environment (rural vs. urban) and gender (boys vs. girls). The data was processed using SPSS statistical software. The statistical significance of the differences was determined using a t-test for dependent samples. We also took a look at how different the sport infrastructure is in these two living environments.

RESULTS: Children, living in the rural environment, have half the sporting facilities as children from urban living environment. The results of the t-test show an increase in all dependent variables: height, weight, muscle mass, skeletal mass, body fat mass, and body water during the summer holidays, regardless of the living environment. Girls from urban areas grew less in height during the holidays, but gained more weight and body fat mass than girls from rural areas. The opposite was true for boys—those from rural areas gained more weight and body fat mass than boys from urban areas. The increase in the other dependent variables was similar for both girls and boys, regardless of the environment.

DISCUSSION: The most important finding of our study is the increase in all dependent variables during the summer holidays, regardless of the living environment. We conclude that the living environment is not as strong a factor as we had expected, even though there are differences in access to sporting facilities.

Keywords: body composition, summer holidays, living environment.

LITERATURE:

Sylejmani, B., Myrtaj, N., Maliqi, A., Gontarev, S., Georgiev, G., in Kalac, R. (2019). Physical fitness in children and adolescents in rural and urban areas. *Journal of Human Sport and Exercise*, 14(4), 866–875. <https://doi.org/10.14198/jhse.2019.144.15>

Volmut, T., Pišot, R., Planinšec, J., in Šimunič, B. (2021). Physical activity drops during summer holidays for 6- to 9-year-old children. *Frontiers in Public Health*, 8(631141). <https://doi.org/10.3389/fpubh.2020.631141>

Weaver, R. G., Beets, M. W., Brazendale, K., in Brusseau, T. A. (2018). Summer Weight Gain and Fitness Loss: Causes and Potential Solutions. *American journal of lifestyle medicine*, 13(2), 116–128. <https://doi.org/10.1177/1559827617750576>

LONGEVITY AND PHYSICAL ACTIVITY: HOW EFFECTIVE ARE WHO PHYSICAL ACTIVITY RECOMMENDATIONS IN TERMS OF LONGEVITY?

Matej MAJERIČ¹, Martin ANDONOVSKI², Goran NIKOVSKI²

¹Faculty of sport, University of Ljubljana

²Faculty of Physical Education, Sport and Health; University Ss. Cyril and Methodius,

Presenting author: Matej Majerič

INTRODUCTION: Longevity is the ability to live a full and quality life, which is associated with good health, well-being and the ability to perform daily activities well into old age. Regular physical activity reduces the risk of mortality from chronic non-communicable diseases, improves mental health and general well-being. The purpose was to determine whether physical activity according to the general WHO recommendations extends life expectancy and reduces the risk of all-cause mortality. And then, in accordance with the findings, to prepare specific recommendations for daily physical activity with examples.

METHODS: The association between longevity and physical activity was determined by analyzing peer-reviewed scientific articles published in the Mendeley and PubMed databases from 1994 to 2024. We used the keywords >physical activity, frequency, intensity, longevity, cancer, adults, cardiovascular disease<. Longevity was defined in years of life, and physical activity was defined by the World Health Organization recommendations for adults aged 18 to 64 and adults older than 65 years.

RESULTS: The selected keywords were contained in 304 articles. Upon closer analysis, we found that 33 articles discussed about the relation between longevity and physical activity. Compared with physical inactivity, 150 to 300 min of moderate-intensity aerobic physical activity (MPA) per week was associated with 1.3 to 3.7 years longer life expectancy in men and 1.5 to 3.5 years longer life expectancy in women. 75 to 150 min of vigorous-intensity aerobic physical activity (VPA) per week was associated with 2.6 to 7.4 years longer life expectancy in men and 3.0 to 7 years longer life expectancy in women. 150 min of MPA or 75 min of VPA per week was associated with a 20% lower risk of all-cause mortality. Twice these recommendations were associated with a 31% lower risk of all-cause mortality. The combination of 250 min of MPA and 50 min of VPA was associated with a 30% lower risk of all-cause mortality. An analysis of the effect of various sports on longevity showed that walking and running were the most accessible forms of daily physical activity for most people. Performing muscle-strengthening activities for MPA or VPA two or more times per week (total of 30 to 60 min) was associated with a 20-27% lower risk of all-cause mortality. Performing 150 min of MVPA and 60 min of muscle-strengthening activities per week was associated with a 40% lower risk of all-cause mortality. Performing a variety of multicomponent physical activity that emphasizes functional balance three or more times per week to improve functional capacity and prevent falls was not associated with a lower risk of all-cause mortality. However, the effect of this exercise, which improved all aspects of balance and daily functioning, was greatest with exercise three times per week for 30 to 45 min.

DISCUSSION: We believe that the WHO recommendations for physical activity and sedentary behavior are written too generally and should therefore be more practically oriented. They

should also explain the intensity of physical activity with heart rate intensity. It would be best to use the generally accepted equation for maximum heart rate ($HR_{max} = 220 - \text{age}$). The findings showed that the effect of physical activity on reducing the risk of all-cause mortality and increasing life expectancy is greatest with regular daily combined aerobic MPA and VPA and muscle-strengthening activities. Therefore, physical activity combinations could be written in the form of examples according to the individual's available daily time for it. Given that walking and running are the most accessible for most people, it would be appropriate to include them in the examples. Ex.: Physical activity for daily available time more than 30 min: 30-40 min walking at 60 to 70% HR_{max} , 5-10 min fast walking at 70 to 85% HR_{max} and 10 min muscle-strengthening activities at 70 to 85% HR_{max} . Physical activity for daily available time 30 min: 20 min walking at 60 to 70% HR_{max} , 5 min fast walking at 70 to 85% HR_{max} and 5 min muscle-strengthening activities at 70 to 85% HR_{max} . Physical activity for daily available time up to 20 min: 10 min walking at 60 to 70% HR_{max} , 5 min fast walking at 70 to 85% HR_{max} and 5 min muscle-strengthening activities at 70 to 85% HR_{max} . Physical activity for daily available time up to 10 min: 5 min fast walking in place 70 to 85% HR_{max} and 5 min muscle-strengthening activities at 70 to 85% HR_{max} . We believe that such physical activity recommendations with examples would encourage more individuals to engage in regular daily physical activity.

Keywords: physical activity, frequency, intensity, longevity, cancer, adults, cardiovascular disease.

LITERATURE:

Garcia, L., Pearce, M., Abbas, A., Mok, A., Strain, T., Ali, S. Brage, S. (2023). Non-occupational physical activity and risk of cardiovascular disease, cancer and mortality outcomes: a dose-response meta-analysis of large prospective studies. *British journal of sports medicine*, 57(15), 979–989. doi.org/10.1136/bjsports-2022-105669

Zhao, M., Veeranki, S. P., Li, S., Steffen, L. M. in Xi, B. (2019). Beneficial associations of low and large doses of leisure time physical activity with all-cause, cardiovascular disease and cancer mortality: a national cohort study of 88,140 US adults. *British journal of sports medicine*, 53(22), 1405–1411. doi.org/10.1136/bjsports-2018-099254

ADVANCES AND CURRENT CHALLENGES IN MOBILE NEUROIMAGING FOR BALANCE AND LOCOMOTION CONTROL

Uros MARUSIC^{1,2}

¹Science and Research Centre Koper, Institute for Kinesiology Research, Slovenia,

²Alma Mater Europaea University, Department of Health Sciences, Slovenia

Presenting author: Uros Marusic

INTRODUCTION: Walking and balance require constant coordination between the brain, spinal cord and body. For many years it was assumed that these functions depended mainly on reflexes and spinal circuits, with the brain playing a limited role. Recent developments in mobile neuroimaging have shown that many cortical regions are involved in walking and balance. These discoveries are important for understanding ageing and conditions such as Parkinson's disease, where impaired locomotion and stability contribute to falls and reduced independence.

METHODS: Mobile neuroimaging involves wearable techniques that enable the measurement of brain activity during movement. The most widely used technique is electroencephalography, which records electrical signals from the scalp with high temporal resolution. This makes it possible to track rapid changes at each step of the gait cycle. However, movement leads to noise from muscles and requires advanced signal processing to remove. Another method is functional near-infrared spectroscopy, which measures changes in blood oxygenation in cortical areas. This approach has less temporal precision and can detect activation in areas such as the prefrontal cortex. Both methods are applied to walking tasks ranging from simple locomotion on a treadmill to complex overground dual-task and balance tasks.

RESULTS: Studies in young healthy adults show that the brain is far more involved in walking than previously thought. Electrical and haemodynamic signals fluctuate with each step not only in motor regions, but also in the parietal, frontal, cingulate and occipital cortices. In older adults, cortical recruitment is stronger, especially in the prefrontal cortex. This increased activation appears to compensate for the age-related decline in automatic control and is evident when walking while performing a second task. In people with Parkinson's disease, cortical activity is even more pronounced. Patients show altered rhythmic patterns in the posterior and motor regions and often rely heavily on attentional and visual systems to maintain gait. External cues such as visual lines on the floor can modulate brain activity and improve walking in this population.

DISCUSSION: Mobile neuroimaging has revealed that walking and balance depend on widespread cortical activity that increases with age and neurological impairment. This knowledge is changing our understanding of gait control and may enable strategies to predict and prevent falls. However, important challenges remain. Electrical recordings during movement are easily contaminated by artefacts, while optical signals can be affected by changes in blood flow in the scalp. There is also a lack of standardized methods across laboratories, which limits the comparability of results. Advances in lightweight sensors, improved analysis algorithms and the integration of different imaging approaches are beginning to address

these issues. Future research should aim to identify reliable brain markers of balance and locomotion deficits and develop interventions that improve mobility in old age and disease.

Keywords: mobile brain/body imaging, gait and balance, electroencephalography, functional near-infrared spectroscopy, aging, Parkinson's disease.

LITERATURE:

Richer, N., Bradford, J. C., & Ferris, D. P. (2024). Mobile neuroimaging: What we have learned about the neural control of human walking, with an emphasis on EEG-based research. *Neuroscience & Biobehavioral Reviews*, 162, 105718.

Kahya, M., Moon, S., Ranchet, M., Vukas, R. R., Lyons, K. E., Pahwa, R., Akinwuntan, A., & Devos, H. (2019). Brain activity during dual task gait and balance in aging and age-related neurodegenerative conditions: A systematic review. *Experimental Gerontology*, 128, 110756.

Stuart, S., Vitorio, R., Morris, R., Martini, D. N., Fino, P. C., & Mancini, M. (2018). Cortical activity during walking and balance tasks in older adults and in people with Parkinson's disease: A structured review. *Maturitas*, 113, 53–72.

Gorjan, D., Gramann, K., De Pauw, K., & Marusic, U. (2022). Removal of movement-induced EEG artifacts: current state of the art and guidelines. *Journal of neural engineering*, 19(1), 011004.

Udina, C., Avtzi, S., Durduran, T., Holtzer, R., Rosso, A. L., Castellano-Tejedor, C., Perez, L., Soto-Bagaria, L., & Inzitari, M. (2020). Functional near-infrared spectroscopy to study cerebral hemodynamics in older adults during cognitive and motor tasks: A review. *Frontiers in Aging Neuroscience*, 11, 367.

LIFESTYLE PATTERNS AND BODY COMPOSITION DIFFERENCES AMONG UNIVERSITY STUDENTS ACROSS WEIGHT CATEGORIES

Črtomir MATEJEK¹ and David KUKOVICA¹

¹Faculty of Education, University of Maribor

Presenting author: David Kukovica

INTRODUCTION: The increase in the prevalence of obesity and overweight among young students is not only a health problem but an issue with broad socio-economic impact. The health costs of obesity-related diseases are placing an increasing burden on health systems, while at the same time increasing the risk of a reduction in productivity and quality of life for individuals. In this context, it is important to note that obesity and overweight are not only physiological but also psychological problems, since they are associated with a higher risk of developing depression, anxiety, low self-esteem and social isolation. This study investigates differences in body composition and lifestyle characteristics between university students with normal body weight and those who are overweight or obese.

METHODS: A total of 55 students (mean = 22.3 years, SD = 1.05) participated, completing three validated self-assessment questionnaires assessing lifestyle habits, physical activity, and well-being. The data collection process involved the administration of the HLPCQ, IPAQ-SF, and WHO-5 questionnaires. Body composition was measured using a multi-frequency bioelectrical impedance device. Statistical analysis included independent samples t-tests and calculation of effect sizes.

RESULTS: Significant differences were observed between groups for several body composition parameters, including body fat mass ($p < .001$), fat-free mass ($p = .020$), and skeletal muscle mass ($p = .024$), all higher in the overweight and obese group. However, most lifestyle variables, including healthy dietary choices, dietary harm avoidance, organized physical activity, and social and mental balance, did not show statistically significant differences between groups. Exceptions included vigorous physical activity, daily routine, and the overall index of lifestyle and personal control, where normal weight students scored significantly higher.

DISCUSSION: Interestingly, this study found no significant differences in high-intensity physical activity levels, healthy dietary choices, or other lifestyle habits between normal-weight and overweight/obese individuals. The findings suggest a complex relationship between body weight and lifestyle habits, with discrepancies possibly reflecting limitations of self-reported measures. The study highlights the need for more objective tools in assessing health-related behaviors among young adults and supports the implementation of targeted interventions in university settings to promote healthy lifestyles among future professionals.

Keywords: body composition, lifestyle assessment, physical activity, dietary habits, university students, obesity prevention.

LITERATURE:

Adams, J. (2020). Addressing socioeconomic inequalities in obesity: Democratising access to resources for achieving and maintaining a healthy weight. *PLoS Medicine*, 17(7), e1003243.

Blüher, M. (2019). Obesity: global epidemiology and pathogenesis. *Nature Reviews Endocrinology*, 15(5), 288-298. <https://doi.org/10.1038/s41574-019-0176-8>

WHO. (2024). The World Health Organization-Five Well-Being Index (WHO-5) - Slovenian translation. [https://cdn.who.int/media/docs/default-source/mental-health/five-well-being-index-\(who-5\)/who-5_slovenian.pdf?sfvrsn=f9adb3c4_3](https://cdn.who.int/media/docs/default-source/mental-health/five-well-being-index-(who-5)/who-5_slovenian.pdf?sfvrsn=f9adb3c4_3)

ASSESSING ADHERENCE TO WHO PHYSICAL ACTIVITY GUIDELINES IN HEALTHY SLOVENE ADULTS USING ACCELEROMETERS AND SELF-REPORT QUESTIONNAIRES

Kaja MEH¹ and Gregor JURAK¹

¹University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia

Presenting author: Kaja Meh

Adherence to physical activity guidelines using different physical activity assessment methods is important. This study compared adherence to physical activity guidelines among 306 healthy Slovene adults using accelerometers and three self-reported questionnaires. Accelerometer data showed 92,3 % of participants met the guidelines, but the result differed when using physical activity questionnaires. The results highlight significant discrepancies between objective and self-reported physical activity measures.

INTRODUCTION: As physical inactivity becomes increasingly prevalent in modern society and its impact on public health grows more evident (Lee et al., 2012), measuring physical activity (PA) has become a key area of research. The World Health Organization (WHO) has issued guidelines recommending at least 150 minutes of moderate to vigorous PA per week for healthy adults (Bull et al., 2020). Since physical activity questionnaires (PAQs) are widely used tools for assessing PA and inactivity in large population studies, we conducted a study comparing the proportion of sufficiently physically active Slovene adults using the most commonly used PAQs.

METHODS: 306 healthy adults participated in the study, data collection took place from October till the end of November. They were provided with UKK RM42 accelerometers, which they wore for seven consecutive days. After returning the devices, participants completed three of the most widely used PAQs in the European Union: the International Physical Activity Questionnaire (IPAQ), the Global Physical Activity Questionnaire (GPAQ), and the physical activity questionnaire from the European Health Interview Survey (EHIS-PAQ).

RESULTS: We used the recommended threshold of 150 minutes of moderate to vigorous PA per week to determine whether participants were sufficiently active according to each assessment method. Using the accelerometer—considered a more objective method—we found that 92,3 % of participants met WHO recommendation. Among the PAQs, the IPAQ produced results most similar to the accelerometer data, identifying 92,6 % of participants as sufficiently active. In contrast, the GPAQ and the EHIS-PAQ identified fewer sufficiently active individuals: 87,2 % and 58,6 %, respectively.

DISCUSSION: Our results revealed discrepancies between self-reported PA using PAQs and objectively measured activity using an accelerometer. Notably, there were differences in the proportion of participants identified as meeting the WHO PA recommendations, particularly between the accelerometer and the GPAQ and EHIS-PAQ. Given that PAQs are commonly used in large-scale population studies—which often inform public health policy and decision-making—it is important to take these differences into account when interpreting adherence to WHO PA guidelines. Furthermore, a recent study highlighted differences in self-reporting of PA among individuals with varying levels of physical fitness (Meh et al.,

2023) although their validity is usually low. Descriptions of physical activity levels in questionnaires usually rely on physical responses to physical activity. Therefore, we hypothesised that the validity of PAQs would be higher in the more physically fit group of participants. To test this, we conducted a validation study with 179 adults whom we divided into three fitness groups based on their cardiovascular fitness and age. Participants were measured for one week using the UKK RM42 accelerometer and self-reported their physical activity using IPAQ-SF, GPAQ, and EHIS-PAQ. We analysed the differences between fitness groups in terms of validity for each PAQ using ANOVA. We also performed an equivalence testing to compare the data obtained with the PAQs and the accelerometers. The results showed a significant trend toward higher validity for moderate to vigorous physical activity from the low to high fitness group as assessed by GPAQ and IPAQ-SF (low, intermediate and high fitness group: 0.06–0.21; 0.26–0.29; 0.40, respectively). Physically fit participants tended to overreport their activity the least, while less fit individuals overreported the most, when using EHIS-PAQ over and underreporting were the smallest. This may lead to misclassification, where physically inactive individuals are incorrectly identified as sufficiently active, and vice versa. Such bias can significantly affect the accuracy of comparisons to WHO recommendations. It is important to highlight that WHO guidelines outline only the minimum level of PA required for general public health benefits. Therefore, healthy and physically fit individuals are encouraged to exceed the 150 minutes of moderate to vigorous PA per week to fully realize the broad spectrum of health benefits associated with adequate and regular PA. Additionally, it would be valuable to examine differences in adherence to physical activity guidelines across various demographic groups (e.g., gender, age), while also emphasizing the importance of using diverse methods for assessing physical activity.

Keywords: physical activity questionnaires, physical activity recommendations, physical activity assessment.

LITERATURE:

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., Carty, C., Chaput, J.-P., Chastin, S., & Chou, R. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, 54(24), 1451–1462.

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., Katzmarzyk, P. T., Alkandari, J. R., Andersen, L. B., Bauman, A. E., Brownson, R. C., Bull, F. C., Craig, C. L., Ekelund, U., Goenka, S., Guthold, R., Hallal, P. C., Haskell, W. L., Heath, G. W., Inoue, S., ... Wells, J. C. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. *The Lancet*, 380(9838), 219–229. [https://doi.org/10.1016/S0140-6736\(12\)61031-9](https://doi.org/10.1016/S0140-6736(12)61031-9)

Meh, K., Sember, V., Sorić, M., Vähä-Ypyä, H., Rocha, P., & Jurak, G. (2023). The dilemma of physical activity questionnaires: Fitter people are less prone to over reporting. *PLOS ONE*, 18(8), e0285357. <https://doi.org/10.1371/journal.pone.0285357>

ADAPTING BODY MASS INDEX CRITERIA AND HANDGRIP STRENGTH AS A STRATEGY TO IMPROVE HEALTH EVALUATION IN OLDER ADULTS LIVING IN MADRID REGION (SPAIN). EXERNET 3.0

Javier MODREGO^{1,2}, Germán VICENTE-RODRÍGUEZ^{2,3,4}, Ignacio ARA-ROYO^{2,5,6}, Jorge PÉREZ-GÓMEZ^{2,7}, Raquel PEDRERO-CHAMIZO^{1,2}, Marcela GONZÁLEZ-GROSS^{1,2,4}, Eva GESTEIRO^{1,2}.

¹ImFine Research Group/ Department of Health and Human Performance. Universidad Politécnica de Madrid

²Physical Exercise and Health Research Network. EXERNET

³Growth, Exercise, Nutrition and Development (EXERGENUD) Research Group/ Department of Physiatry and Nursing. Universidad de Zaragoza, Zaragoza, Spain

⁴Centro de Investigación Biomédica en Red de Fisiopatología de la Obesidad y Nutrición (CIBERObn), Madrid, Spain

⁵GENUD-Toledo Research Group/ Department of Physical Education Universidad de Castilla-La Mancha, Toledo 45071, Spain.

⁶CIBER en Fragilidad y Envejecimiento Saludable (CIBERFES), Madrid, Spain

⁷HEME Research Group/ Department of Didactics of Music, Plastic and Body Expression, University of Extremadura, Spain.

Presenting author: Javier Modrego

INTRODUCTION: Handgrip strength (HGS) has been determined as an independent health marker. Sarcopenia is a growing issue in older adults, especially when it is associated with obesity. Older people's special characteristics make it necessary to modify body mass index (BMI) criteria used for adults. Our aim was to determine the need to use HGS relative (rHGS) to fat mass percentage (%FM) together with BMI status when evaluating strength in older adults.

METHODS 233 older adults (mean age 77.1 ± 5.04 y; 65.2% females) belonging to EXERNET 3.0 study living in the region of Madrid (Spain) were included. Age groups were established (G1: 65-<75y N=79; G2: 75-<85y N=133, G3: ≥ 85 y N=21). HGS was measured twice in both hands with a TKK 501 dynamometer (Takei Scientific Instruments, Tokyo, Japan). Maximum HGS was the highest value obtained. rHGS was calculated as maximum HGS/%FM. BMI was considered both with WHO criteria (<18.5 low body mass; 19-<25 normal weight; 25-<30 overweight; ≥ 30 obesity) and Spanish Society of Geriatrics and Gerontology (SSGG) criteria for older adults (<22 low weight; 22-<27 normal body mass; 27-<30 overweight and ≥ 30 obesity). %FM was measured by bioimpedance analysis (Tanita BC 418-MA, Tanita Corp. Tokyo, Japan). Kruskal-Wallis test analysis, followed by DSCF comparison was performed using Jamovi software v2.6. Significance was set at $p \leq 0.05$.

RESULTS: No significant differences in maximum HGS were found between BMI groups according to either WHO or SSGG criteria for BMI. Significant differences in rHGS were found between normal body mass and obese ($p=0.001$) according to WHO criteria, while between overweight and obese differences were near significance ($p=0.066$). According to SSGG, significant differences in rHGS were found between normal body mass and the other two groups (both $p < 0.001$). Regarding age groups, normal body mass in G1 showed significant differences in rHGS compared with obese ($p=0.05$) according to WHO, while according to

SSGG criteria, significant differences were found when comparing the normal body mass group with obese and overweight (both $p < 0.05$). In G2, only near significant differences were found between normal body mass and obese ($p = 0.054$) according to WHO, while according to SSGG, significant differences were found between normal body mass and the other groups (both $p < 0.05$). In G3, no significant differences were found according to WHO criteria or SSGG.

DISCUSSION Using rHGS following the SSGG criteria for BMI can provide a more accurate evaluation of sarcopenia and health status in older adults living in Madrid region (Spain).

Keywords: sarcopenia, handgrip strength, body mass index.

LITERATURE:

Jeong W, Moon JY, Kim JH. (2023). Association of absolute and relative handgrip strength with all-cause mortality among middle-aged and old-aged people. *BMC Geriatr.* 23; 23(1):321

González Arnáiz E, López Gómez JJ, Ariadel Cobo D, et al. (2025) Absolute and adjusted handgrip strength values in obese patients. *Endocrinol Diabetes Nutr (Engl Ed).* 72(5):501560

Camina-Martín MA, de Mateo-Silleras B, Malafarina V **et al. (2016)**: Valoración del estado nutricional en Geriatría: declaración de consenso del Grupo de Nutrición de la Sociedad Española de Geriatría y Gerontología. [Nutritional status assessment in Geriatrics: Consensus declaration by the Spanish Society of Geriatrics and Gerontology NutritionWork Group]. *Rev Esp Geriatr Gerontol.* 51(1):52-7.

CORTICO-MUSCULAR PHASE CONNECTIVITY IN EARLY-STAGE PARKINSON'S DISEASE: INSIGHTS FROM AN ISOMETRIC MOTOR TASK

Nina OMEJC^{1,2}, Tomislav STANKOVSKI^{3,4}, Manca PESKAR^{5,6}, Miloš KALC⁵, Paolo MANGANOTTI⁷, Klaus GRAMANN⁶, Sašo DŽEROSKI¹, Uros MARUSIC^{5,8}

¹Jožef Stefan Institute, Department of Knowledge Technologies, Ljubljana, Slovenia

²Jožef Stefan International Postgraduate School, Ljubljana, Slovenia

³Faculty of Medicine, Ss. Cyril and Methodius University in Skopje, Skopje, Macedonia

⁴Department of Physics, Lancaster University, LA1 4YB Lancaster, U.K.

⁵Institute for Kinesiology Research, Science and Research Centre Koper, Koper, Slovenia

⁶Department of Psychology and Ergonomics, Faculty V–Mechanical Engineering and Transport Systems, Technische Universität Berlin

⁷Clinical Unit of Neurology, Department of Medical, Surgical and Health Sciences, Cattinara Hospital, University of Trieste, Trieste, Italy.

⁸Department of Health Sciences, Alma Mater Europaea University, Maribor, Slovenia

Presenting author: Nina Omejc

INTRODUCTION: Parkinson's disease is associated with disrupted motor control linked to abnormal beta-band oscillations in cortico-basal ganglia loops. Conventional diagnostic tools such as MDS-UPDRS remain limited in sensitivity and often miss early-stage deficits. In this study, we assessed cortico-muscular interactions using electroencephalography and electromyography, building on prior work that explored cortico-muscular coherence as a marker of motor control efficiency. We extended these analyses by applying a phase dynamics modeling framework. Our goal was to determine whether early Parkinson's disease affects cortico-muscular phase connectivity and whether directional coupling can provide additional diagnostic insight.

METHODS: We analyzed data of 15 individuals with early-stage Parkinson's disease and 16 age- and gender-matched healthy controls. Participants performed three conditions: a motor task (isometric knee extension at 30% maximum voluntary contraction), a cognitive task (silent serial -3 subtraction), and a dual task combining both. Electroencephalogram was recorded using 128 electrodes and electromyogram using two 32-channel arrays on the vastus lateralis muscles. After preprocessing, we computed wavelet-based power spectra, followed by cortico-muscular phase coherence between electroencephalographic and electromyographic signal. We then applied a phase dynamics model and infer its parameters using dynamic Bayesian inference. By this, we were able to infer directional coupling, extract coupling strength and coupling structure.

RESULTS: Electroencephalogram power spectra showed task-dependent but not cohort-dependent differences, with strongest fronto-central activity during the motor task. In contrast, cortico-muscular phase coherence in the 12.5–15 Hz beta range was significantly higher in healthy controls at the Cz electrode during the motor task. The phase dynamics model revealed greater directional coupling from cortex to muscle than vice versa, with coupling strength and structure more pronounced in control group. The Parkinson's disease group exhibited weaker and less consistent coupling functions. Although correlations between

connectivity metrics and UPDRS scores were not statistically significant, we observed trends suggesting their potential clinical relevance.

DISCUSSION: We found that even in early-stage, medicated Parkinson's disease patients, cortico-muscular phase connectivity was altered—particularly in the low-beta range during isolated motor tasks. The topography of phase coherence differed from that of wavelet power, indicating distinct neural mechanisms. Directional modeling showed stronger coupling from cortex to the muscles, also more pronounced in healthy individuals. Despite high inter-individual variability, these findings demonstrated that cortico-muscular phase connectivity holds promise as a non-invasive biomarker. While the approach may not yet be suitable for clinical diagnosis, it could be valuable for tracking individual rehabilitation outcomes. This work has already been published, and additional methodological details and results are available in the full research paper (see references).

Keywords: cortico-muscular connectivity, phase connectivity, electroencephalograph, electromyogram, Parkinson's disease

LITERATURE:

Marusic, U., Peskar, M., Šömen, M. M., Kalc, M., Holobar, A., Gramann, K., ... & Manganotti, P. (2023). Neuromuscular assessment of force development, postural, and gait performance under cognitive-motor dual-tasking in healthy older adults and people with early Parkinson's disease: Study protocol for a cross-sectional Mobile Brain/Body Imaging (MoBI) study. *Open Research Europe*, 3, 58.

Omejc, N., Stankovski, T., Peskar, M., Kalc, M., Manganotti, P., Gramann, K., ... & Marusic, U. (2025). Cortico-Muscular Phase Connectivity During an Isometric Knee Extension Task in People with Early Parkinson's Disease. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*.

Stankovski, T., Duggento, A., McClintock, P. V., & Stefanovska, A. (2012). Inference of time-evolving coupled dynamical systems in the presence of noise. *Physical review letters*, 109(2), 024101.

COMPREHENSIVE CLINICAL AND LABORATORY EVALUATION OF THE EFFECTS OF FUNCTIONAL TRAINING IN OLDER ADULTS

Gábor PAPP^{1,2}, Ádám DIÓS², Ágnes GYETVAI², Attila CSABA ARANY¹, Márta NAGY¹,
Andrea NAGY², László BALOGH¹

¹Institute of Sport Sciences, University of Debrecen,

²Division of Clinical Immunology, Institute of Internal Medicine, Faculty of Medicine, University of Debrecen

Presenting author: Gábor Papp

INTRODUCTION: The chronic, low-grade systemic inflammation that develops in the elderly leads to elevated levels of reactive oxygen species in tissues, which damage cellular organelles and membranes, ultimately resulting in apoptosis and proteolysis. These processes contribute to increased inflammation and degradation in aging muscles, and also play a crucial role in the development of cardiovascular diseases and dementia. Previous research suggests that regular physical activity enhances antioxidant defenses, and increase the resistance of tissues and organs to oxidative stress. Our study aimed to investigate the impact of regular functional exercise on physical fitness, muscle strength and function, and the antioxidant system in women over the age of 65.

METHODS: Sixteen previously sedentary but otherwise healthy women over the age of 65 participated in a six-week functional training program. At the beginning and at the end of intervention, we assessed the motor and cognitive functions of the participants. Blood serum samples were analyzed for the activity of antioxidant enzymes (catalase, superoxide dismutase, and glutathione peroxidase) as well as total serum nitrite/nitrate concentrations and levels of peroxidized lipids. We also measured the serum levels of brain-derived neurotrophic factor and vascular endothelial growth factor.

RESULTS: Participants showed improved physical performance, increased muscle strength and mass, and decreased body fat after the training intervention. Cognitive and coordination test scores also improved. Enzyme activity of catalase increased, along with elevated serum total nitrite/nitrate levels and higher concentrations of brain-derived neurotrophic factor and vascular endothelial growth factor.

DISCUSSION: These findings suggest that regular physical activity may reduce oxidative stress in older adults and thereby slow the progression of tissue damage and functional decline associated with aging. Our findings indicate that appropriately adapted functional training is a suitable form of exercise for improving physical function in older adults, even over a relatively short intervention period.

This research was supported by the National Research, Development and Innovation Fund of Hungary (TKP2021-EGA-20).

Keywords: aging, exercise, oxidative stress, brain-derived neurotrophic factor, vascular endothelial growth factor.

LITERATURE:

Kruk J, Aboul-Enein HY, Kładna A, Bowser JE. (2019). Oxidative stress in biological systems and its relation with pathophysiological functions: the effect of physical activity on cellular redox homeostasis. *Free Radic Res*, 53(5): 497-521.

Papp G, Szabó K, Jámbor I, Mile M, Berki AR, Arany AC, Makra G, Szodoray P, Csiki Z, Balogh L. (2021). Regular Exercise May Restore Certain Age-Related Alterations of Adaptive Immunity and Rebalance Immune Regulation. *Front Immunol*, 12: 639308.

Buzdagli Y, Ozan M, Baygutalp N, Oget F, Karayigit R, Yuce N, Kan E, Baygutalp F, Ucar H, Buzdağlı Y. (2024). The effect of high-intensity intermittent and moderate-intensity continuous exercises on neurobiological markers and cognitive performance. *BMC Sports Sci Med Rehabil*, 16(1): 39.

RELIABILITY AND CONCURRENT VALIDITY OF THE 30-15 INTERMITTENT FITNESS TEST FOR ASSESSING CARDIORESPIRATORY FUNCTION IN PREHYPERTENSIVE INDIVIDUALS

Armin PARAVLIĆ^{1,2,3}, Gašper TURNŠEK¹, Simon ISKRA¹, Kristina DROLE¹

¹Faculty of Sport, University of Ljubljana, Ljubljana, Slovenia

²Science and Research Centre Koper, Institute for Kinesiology Research, Koper, Slovenia

³Faculty of Sport Studies, Incubator of Kinanthropology Research, Masaryk University, Brno, Czech Republic

Presenting author: Armin Paravlić

INTRODUCTION: While exercise is not medicine in the traditional sense, it serves as a powerful tool for preventing and managing various diseases. Therefore, its precise prescription must be ensured. In the context of aerobic exercise, various methods exist for assessing maximal aerobic capacity, also known as $\text{VO}_{2\text{max}}$. Among these, the cardiopulmonary exercise test performed on a treadmill or stationary bicycle is considered the gold-standard method. However, this test is not optimal for large-scale assessments due to costly equipment and discomfort associated with wearing a mask, potentially limiting its broader applicability. As a feasible alternative to laboratory-based $\text{VO}_{2\text{max}}$ assessments, the 30-15 intermittent fitness test was initially introduced for athletic populations, however, its reliability and validity have not yet been assessed in specific populations such as prehypertensive individuals.

METHODS: We recruited 13 participants (11 males, 2 females; mean age: 24.17 ± 2.49 , mean body mass index $24.21 \pm 2.40 \text{ kg/m}^2$). Participants attended three laboratory visits, each separated by 3 to 7 days. During these visits, they performed a cardiopulmonary exercise test on a treadmill on one visit and the 30-15 intermittent fitness tests on the tartan court during the other two visits. At the initial visit, demographic characteristics, anthropometric measurements and physical activity level were assessed. Hemodynamic parameters including blood pressure, vascular reactivity, and arterial stiffness of brachial artery were assessed using (Vicorder, 80 Beats Medical, United Kingdom).

RESULTS: Very high reliability ratings were observed for 30-15 intermittent fitness test measures, as follows: end-running speed ($\text{ICC} = 0.990$, $p < 0.001$), maximal heart rate ($\text{ICC} = 0.819$, $p < 0.001$), and equation-derived $\text{VO}_{2\text{max}}$ ($\text{ICC} = 0.984$, $p < 0.001$). Furthermore, $\text{VO}_{2\text{max}}$ and maximal heart rate assessed by 30-15 intermittent fitness test highly correlated with measures obtained from treadmill cardiopulmonary exercise testing ($\text{VO}_{2\text{max}}$, $r = 0.814$, $p < 0.001$; and maximal heart rate, $r = 0.912$, $p < 0.001$). Additionally, moderate to high associations were found between measures of maximal aerobic capacity, vascular reactivity and arterial stiffness (all $r \geq 0.450$, $p < 0.05$).

DISCUSSION: The results of this study demonstrate that the 30-15 intermittent fitness test is a reliable and valid tool for assessing maximal aerobic capacity in prehypertensive individuals. Furthermore, the findings indicate that clinically significant cardiovascular health indicators, such as vascular reactivity of the brachial artery assessed via flow-mediated slowing, are positively associated with cardiorespiratory fitness. Future research should explore the feasibility of using the 30-15 intermittent fitness test to prescribe endurance training in prehypertensive populations.

Keywords: CPET, 30-15 IFT, vascular function, high blood pressure, exercise prescription.

Acknowledgements: The authors would like to thank the participants for their involvement in this study.

Funding: The research is part of projects funded by the University of Ljubljana's Development Fund titled "The role of physical Activity in Cardiovascular disease risk reducTiON for Non-communicable diseases. Do non-responders to exercise really exist?" (Project ID: 005-1/2023) and "The role of physical Activity in Cardiovascular disease risk reducTiON – On the way to personalized exercise prescription (ACT-ON)" (project ID: 802-15/2023-5).

LITERATURE:

Hanssen, H., Boardman, H., Deiseroth, A., Moholdt, T., Simonenko, M., Kränkel, N., Niebauer, J., Tiberi, M., Abreu, A., Solberg, E. E., Pescatello, L., Brguljan, J., Coca, A., & Leeson, P. (2022). Personalized exercise prescription in the prevention and treatment of arterial hypertension: A Consensus Document from the European Association of Preventive Cardiology (EAPC) and the ESC Council on Hypertension. *European Journal of Preventive Cardiology*, 29(1), 205–215. <https://doi.org/10.1093/eurjpc/zwaa141>

Mohoric, U., Sibila, M., Abazovic, E., Jovanovic, S., & Paravlic, A. H. (2022). Comparison of the Field-Based Intermittent Running Fitness Test 30-15 and the Treadmill Multistage Incremental Test for the Assessment of Cardiorespiratory Fitness in Elite Handball Players. *International Journal of Environmental Research and Public Health*, 19(6). <https://doi.org/10.3390/ijerph19063535>

Paravlic, A. H., Simunic, B., Pisot, R., Rauter, S., & Stuhlec, S. (2022). The reliability , validity and usefulness of the 30 – 15 intermittent fitness test for cardiorespiratory fitness assessment in military personnel. *Scientific Reports*, 1–8. <https://doi.org/10.1038/s41598-022-20315-3>

Pereira, T., Almeida, A., & Conde, J. (2018). *Flow-Mediated Slowing as a Methodological Alternative to the Conventional Echo-Tracking Flow-Mediated Dilation Technique for the Evaluation of Endothelial Function: A Preliminary Report*. <https://research.ebsco.com/linkprocessor/plink?id=971337cb-e56b-36f5-8597-c839a5fd9a04>

TREATMENT WITH IRISIN IN AGED MICE MIMICS THE EFFECTS OF EXERCISE BY INCREASING THE SIZE OF THE HIPPOCAMPUS AND THE CELLULARITY OF THE DENTATE GYRUS THROUGH THE ENHANCEMENT OF KEY FACTORS OF NEUROPLASTICITY

Luisa PELLICANI¹, Manuela DICARLO², Patrizia PIGNATARO¹, Onofrio TERREVOLI²,
Michela TAURINO¹, Roberta ZERLOTIN², Clelia SURIANO¹, Angela ORANGER²,
Graziana COLAIANNI², Silvia COLUCCI¹, Maria GRANO²

¹Department of Translational Biomedicine and Neuroscience, University of Bari, Bari, Italy

²Department of Precision and Regenerative Medicine and Ionian Area, University of Bari, Bari, Italy

Presenting author: Luisa Pellicani

INTRODUCTION: In recent years, there has been growing evidence suggesting a positive association between regular physical activity and brain health in older adults. Both animal and human studies have evidenced that physical activity induces functional and morphological changes in the hippocampus, the brain area primarily related to memory and learning. Recently, we and others have demonstrated that irisin, a peptide secreted by skeletal muscle upon exercise, enhances the expression of factors associated to brain plasticity. Circulating irisin crosses the blood-brain barrier and stimulates the synthesis of its precursor, the Fibronectin type III domain-containing protein 5 (FND5). Indeed, we reported that peripheral administration of irisin was effective in reducing the depressive behaviours in young mice by increasing the expression of neurotrophins.

In this study, we investigated the molecular mechanisms underlying the effect of irisin by evaluating the expression of key neuroplasticity factors and the morphology of the hippocampus.

METHODS: 12-month-old C57BL/6J mice were subcutaneously injected with recombinant irisin (100 µg/kg) (n=11) or vehicle (0.9% saline solution) (n=8) once a week for 8 months. Mice were sacrificed, and their brains were dissected to isolate the hippocampus. For the gene expression analysis, Real time PCR assay was performed on homogenized hippocampus samples. For brain morphology, 5 mm thick sagittal sections of the hippocampus were stained with Cresyl violet and digitalized using the Aperio ScanScope CS (Leica Biosystems). Contour tracing with the ImageJ software was used for height and width measurements of hippocampus and dentate gyrus. At least 5 high power fields were analysed for each section by two independent observers.

RESULTS: In the hippocampus of aged mice, irisin treatment increased the expression of exercise-induced neuroplasticity factors such as brain-derived neurotrophic factor (*Bdnf*) ($p<0.05$), nerve growth factor (*Ngf*) ($p<0.05$), and fibroblast growth factor 2 (*Fgf-2*) ($p<0.01$) compared with vehicle-treated mice. Of note, the gene expression of irisin precursor, *Fndc5*, and its coactivator factor, peroxisome proliferator-activated receptor gamma coactivator 1-alpha (*Pgc-1α*), were significantly increased in the hippocampus. Moreover, morphometric measurements in the brain sections stained with cresyl-violet demonstrated an increased hippocampus width ($p<0.05$) and dentate gyrus cellularity area ($p<0.05$) in irisin-treated mice.

DISCUSSION: Our findings revealed that prolonged systemic treatment with irisin in aged mice mimics the effects of physical exercise, reversing the age-related decline in hippocampal volume, which is often accompanied by a reduction in memory functions. The increased expression of neuroplasticity factors in the hippocampus was suggestive of an irisin-induced cognitive improvement, likely due to the major activation of FND5/irisin system. The present study paves the way towards the possibility to use irisin treatment as a potential substitute of exercise for ageing-related cognitive disease therapy.

Keywords: irisin, brain, exercise

LITERATURE:

Xu, L. et al. (2023). The Effects of Exercise for Cognitive Function in Older Adults: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Int J Environ Res Public Health*, 20(2):1088.

Pignataro, P. et al. (2022). Antidepressant Effect of Intermittent Long-Term Systemic Administration of Irisin in Mice. *Int J Mol Sci.*, 23(14):7596.

Dicarulo, M. et al. (2023). Short-Term Irisin Treatment Enhanced Neurotrophin Expression Differently in the Hippocampus and the Prefrontal Cortex of Young Mice. *Int J Mol Sci.*, 24(11): 9111.

Dicarulo M, et al. (2024). Irisin Levels in Cerebrospinal Fluid Correlate with Biomarkers and Clinical Dementia Scores in Alzheimer Disease. *Ann Neurol.*, 96(1):61-73.

Erickson KI, et al. (2011). Exercise training increases size of hippocampus and improves memory. *Proc Natl Acad Sci U S A*, 108(7):3017-22.

SPECTRAL POWER AND EVENT-RELATED POTENTIALS ASSOCIATED WITH COGNITIVE-MOTOR DUAL-TASK BALANCING IN EARLY PARKINSON'S DISEASE

Manca PESKAR^{1,2}, Paolo MANGANOTTI³, Klaus GRAMANN², Uros MARUSIC^{1,4}

¹ Institute for Kinesiology Research, Science and Research Centre Koper, Slovenia

² Biological Psychology and Neuroergonomics, Department of Psychology and Ergonomics, Faculty V: Mechanical Engineering and Transport Systems, Technische Universität Berlin, Berlin, Germany

³ Clinical Unit of Neurology, Department of Medicine, Surgery, and Health Sciences, Trieste University Hospital - ASUGI, University of Trieste, Trieste, Italy

⁴ Department of Health Sciences, Alma Mater Europaea – ECM, Maribor, Slovenia

Presenting author: Manca Peskar

INTRODUCTION: Individuals with Parkinson's Disease (PD) often compensate for impaired automatic balance control by recruiting additional attentional resources for motor tasks. However, as the disease progresses, cognitive function also deteriorates, further compromising postural stability. The interaction between cognitive and motor systems in the early stages of PD remains insufficiently understood. This study aimed to elucidate behavioral and neurophysiological changes in early-stage PD, providing a more precise characterization of disease-related deviations from healthy cognitive and motor functioning.

METHODS: Eighteen individuals with PD (mean age: 62.9 ± 6.6 years) and 18 age-matched healthy controls (mean age: 62.9 ± 6.4 years) performed three tasks: (i) a balance single-task in a semi-tandem stance (ST-sts), (ii) a visual oddball single-task featuring conflicting Stroop color-word stimuli (ST-Stroop), and (iii) a dual-task (DT) combining both. Postural stability was assessed via center-of-pressure displacement using a force plate, while neurophysiological responses were recorded using 128-channel electroencephalography (EEG).

RESULTS: Participants with PD exhibited reduced ($p = .009$) and slower ($p = .008$) postural sway compared to controls. Additionally, less sway was observed during DT than ST ($p < .001$). EEG analyses revealed distinct spectral activity patterns across both groups: central midline low-frequency (delta, theta) power increased with cognitive load ($p < .012$), centro-parietal beta desynchronization intensified with motor engagement ($p < .050$), and parietal alpha desynchronization was more pronounced in DT ($p = .025$), underscoring the functional roles of specific frequency bands in cognitive-motor integration. Additionally, PD participants compared to healthy controls exhibited delayed event-related P300 responses ($p = .034$), a component associated with conflict resolution, suggesting compensatory neural strategies or impaired neural efficiency.

DISCUSSION: Reduced sway in PD may result from postural rigidity and tonic muscle activation, whereas reduced sway in DT could reflect enhanced automatic postural control while conscious attention was directed to the cognitive task. The findings demonstrate that in medicated participants with early-stage PD, the cortical power spectra are indistinguishable from those of healthy controls. At the same time, data indicate that the cognitive-related evoked potentials might offer more sensitivity to disease-specific cortical changes and that selective attention capacities may be more vulnerable than sensory acuity in early PD.

Keywords: EEG, Parkinson's disease, center of pressure displacement

LITERATURE:

Ivanenko, Y. & Gurfinkel, V. S. Human postural control. *Front. Neurosci.* **12**, 1–9 (2018).

Polskaia, N., Richer, N., Dionne, E. & Lajoie, Y. Continuous cognitive task promotes greater postural stability than an internal or external focus of attention. *Gait Posture* **41**, 454–458 (2015).

Cavanagh, J. F. & Frank, M. J. Frontal theta as a mechanism for cognitive control. *Trends Cogn. Sci.* **18**, 414 (2014).

Barone, J. & Rossiter, H. E. Understanding the Role of Sensorimotor Beta Oscillations. *Front. Syst. Neurosci.* **15**, 1–7 (2021).

Kahya, M. *et al.* Brain activity during dual-task standing in older adults. *J. Neuroeng. Rehabil.* **19**, 1–10 (2022).

DYNAMIC BALANCE AND LATERAL ASYMMETRY IN PRESCHOOL CHILDREN: DIFFERENCES BETWEEN CONTINENTAL AND COASTAL REGIONS OF CENTRAL EUROPE

Vilko PETRIĆ¹, Sanja LJUBIČIĆ¹, Donata VIDAKOVIĆ SAMARŽIJA²

¹Faculty of Teacher Education, University of Rijeka, Croatia

²Department of Teacher and Preschool Teacher Education, University of Zadar, Croatia

Presenting author: Sanja Ljubičić

INTRODUCTION: Dynamic balance is a complex ability that emerges early in life and is essential for motor development. It implies the ability to maintain stability while anticipating and responding to changes as the body moves through space. The aim of this study was to examine differences in dynamic balance and lateral asymmetry among preschool children based on their region of residence, specifically comparing continental (Ljubljana, Zagreb) and coastal areas (Koper, Rijeka) of Central Europe. Knowledge of regional differences in motor development is important because environmental, cultural, and lifestyle factors can significantly influence children's motor competencies. Impaired balance and a high degree of lateral asymmetry may have long-term consequences for participation in physical activity, injury risk, and overall health. The findings of this study may assist in designing targeted interventions in the preschool period that promote balanced and comprehensive motor development.

METHODS: A total of 280 boys and girls aged 4 to 6 years were recruited from four major cities in Croatia and Slovenia. Vertical jump performance was assessed using the drift protocol with the reliable and valid Optojump measuring system. Descriptive statistics were calculated, and data were analyzed using analysis of variance (ANOVA) and independent samples t-tests.

RESULTS: The results indicated that children from the Ljubljana region exhibited significantly poorer dynamic balance ($p < 0.001$), while children from coastal areas demonstrated significantly better performance compared to those living in continental regions of Europe ($p = 0.03$). Analysis of the total sample also revealed notable asymmetries between the left and right leg, exceeding the recommended threshold of 15%.

DISCUSSION: Deviations in lateral asymmetry can manifest as deviations in movement control and poorer spatial orientation. These findings emphasize the importance of regional and individual monitoring of motor development and highlight the need for targeted interventions that will promote balanced development of motor skills.

Keywords: children, preschool age, dynamic balance, lateral asymmetry, continental and coastal Europe.

LITERATURE:

Latorre-Román PA. et al. (2021). Analysis of dynamic balance in preschool children through the balance beam test: A cross-sectional study providing reference values. *Gait & posture*, 83: 294–299. <https://doi.org/10.1016/j.gaitpost.2020.11.004>

Li R, Liu M, Zhu J, Li R, Zhao H, & Zhang L. (2022). Age and gender differences in static and dynamic balance of Chinese preschool children. *Frontiers in physiology*, 13: 1013171. <https://doi.org/10.3389/fphys.2022.1013171>

Sibley KM, Beauchamp MK, Van Ooteghem K, Straus SE, & Jaglal SB. (2015). Using the systems framework for postural control to analyze the components of balance evaluated in standardized balance measures: a scoping review. *Archives of physical medicine and rehabilitation*, 96(1): 122–132.e29. <https://doi.org/10.1016/j.apmr.2014.06.021>

CORRELATION BETWEEN IRISIN, AN EXERCISE-INDUCED MYOKINE, AND MULTI-DOMAIN COGNITION IN DEMENTIA PATIENTS

Patrizia PIGNATARO¹, Manuela DICARLO², Chiara ZECCA³, Daniele URSO³,
Maria Teresa DELL'ABATE³, Davide VILELLA³, Onofrio TERREVOLI², Luisa PELLICANI¹,
Michela TAURINO¹, Clelia SURIANO¹, Angela ORANGER², Graziana COLAIANNI²,
Silvia COLUCCI¹, Maria GRANO², Giancarlo LOGROSCINO³

¹ Department of Translational Biomedicine and Neuroscience (DiBrain), University of Bari "A. Moro", Bari, Italy.

² Department of Precision and Regenerative Medicine and Ionian Area (DiMePre-J), University of Bari "A. Moro", Bari, Italy.

³ Center for Neurodegenerative Diseases and the Aging Brain, University of Bari "A. Moro" at "Pia Fondazione Card G. Panico" Hospital, Tricase, Italy.

INTRODUCTION: Dementia is a common disabling neurocognitive disorder associated with a progressive deterioration of brain functions, and it mainly affects people older than 65 years of age. There is an increasingly emerging need to identify specific markers of dementia for interventions before disease progression and the cognitive decline becomes severe. Irisin is a myokine, recently discovered, produced by skeletal muscle during physical activity and released into the bloodstream with multiple effects on various organs. Recently, it has been discovered that irisin exerts a neuroprotective role on the brain. Circulating irisin crosses the blood-brain barrier and stimulates the synthesis of its precursor, the Fibronectin type III domain-containing protein 5 (FNDC5) with a forward loop that amplifies its local concentration in the brain. Here, we investigated the association of irisin with cognition in a cohort of dementia patients biologically classified according to the Amyloid- β -Tau-Neurodegeneration classification system.

METHODS: Cerebrospinal fluid (CSF) and serum irisin levels were measured using enzyme-linked immunoassays in patients with Alzheimer's disease (AD, n=82), mild cognitive impairment (MCI, n=44), and subjective memory complaint (SMC, n=20) to evaluate its possible association with cognition. After enrolling 146 subjects, an extensive neuropsychological examination was performed using 18 tests including the Mini Mental State Examination, the Frontal Assessment Battery, and the Clock Drawing Test, three screening tests used to assess global cognitive efficiency. Psychometric tests such as Trail Making Test (version A and B), Rey-Osterrieth Complex Figure, Rey Auditory Verbal Learning test, Stroop Color and Word Test, Verbal Fluency test, Digit Span, Boston Naming Test etc., were administered to evaluate the efficiency of single domain (memory, attention, executive functions, language, and visuospatial abilities). Data were analyzed using the GraphPad Prism (version 9.0) statistical software. Datasets were initially checked for normal distribution by the Shapiro-Wilk normality test. Correlations were performed using Spearman or Pearson correlation coefficient test. Results were significant at $p < 0.05$.

RESULTS: Decreased CSF and serum irisin levels were observed in AD and MCI patients compared to SMC. A significant correlation has been found between irisin in the CSF and serum and global cognitive efficiency, as well as with specific cognitive domains such as memory, executive functions, attention, visuospatial abilities, and language. Higher levels of CSF and serum irisin were associated with better cognitive performance.

DISCUSSION: Our results highlighted the key involvement of irisin in multi-domain cognition, indicating its potential role as a cognitive biomarker of AD progression. These findings encourage further investigations suggesting FNDC5/irisin pathway as a potential target for therapeutic strategies to counteract cognitive impairment in AD patients.

Keywords: Alzheimer's disease, mild cognitive impairment, subjective memory complaint, cognition, dementia, irisin.

LITERATURE:

Pignataro, P., Dicarlo M. et al. *Int J Mol Sci*, 2021;22:1605.

Islam, M.R. et al. *Nature metabolism*, 2021; 3: 1058-1070.

Peng, J. and J. Wu *Front Aging Neurosci*, 2022. 14: 863901.

Jack, C.R. Jr et al. *Alzheimers Dement*, 2018;14:535-62.

EXERGAMING REJUVENATES RESTING-STATE BRAIN COMPLEXITY AND MODULATES ADAPTABILITY DURING GAMEPLAY IN OLDER ADULTS: AN EEG MULTISCALE ENTROPY STUDY

Daghan PISKIN¹, Helen MÜLLER^{1,2}, Nina SKJÆRET-MARONI², Beatrix VEREIJKEN²,
Jochen BAUMEISTER¹

¹Exercise Science and Neuroscience Unit, Department of Exercise & Health, Paderborn University, Germany,

²Department of Neuromedicine and Movement Science, Norwegian University of Science and Technology (NTNU), Norway

Presenting author: Daghan Piskin

INTRODUCTION: Age-related changes in brain signal complexity are associated with cognitive decline and reduced neural adaptivity in older adults. Exergaming presents a promising prophylactic intervention enabling both physical and cognitive training. The aim of the present study was to assess changes in brain signal complexity following a 12-week exergaming intervention in elderly adults, both at resting-state and during gameplay.

METHODS: Twenty-eight healthy older adults participated in a 12-week exergaming intervention. Electroencephalography was recorded using 65 active electrodes at resting state and during exergaming at first and last sessions. Brain signal complexity was quantified using multiscale entropy analysis on preprocessed signal across 64 time scales.

RESULTS: Post-intervention resting-state electroencephalography revealed a significant reduction in complexity at fine scales and a significant increase in complexity at coarse scales across frontal, central, and posterior brain regions. During active exergaming, signal complexity predominantly decreased at coarse scales post-intervention at all three regions.

DISCUSSION: The observed changes in resting-state complexity suggest a younger brain profile by shifting default cortical dynamics from age-associated increased local processing towards enhanced distributed processing, potentially counteracting age-related increases in neural modularity. The decrease in complexity at coarse scales during gameplay may indicate more efficient, specialized neural processing as a result of learning and higher adaptability. These findings indicate that exergaming can positively influence brain signal complexity in older adults, offering a potential avenue to minimize age-related neural decline and support healthy brain aging.

Keywords: aging, brain complexity, exergaming, electroencephalography, multiscale entropy.

LITERATURE:

McIntosh, A. R., Vakorin, V., Kovacevic, N., Wang, H., Diaconescu, A., & Protzner, A. B. (2014). Spatiotemporal dependency of age-related changes in brain signal variability. *Cerebral Cortex*, 24(7), 1806-1817.

Müller, H., Baumeister, J., Bardal, E. M., Vereijken, B., & Skjæret-Maroni, N. (2023). Exergaming in older adults: the effects of game characteristics on brain activity and physical activity. *Frontiers in Aging Neuroscience*, 15, 1143859.

Wang, H., McIntosh, A. R., Kovacevic, N., Karachalios, M., & Protzner, A. B. (2016). Age-related multiscale changes in brain signal variability in pre-task versus post-task resting-state EEG. *Journal of cognitive neuroscience*, 28(7), 971-984.

Wang, C. H., Tsai, C. L., Tseng, P., Yang, A. C., Lo, M. T., Peng, C. K., ... & Liang, W. K. (2014). The association of physical activity to neural adaptability during visuo-spatial processing in healthy elderly adults: A multiscale entropy analysis. *Brain and Cognition*, 92, 73-83.

THE POWER OF GRAVITY: FROM EVOLUTIONARY NECESSITY TO HUMAN HEALTH

Rado PIŠOT¹, Boštjan ŠIMUNIČ¹, Gianni BIOLO², Uroš MARUŠIČ¹, Marco NARICI^{1,3}

¹Science and Research Centre, Koper, Slovenia

²Department of Medical Sciences, University of Trieste, Italy

³Department of Biomedical Sciences, University of Padova, Padua, Italy

Presenting author: Rado Pišot

INTRODUCTION: Gravity has been the constant environmental force shaping life on Earth throughout evolution, profoundly influencing human biology by guiding anatomical structures, musculoskeletal architecture, and physiological regulation. Human adaptation to gravity drove major skeletal changes that enabled upright posture and bipedalism, the evolution of a double-curved spine for balance, and cardiovascular adjustments—such as elevated blood pressure—to sustain cerebral perfusion. Human physiology developed under a 1-g gravitational field; removal or reduction of gravitational load—through prolonged physical inactivity (sedentary behaviour), bed rest, or spaceflight analogs—reveals vulnerabilities in musculoskeletal integrity, cardiovascular regulation, respiratory function, metabolism, and motor control.

METHODS: Controlled bed rest protocols, ranging from horizontal to head-down tilt and lasting days to months, have provided unique insights into the deleterious effects of physical inactivity (PI). Over the past two decades, research at the Bedrest Centre Koper, Slovenia, in collaboration with hospitals and international partners, has shown that PI induces rapid declines in muscle mass, strength, aerobic capacity, glucose metabolism, and motor control.

RESULTS: Lower-limb muscles demonstrate marked atrophy and altered twitch contraction properties. Recent studies report up to ~12% muscle volume loss and ~23% force reduction after only 21 days of inactivity. Likewise, proteomic analyses after 21 days of head-down bed rest revealed changes in endothelial function, coagulation pathways, and markers associated with increased cardiovascular risk.

DISCUSSION: These findings highlight the paradox of rest: while necessary for recovery, prolonged inactivity in the absence of gravitational load accelerates functional decline, closely mimicking aging. Importantly, multimodal interventions—including nutritional support, daily cognitive training during bed rest, and pre-bed rest conditioning—significantly mitigate these declines and accelerate recovery, with active preparation proving most effective. We have developed an integrated approach that prevents inactivity-induced muscle atrophy, strength loss, insulin resistance, and declines in both physical and cognitive performance in older adults during short-term bed rest.

Understanding these processes is critical for designing user-centered countermeasures with translational impact for spaceflight, rehabilitation, and healthy longevity. This approach also shows promise for clinical application in hospitalized elderly populations. Overall, these findings underscore that gravity is not merely a background force but a fundamental determinant of health. Recognizing its role provides insight into risks posed by sedentary lifestyles,

hospitalization, or microgravity, and informs the development of targeted countermeasures—such as resistance training, nutritional strategies, and functional rehabilitation—to preserve function, promote recovery, and sustain healthy aging.

Keywords: gravity, evolution, bed rest, muscle atrophy, rehabilitation.

LITERATURE:

Sarto, F., et al. (2025). Twenty-one days of bed rest alter motor unit properties and lower limb muscle size in healthy adults. *Journal of Applied Physiology*. Advance online publication.

Kashirina, D. N., et al. (2024). Assessment of the effect of 21-day head-down bed rest on the cardiovascular system by blood proteomic profile data. *Frontiers in Physiology*, 15, 1375929.

Di Girolamo, F. G., et al. (2021). The aging muscle in experimental bed rest: A systematic review and meta-analysis. *Frontiers in Nutrition*, 8, 724844.

Pišot, R. et al. (2025). Addressing the paradox of rest with innovative technologies. *Slovenian journal of public health : the journal of National Institute of Public Health*. [Online ed.]. 2025, letn. 64, št. 2, str. 68-72.

Lieberman, D. E. (2011). *The evolution of the human head*. Cambridge, MA: Harvard University Press.

GENDER DIFFERENCES IN PHYSICAL ACTIVITY AS AN ADAPTATION TO THE COVID-19 CRISIS IN OLD AGE

Saša PIŠOT¹ and Kaja TERAŽ^{1,2}

¹Institute for Kinesiology research, Science and research centre Koper, Slovenia

²Department of Medical, Surgical, and Health Sciences, University of Trieste, Italy

Presenting author: Saša Pišot

INTRODUCTION: The COVID-19 pandemic posed significant challenges for older adults, accelerating lifestyle changes and increasing social isolation. Physical activity (PA) is known to contribute to resilience and healthy ageing. This study investigates whether individuals who were physically active prior to the pandemic were better equipped to adapt to age-related and pandemic-related changes. A secondary focus examines gender differences in adaptation and perceived future outlook.

METHOD: We conducted a longitudinal study of physically active older adults from 2013 to 2021. PA was assessed by using the Global Physical Activity Questionnaire (GPAQ) and supplementary socio-demographic questions. Additionally, a qualitative analysis of 52 semi-structured interviews (30 women, 22 men; mean age 68.4 ± 5.6) explored experiences with PA and perspectives on post-pandemic life. Participants were coded for (1) pre-pandemic PA levels, (2) adaptation to COVID restrictions, and (3) views on the future. An explanatory mixed-method design with thematic analysis was performed with attention to gender-based variation.

RESULTS: *Adaptation and Pre-pandemic Activity:* both genders reported reduced sedentary behaviour compared to baseline and health-enhancing physical activity (HEPA) standards (>3000 MET-min/week; males = 4425.3 ± 2821.3 ; females = 3575.8 ± 2491.3). Participants with regular pre-pandemic PA routines (e.g., walking, exercise, gardening, dance) reported fewer negative physical and emotional impacts and showed greater adaptability (e.g., switching to solo walks or home routines). Less active individuals more frequently described declines in mobility, motivation, and mental well-being, with some not resuming activity post-restriction.

Gender Differences: Active women, while resilient, more often reported emotional strain, social withdrawal, and concerns about health decline. Active men tended to maintain routines more consistently, often through outdoor daily physical work and informal sports. Men were also more likely to express rational or structural concerns (e.g., economic, institutional), while women voiced more personal and relational distress.

DISCUSSION: Over the eight years, shifts in PA involved replacing structured activities with informal ones such as walking or household tasks. During COVID-19, lifestyle restrictions led to increased time in nature and domestic PA, potentially reducing sedentary behaviour. Pre-pandemic PA supported adaptability with active individuals maintaining routines and coping proactively. Gendered differences in emotional and social responses underscore the need for lifelong PA promotion and gender-sensitive public health strategies to foster resilience in ageing populations.

Keywords: Physical activity, Ageing, Gender differences; Coping strategies, future perspective

LITERATURE:

Acree, L. S., Longfors, J., Fjeldstad, A. S., Fjeldstad, C., Schank, B., Nickel, K. J., ... & Gardner, A. W. (2006). Physical activity is related to quality of life in older adults. Health and quality of life outcomes, 4, 1-6. doi:10.1186/1477-7525-4-37;

Rivera-Torres, S., Fahey, T. D., & Rivera, M. A. (2019). Adherence to exercise programs in older adults: informative report. *Gerontology and geriatric medicine*, 5, 2333721418823604. <https://doi.org/10.1177/2333721418823604>;

Teraž, K., Pišot, S., Šimunic, B., & Pišot, R. (2022). Does an active lifestyle matter? A longitudinal study of physical activity and health-related determinants in older adults. *Frontiers in public health*, 10, 975608; <https://doi.org/10.3389/fpubh.2022.975608>;

Menec VH. The relation between everyday activities and successful aging: a 6-year longitudinal study. *J Gerontol B Psychol Sci Soc Sci*. (2003) 58:S74–82. doi: 10.1093/geronb/58.2.S74;

Lawlor DA. Is housework good for health? Levels of physical activity and factors associated with activity in elderly women. Results from the British Women's heart and health study. *J Epidemiol Community Health*. (2002) 56:473–8. doi: 10.1136/jech.56.6.473.

MOVING BEYOND PAIN: EFFECTS OF INDIVIDUALIZED EXERCISE AND WALKING PROGRAM IN LUMBAR SPINAL STENOSIS PATIENTS

Katja PLASKAN¹, Maja PAJEK¹, Miha VODIČAR²

¹Faculty of Sport, University of Ljubljana, Ljubljana, Slovenia

²Orthopedic Clinic, University Medical Centre Ljubljana and Medical faculty, University of Ljubljana, Slovenia

Presenting author: Katja Plaskan

INTRODUCTION: Lumbar spinal stenosis (LSS) is a common degenerative condition among older adults, frequently associated with neurogenic claudication and reduced walking ability. Precise assessment of functional limitations and pain is essential for evaluating disease progression and treatment outcomes.

METHODS: In this prospective study 66 patients diagnosed with LSS based on clinical and radiological criteria were enrolled between September 2024 to May 2025. The primary outcomes were Visual Analogue Scale (VAS) and total distance walked during the 6- Minute Walk Test (6MWT). We used a repeated-measures ANOVA to examine changes in VAS and 6MWT over time and whether these changes differed by randomization group.

RESULTS: Preliminary data showed a significant main effect of time, $F(1.25, 47.60) = 22.28, p < 0.001$, indicating that 6MWT changed significantly across time points. Additionally, a significant time $\times$ group interaction was observed, $F(1.25, 47.60) = 8.62, p = 0.003$, indicating differential improvements across groups. Pain levels also improved significantly over time, as shown by the VAS scores VAS, $F(1.97, 70.98) = 5.26, p = 0.008$ (Greenhouse-Geisser corrected).

DISCUSSION: This study suggests that the individualized exercise and walking program led to meaningful improvements in both pain reduction and walking capacity in LSS patients. The results highlight the value of non-operative interventions in managing symptoms and enhancing quality of life in this population.

Keywords: spine, exercise, program, walking ability, pain

LITERATURE:

Ammendolia, C., Hofkirchner, C., Plener, J., Bussi res, A., Schneider, M. J., Young, J. J., Furlan, A. D., Stuber, K., Ahmed, A., Cancelliere, C., Adeboyejo, A., & Ornelas, J. (2022). Non-operative treatment for lumbar spinal stenosis with neurogenic claudication: an updated systematic review. *BMJ Open*, 12(1). <https://doi.org/10.1136/BMJOPEN-2021-057724>

Comer, C., Williamson, E., McIlroy, S., Srikanesan, C., Dalton, S., Melendez-Torres, G. J., & Lamb, S. E. (2024). Exercise treatments for lumbar spinal stenosis: A systematic review and intervention component analysis of randomised controlled trials. *Clinical Rehabilitation*, 38(3), 361–374. <https://doi.org/10.1177/02692155231201048>

Dobkin, B. H. (2019). Provocative Walking Test of Strength for Diagnosis, Management, and Outcome Assessment of Symptomatic Lumbar Spinal Stenosis. *Neurorehabilitation and Neural Repair*, 33(12), 1003–1007. <https://doi.org/10.1177/1545968319876256>

Lang, A. E., Hendrick, P. A., Clay, L., Mondal, P., Trask, C. M., Bath, B., Penz, E. D., Stewart, S. A., Baxter, G. D., Hurley, D. A., McDonough, S. M., & Milosavljevic, S. (2021). A randomized controlled trial investigating effects of an individualized pedometer driven walking program on chronic low back pain. *BMC Musculoskeletal Disorders*, 22(1). <https://doi.org/10.1186/S12891-021-04060-8>

Marchand, A. A., Houle, M., O'Shaughnessy, J., Châtillon, C. É., Cantin, V., & Descarreaux, M. (2021). Effectiveness of an exercise-based prehabilitation program for patients awaiting surgery for lumbar spinal stenosis: a randomized clinical trial. *Scientific Reports*, 11(1), 1–13. <https://doi.org/10.1038/s41598-021-90537-4>

ADHERENCE TO THE MEDITERRANEAN DIET AND RISK OF LOW MUSCULAR STRENGTH IN CHILDREN: THE ASOMAD STUDY

Alicia PORTALS-RIOMAO^{1,2,5}, Asmaa NEHARI¹, Jaime LÓPEZ-SEOANE^{1,2},
Lisset PANTOJA-ARÉVALO^{1,2}, Marcela GONZÁLEZ-GROSS^{1,2,3},
Carlos QUESADA-GONZÁLEZ^{1,4}, Eva GESTEIRO^{1,2}, Augusto G. ZAPICO^{1,2}

¹ImFINE Research Group, Department of Health and Human Performance, Universidad Politécnica de Madrid, Madrid, Spain

²Physical Exercise and Health Research Network, EXERNET, Madrid, Spain.

³Biomedical Research Center of Pathophysiology of Obesity and Nutrition-CIBERObn, Carlos III Health Institute, Madrid, Spain

⁴Department of Mathematics Applied to Information and Communication Technologies, Universidad Politécnica de Madrid, Madrid, Spain

⁵Department of Language, Arts and Physical Education. Universidad Complutense de Madrid, Madrid, Spain

Presenting author: Augusto G. Zapico

INTRODUCTION: Muscular strength is essential for children's development and long-term health. Several factors influence strength, including nutrition. It is closely associated with reduced risk of metabolic, cardiovascular, and musculoskeletal disorders, and plays a central role in functional autonomy, bone mineral density, and overall physical development. In relation to nutrition, the Mediterranean diet has proven benefits for metabolic health. However, its link with muscular strength in children is not well established. This study examines the association between diet adherence and the risk of low strength in Madrid city schoolchildren. Sex differences are also explored.

METHODOLOGY: Data were collected over three winter academic seasons in schoolchildren aged 8-12 in the city of Madrid (2020-21, 2021-22, 2022-23). The full sample combined all years to increase statistical power. Strength risk was measured with an analog dynamometer (Takei TKK5001, GRIP-A, Tokyo, Japan) and results were assessed using age adjusted cut-offs. Diet quality was measured using the KIDMED index. Statistical analyses included Chi-square tests, logistic regression, and a Random Forest model.

RESULTS: The final sample comprised 1236 observations. Boys showed a significantly higher risk of low muscular strength compared to girls ($\chi^2 = 10.84, p < 0.001$). Girls demonstrated better adherence to the Mediterranean diet ($\chi^2 = 8.73, p = 0.013$). A significant association was found between KIDMED adherence and strength of risk. This relationship was observed in both sexes but was stronger in boys ($\chi^2 = 12.94, p = 0.012$) than in girls ($\chi^2 = 6.39, p = 0.041$). In boys, better dietary habits were more clearly associated with a reduced risk of low strength. Logistic regression confirmed these patterns. Boys were over three times more likely to show low strength (OR = 3.42). Children with poor adherence to the Mediterranean diet had 2.5 times higher odds of being at risk (95% CI: 1.5–4.0). Higher KIDMED scores were associated with a lower probability of strength risk across the sample. The model achieved an overall classification accuracy of 77%, supporting the predictive value of diet and sex. Although the pseudo-R-squared was modest (0.037), the direction and significance of the associations remained consistent. A Random Forest model reinforced these results, reaching 77% accuracy.

DISCUSSION: Low adherence to the Mediterranean diet was significantly associated with an increased risk of low muscular strength, especially in boys. Despite their typically higher muscle mass, boys may be more affected by poor diet quality. The findings support prior evidence on the role of nutrition in strength development. Significant associations in both sexes reinforce the diet's protective effect. Although the logistic model explained limited variance, both it and the Random Forest consistently identified sex and diet as predictors. These results highlight the importance of promoting healthy eating habits to reduce strength-related risks. Future studies should consider additional variables to improve model performance.

Keywords: Schoolchildren, healthy habits, diet, muscular strength.

Funding: UPM and Área delegada de Deportes, Ayuntamiento de Madrid (Spain).

LITERATURE:

Muros, J. J., CofreBolados, C., Arriscado, D., Zurita, F., & Knox, E. (2017). *Mediterranean diet adherence is associated with lifestyle, physical fitness, and mental wellness among 10yearolds in Chile*. *Nutrition*, 35, 87–92.

Ruiz, J. R., CastroPiñero, J., Artero, E. G., Ortega, F. B., Sjöström, M., Suni, J., & Castillo, M. J. (2011). *ALPHAfitness test battery: Healthrelated fieldbased fitness tests assessment in children and adolescents*. *Nutrición Hospitalaria*, 26(6), 1210–1214.

SerraMajem, L., Ribas, L., Ngo, J., Ortega, R. M., García, A., PérezRodrigo, C., & Aranceta, J. (2004). *Food, youth and the Mediterranean diet in Spain: Development of KIDMED, Mediterranean Diet Quality Index in children and adolescents*. *Public Health Nutrition*, 7(7), 931–935.

PROMOTING PHYSICAL AND COGNITIVE HEALTH THROUGH MUSIC-BASED EXERCISE PROGRAMS IN PEOPLE WITH DEMENTIA – DEVELOPMENT AND EVALUATION

Alexander PRINZ¹ and Kerstin WITTE¹

¹Otto-von-Guericke-University, Department of Sports Engineering/Movement Science,

Presenting author: Prinz, Alexander

INTRODUCTION: Physical activity is known to have beneficial effects on cognitive, motor, and emotional functioning in people with dementia. However, designing appropriate exercise programs for this population is challenging due to issues of motivation, feasibility, and individual variability. Although first indications suggest that the combination of music and movement may be especially effective, there are currently no standardized guidelines or strong evidence regarding the optimal structure of such programs. The aim of our research was therefore to develop and evaluate music-based exercise programs specifically tailored for people with dementia, focusing on feasibility, acceptance, and effectiveness.

METHODS: Across four consecutive intervention studies, we developed and implemented five different music-based exercise formats in both residential and day care settings, involving a total of 97 people with dementia. The study population had a mean age of approximately 83.6 years ($SD \approx 5.2$) and comprised 86 women and 11 men. Program durations ranged from 12 to 24 weeks, with sessions held twice weekly for 45–60 minutes. The interventions included strength-based, dance-based, and multidimensional training formats, all consistently accompanied by music. The multidimensional programs combined elements of strength, coordination, balance, and functional mobility to address multiple physical capacities simultaneously. Outcome measures included motor parameters—specifically motor reaction time, grip strength, and functional mobility (drop bar, hand dynamometer, timed-up-and-go test)—as well as cognitive performance (assessed using CERAD-NP and the Trail Making Test A/B) and health-related quality of life (NOSGER II or QUALIDEM).

RESULTS: All programs proved to be feasible for people with dementia and were met with high levels of acceptance among participants. On average, 86 % of all scheduled sessions were attended, reflecting strong engagement and adherence. Significant improvements were observed in motor outcomes, particularly in motor reaction time ($p = .03 - <.001$; $d = 0.3-0.6$), functional mobility ($p = .001 - <.001$; $d = 0.5-0.7$), and grip strength ($p = .03 - <.001$; $d = 0.4-0.9$), while other motor functions remained stable over the intervention period. Cognitive performance was largely maintained, and significant improvements were noted in selective domains such as attention and verbal fluency ($p = .04 - <.001$; $d = 0.4-0.6$). Quality of life remained stable or showed slight improvements across programs.

DISCUSSION: The findings suggest that music-based exercise programs are both feasible and effective in the context of dementia care. In addition to motor benefits, they may contribute to cognitive stabilization and support psychosocial well-being. Notably, none of the studies reported any deterioration in motor, cognitive, or quality of life outcomes following the interventions. The positive results regarding feasibility and participant acceptance underscore the potential of these interventions as part of non-pharmacological dementia management.

Further controlled studies with larger samples are needed to explore long-term effects and optimize program design, particularly regarding the role of musical parameters.

Keywords: dementia, physical activity, music-based intervention, cognitive function, motor skills, quality of life.

LITERATURE:

Lepping, Rebecca J.; Hess, Benjamin J.; Taylor, Jasmine M.; Hanson-Abromeit, Deanna; Williams, Kristine N. (2024): Inconsistent Music-Based Intervention Reporting in Dementia Studies: A Systematic Mapping Review.

Prinz, Alexander; Langhans, Corinna; Rehfeld, Kathrin; Partie, Marcel; Hökelmann, Anita; Witte, Kerstin (2021): Effects of Music-Based Physical Training on Selected Motor and Cognitive Abilities in seniors with Dementia-Results of an Intervention Pilot Study. In: *J Geriatr Med Gerontol* 7 (4). DOI: 10.23937/2469-5858/1510124.

Prinz, Alexander; Langhans, Corinna; Rehfeld, Kathrin; Partie, Marcel; Hökelmann, Anita; Witte, Kerstin (2022): Umsetzung eines speziell entwickelten musikbasierten gesundheitsfördernden Krafttrainings für Seniorinnen mit Demenz. In: *B&G Bewegungstherapie und Gesundheitssport* 38 (01), S. 12–19. DOI: 10.1055/a-1714-0982.

Prinz, A.; Schumacher, A.; Witte, K. (2021): Influence of a multidimensional music-based exercise program on selected cognitive and motor skills in dementia patients-a pilot study. In: *German journal of exercise and sport research* 51 (4), S. 495–505. DOI: 10.1007/s12662-021-00765-z.

Prinz, Alexander; Schumacher, Anneke; Witte, Kerstin (2023): Changes in Selected Cognitive and Motor Skills as Well as the Quality of Life After a 24-Week Multidimensional Music-Based Exercise Program in People With Dementia. In: *American journal of Alzheimer's disease and other dementias* 38, 15333175231191022. DOI: 10.1177/15333175231191022

50TH ANNIVERSARY OF THE ANALYSIS OF METRIC PROPERTIES OF COMPOSITE MOTORIC TESTS – WHAT MADE AN INTEGRATIVE LEAP IN DEVELOPMENT OF KINESIOMETRICS

Franjo PROT^{1,2}

¹Faculty of Kinesiology, Zagreb, Croatia

²Science and Research Center. Koper, Slovenia

Presenting author: Franjo Prot

INTRODUCTION: From the very beginning of application of certain motor behavior as indicators of the level of proficiency for certain purposes, the inconsistencies have been noticed. In the same situation the subject's results vary if they could repeat a task very shortly after the previous attempt. The researchers used various strategies to select the most appropriate representative value. The promising solutions seem to be calculation of composite score what leads to weighted summations. Several strategies have been proposed. Based on Guttman (1952), Image theory and Harris (1962), insight, certain developments were applied. On the 50th anniversary of that success some remarks were made for the remembrance.

METHODS: Relevant research in Zagreb kinesiology circle in early seventies lead to Zagreb kinesiometric circle. Research results were didactically transposed to the new postgraduate scientific master's degree study program of Kinesiology with introduction of kinesiometry as basic applied discipline. New, innovative organized treatment of results of measurement in domain of motor behavior had been designed and provided. The focus of the presentation are the results of preliminary and main research of battery of 110 motoric tests and related hierarchical latent structure published for the first time 50 years ago. The international reception of these enterprises was welcomed and positive what is documented with evidence.

RESULTS: Let Z be a matrix of standardized (normalized, if necessary) results which describe set E over the set T . Then $R = Z^t Z n^{-1}$ and $U^2 = (\text{diag } R^{-1})^{-1}$ denote the correlation matrix and a diagonal matrix of estimated error variances, respectively. Error variables could be defined as antiimage variables (i.e., $E = Z R^{-1} U^2$), and true parts as image variables (i.e., $T = Z (I - R^{-1} U^2)$). The respective covariance matrices are: $A = E^t E n^{-1} = U^2 R^{-1} U^2$ and $G = T^t T n^{-1} = R + U^2 R^{-1} U^2 - 2U^2$. Then the covariances between observed (Z) and true variables (T) are $P = Z^t T n^{-1} = R - U^2$, and covariances between observed (Z) and error variables (E) are $Z^t E n^{-1} = U^2$. Let $H = Z U^{-1}$, represent the observed variables transformed to the "universal" metric, where $M = H^t H n^{-1} = U^{-1} R U^{-1}$ (see e.g. Harris (1962)). Let x, y, v and w denote normalized eigenvectors and let l^2, d^2, w^2 and h^2 denote eigenvalues of the matrices R, G, P and M , respectively. Based on such eigen decompositions measures of representativeness, reliability, homogeneity and convergence of metric indicators were developed.

DISCUSSION: Momirović and his kinesiometric circle constantly improved algorithms and implementations of programs for the analysis of metric characteristics of composite measurement instruments ("RTT" programs) from the initial SS program (MAPANAL) through the upgraded versions RTT6 and RTT7 (Statistical System, Momirović, 1978 and 1980), RTT8 (GENSTAT version, Momirović and Prot 1986), RTT9/10 (SPSS macro version; Momirović and Knežević, 1996), to the most complex and general RTT12G with variants RTT12CL, RTT12NCL

i.e. the analysis of generalizability before and after partialisation of a set of reference variables, RTT12GS, RTT12GSS i.e the analysis of generalizability after sigmoid (0, +1) sigmoid (-1, +1) transformation of items results. The new stage of development was achieved using neural network methodology. As an example, RTT13HNN (Momirović, 2002) is an emulation of Hopfield neural network (Hopfield, 1982) for the estimation of sampling adequacy, reliability and homogeneity of composite measurement instruments discussion.

Keywords: kinesiometrics, multiitem composite measures, internal metric properties, reliability, validity.

LITERATURE:

Kurelić, N., Momirović, K., Stojanović, M., Šturm, J., Radojević, D., & Viskić-Štalec, N. (1975). Struktura i razvoj morfoloških i motoričkih dimenzija omladine. [Structure and development of morphological and motor dimensions of the young. In Serbo-Croatian.] Beograd: Institut za naučna istraživanja Fakulteta za fizičko vaspitanje Universiteta u Beogradu.

Momirović, K. i Wolf, B. (1975). Pouzdanost nekih kompozitnih testova primarnih motoričkih sposobnosti. [The reliability of some composite tests of primary motoric abilities. In Croatian.] Kinesiology, 5. (1.-2.), 170-192. Preuzeto s <https://hrcak.srce.hr/240633>

Gredelj, M., Metikoš, D., Hošek, A. i Momirović, K. (1975). Model hijerarhijske strukture motičkih sposobnosti: 1. rezultati dobijeni primjenom jednog neoklasičnog postupka za procjenu latentnih dimenzija. [A model of hierarchic structure of motoric abilities: 1. the results obtained using a neoclassical method for estimating latent dimensions. In Croatian.] Kinesiology, 5. (1.-2.), 8-81. Preuzeto s <https://hrcak.srce.hr/240516>

Momirović, K. , Pavičić L., i Hošek, A. (1982). Neki postupci za procjenu pouzdanosti na temelju unikne varijance čestica kompozitnih mjernih instrumenata. [Some procedures for assessment of reliability on the basis of the unique variance of items of the composite measuring instruments. In Croatian.] Kinesiology, 13. (1.-2.), 23-27. Preuzeto s <https://hrcak.srce.hr/232109>

Měkota, K., Blahuš, P., (1983) Motorické testy v tělesné výchově. [Motoric tests in physical education. In Chech.] Státní pedagogické nakladatelství, Prag, 335 pages.

EFFECTS OF A 6-MONTH RHYTHMIC GYMNASTICS TRAINING ON HIP AND SHOULDER ACTIVE FLEXIBILITY AND FUNCTIONAL ASYMMETRY IN YOUNG GIRLS

Tijana PURENOVIĆ-IVANOVIĆ¹, Katarzyna STERKOWICZ-PRZYBYCIEN², Saša JOVANOVIĆ^{3,4}

¹ Faculty of Sport and Physical Education, University of Niš, Niš, Serbia

² Department of Gymnastics and Dance, Institute of Sport Sciences, University of Physical Culture in Krakow, Krakow, Poland

³ Faculty of Physical Education and Sport, University of Banja Luka, Banja Luka, Bosnia and Herzegovina

⁴ Znanstveno-raziskovalno središče Koper, Koper, Slovenija

Presenting author: Saša Jovanović

INTRODUCTION: Sport such as rhythmic gymnastics requires athletes to achieve large joint ranges of motion, and often the athlete's opportunity to win is based solely on this ability, i.e., flexibility. Also, this sport is known as sport of asymmetry and lateral preferences with conditions of increasing physical activity or repeated asymmetric force impact on the locomotor system. Even though rhythmic gymnastics aims to exercise gymnast's body bilaterally, its unilateral training may lead to apparent asymmetries, which in the long term can produce pathologies. This study sought to observe the effects of a 6-month rhythmic gymnastics training on hip and shoulder range of motion and functional asymmetry in young girls.

METHODS: The effects were examined in 44 gymnasts and 51 aged-matched untrained controls, aged 6–8 ($n=17$ and $n=19$, respectively), and 8–11 ($n=27$ and $n=32$, respectively). Their baseline characteristics (body height, body mass, body mass index) were established, as well as their hip (right/left hip flexion, right/left hip extension, right/left hip abduction, in °) and shoulder range of motion (right/left shoulder flexion, right/left shoulder extension, in °), and asymmetry index (in %) was calculated. The samples were evaluated pre- and post-intervention. Data analysis employed SPSS 26.0 software, applying descriptive statistics, the Shapiro–Wilk test, and baseline-adjusted analysis of covariance.

RESULTS AND DISCUSSION: In both age-groups of examinees, significant post-test improvements with large effects were observed in hip flexion and abduction ($p<0.001$). In the sample of older group of participants, in addition to hip flexion and abduction, a significant improvements were seen in left hip extension ($p=0.012$), shoulder flexion (Right: $p<0.001$; Left: $p=0.014$) and extension (Right: $p=0.045$; Left: $p<0.001$). Post-intervention, gymnasts showed range of motion gains, especially younger ones, while controls mostly declined during this 6-month period. Concerning the asymmetry in younger age group, its prevalence was more prominent in controls at both pre- and post-intervention, whereas in older group gymnasts these side-to-side differences were much prevalent than in their peers. Also, age differences were notable, and this functional asymmetry prevalence increase might prove the negative impact of rhythmic gymnastics' unilateral training. Conversely, asymmetry in controls declined with age, indicating that it may be driven more by training than development alone, i.e., an aging provides a functional asymmetry flattening, while training process develops asymmetry indirectly.

Keywords: range of motion, lateral preferences, rhythmic gymnasts, untrained controls.

LITERATURE:

Harvey D, Mansfield C. (2000). Measuring flexibility for performance and injury prevention. In JC Gore (Ed.), *Physiological tests for elite athletes* (pp. 98–113). Champaign, IL: Human Kinetics.

Macedo LG, Magee DJ. (2008). Differences in range of motion between dominant and non-dominant sides of upper and lower extremities. *J Manipulative Physiol Ther*, 31(8): 577–582.

Purenović-Ivanović T, Sterkowicz-Przybycień K, Došić A, Stojanović S, Ilbak I. (2024). Hip and shoulder flexibility in novice rhythmic gymnasts and age-matched controls: Inter-limb asymmetry. *Balneo Res J*, 15(3): 720.

Vandervoort AA, Stathokostas L. (2016). The flexibility debate: implications for health and function as we age. *Annu Rev Gerontol Geriatr*, 36(1): 169–192.

ASSOCIATION BETWEEN MUSCLE CONTRACTILITY AND STRUCTURAL FEATURES IN SLOVENIAN OLDER ADULTS

Katarina PUS^{1,2,3}, Diana A MADRID FUENTES⁴, Ashley WEAVER⁴, Jeannette R MAHONEY⁵, Boštjan ŠIMUNIČ¹

¹ Institute for Kinesiology Research, Science and Research Centre Koper, Koper, Slovenia

² Department of Health Sciences, Alma Mater Europaea University, Maribor, Slovenia

³ Faculty of Sport, University of Ljubljana, Ljubljana, Slovenia

⁴ Department of Biomedical Engineering, Center for Injury Biomechanics, Wake Forest University School of Medicine, NC, USA

⁵ Renaissance School of Medicine, Stony Brook University, Department of Neurology, NY, USA

Presenting author: Katarina Puš

INTRODUCTION: Aging is accompanied by significant alternations in skeletal muscle composition, most notably in the infiltration of adipose tissue, which adversely affects muscle strength, mobility and overall physical function. As skeletal muscle deteriorates, individuals are at increased risk for functional impairments and reduced independence. While magnetic resonance imaging offers a precise assessment of intramuscular fat accumulation, its cost and limited accessibility present challenges for widespread use, particularly in clinical or community-based settings. In recent years, tensiomyography (TMG) has gained attention as a non-invasive and portable method to evaluate muscle contractile properties. Previous research has indicated that TMG may be sensitive to early muscular changes and muscle fiber composition. However, its ability to detect alternations in muscle fat infiltration in older adults has yet to be investigated. The aim of this study was to explore the associations between TMG-derived parameters, physical performance tests and muscle fat fraction (MFF) in Slovenian older adults.

METHODS: The sample included 51 older adults from Slovenia (aged 82, 54% female) recruited from nursing homes, local community centers and retirement homes. TMG assessments were performed on vastus lateralis and biceps femoris of the right leg including delay time, radial displacement and contraction velocity. Physical performance was evaluated with five times sit-to-stand test, timed up-and-go, gait speed and handgrip strength. MFF was quantified using Dixon sequence with an image analysis performed on five 3-mm slices using Daphne and 3D Slicer software, split to knee extensors and flexors. MFF was calculated based on fat-to-water signal intensity ratios.

RESULTS: Moderate positive correlations were observed between MFF of both knee flexors and extensors and timed up-and-go performance (flexors: $r = .366$, $p = .012$; extensors: $r = .388$, $p = .008$). STS performance was also moderately correlated with MFF of the knee extensors ($r = .345$, $p = .022$). A negative trend was noted between gait speed and MFF for both muscle groups (flexors: $r = -.280$, $p = .062$; extensors: $r = -.279$, $p = .067$). Notably, strong negative associations were found between knee extensor MFF and TMG-derived parameters, including VL radial displacement ($r = -.522$, $p < .001$) and contraction velocity ($r = -.546$, $p < .001$).

DISCUSSION: These findings suggest that TMG can effectively detect muscle quality deterioration associated with intramuscular fat infiltration and physical performance decline in older adults. Particularly, radial displacement and contraction velocity of the VL muscle demonstrated strong relationships with MFF values. Despite these clear associations, the mechanisms underlying this association remain poorly understood. To advance clinical applications future research of these mechanisms should focus onto explaining the changes in mechanics of muscle contraction, specifically in radial displacement.

Keywords: Slovenian older adults, muscle fat fraction, muscle mechanics, tensiomyography

LITERATURE:

Avesani, C. M., de Abreu, A. M., Ribeiro, H. S., Brismar, T. B., Stenvinkel, P., Sabatino, A., & Lindholm, B. (2023). Muscle fat infiltration in chronic kidney disease: a marker related to muscle quality, muscle strength and sarcopenia. *Journal of Nephrology*, 36(3), 895–910. <https://doi.org/10.1007/s40620-022-01553-0>

Delmonico, M. J., Harris, T. B., Visser, M., Park, S. W., Conroy, M. B., Velasquez-Mieyer, P., Boudreau, R., Manini, T. M., Nevitt, M., Newman, A. B., & Goodpaster, B. H. (2009). Longitudinal study of muscle strength, quality, and adipose tissue infiltration. *The American Journal of Clinical Nutrition*, 90(6), 1579–1585. <https://doi.org/10.3945/ajcn.2009.28047>

Franchi, M. V., Sarto, F., Simunič, B., Pišot, R., & Narici, M. V. (2022). Early Changes of Hamstrings Morphology and Contractile Properties during 10 d of Complete Inactivity. *Medicine and Science in Sports and Exercise*, 54(8), 1346–1354. <https://doi.org/10.1249/MSS.0000000000002922>

Kirk, E. A., Gilmore, K. J., & Rice, C. L. (2018). Neuromuscular changes of the aged human hamstrings. *Journal of Neurophysiology*, 120(2), 480–488. <https://doi.org/10.1152/jn.00794.2017>

Šimunič, B., Degens, H., Rittweger, J., Narici, M., Mekjavić, I. B., & Pišot, R. (2011). Noninvasive estimation of myosin heavy chain composition in human skeletal muscle. *Medicine and Science in Sports and Exercise*, 43(9), 1619–1625. <https://doi.org/10.1249/mss.0b013e31821522d0>

IMPACT OF SPORTS BIOGRAPHY ON COGNITIVE AND MOTOR FUNCTION IN OLDER ADULTS

Kathrin REHFELD¹, Alexander PRINZ¹, Luise STÖSSEL¹, Anita HÖKELMANN¹, Kerstin WITTE¹

¹Otto von Guericke University/ Sports Engineering & Human Movement Science, Magdeburg, Germany

Presenting author: Kathrin Rehfeld

INTRODUCTION: While physical activity is widely recognized for its benefits on both cognitive and motor health in older adults, there is limited evidence regarding **how the timing and consistency of physical activity across the lifespan**—the so-called *sports biography*—influences these outcomes (Clare et al., 2017). Furthermore, it remains unclear whether starting physical activity only in late adulthood can compensate for a previously inactive lifestyle in terms of preserving or enhancing cognitive and motor functions (Cheng et al., 2014; Kempermann et al. 2010). Most existing studies do not differentiate between lifelong and late-life activity patterns, nor do they adequately control for confounding factors like education, which strongly contribute to cognitive reserve. The aim of this pilot study is to investigate the impact of different physical activity trajectories across the lifespan (sports biography) on present-day cognitive and motor functions in older adults, while accounting for educational background as a proxy for cognitive reserve.

METHODS: A total of 75 older adults (mean age = 70.8 ± 5.4 years) were grouped based on their sports biography: no physical activity across the lifespan (Group 1; $n = 25$), consistent physical activity throughout life (Group 2; $n = 25$), and activity only beginning in late adulthood (Group 3; $n = 25$). Cognitive assessments included the Number-Connection Test (NCT) for processing speed, the LPS50+ for general intelligence, and BIS-4 for working memory (numerical, verbal, spatial). Motor performance was measured using grip strength, reaction time (Drop-Bar Test), chair-rising test, six-minute walk test, and balance assessments (SET and mCTSIB). Welch ANOVA and post-hoc tests were applied.

RESULTS: Cognitive performance did not significantly differ between the groups in any domain: *Processing speed* (NCT): $p = .853$; *General intelligence* (LPS50+): $p = .597$; *Working memory* total score (BIS-4): $p = .862$. However, participants with an university degree outperformed others in *general intelligence* ($p = .007$) and *verbal memory* ($p = .024$), indicating education's strong influence on cognitive reserve. Motor function showed significant group differences: *Reaction time* (Drop-Bar Test): $p = .004$; Group 2 faster (14.52 cm) than Group 1 (20.52 cm), $p = .020$; Cohen's $d = 0.87$; *Leg strength* (Chair-Rising Test): $p = .001$; Group 2 (7.54 s) faster than Group 1 (10.08 s), $p < .001$; $d = 1.11$; *Endurance* (6-Minute Walk): $p = .024$; Group 2 (670.96 m) outperformed Group 1 (559.44 m), $p = .029$; $d = 0.68$. Balance and grip strength showed no significant differences.

DISCUSSION: Lifelong physical activity is associated with better motor performance in older adults, especially in reaction time, strength, and endurance. However, cognitive performance was not significantly affected by physical activity history, likely due to a ceiling effect caused by uniformly high educational levels across groups. These findings suggest that while physical activity enhances motor aging trajectories, cognitive reserve may be more

closely tied to educational attainment (Yaffe et al., 2009; Clare et al. 2017). Future longitudinal studies should explore how physical activity and education interact over the life course to shape healthy aging.

Keywords: Cognitive reserve, Lifelong physical activity, Motor function, Aging, Sports biography, Cognitive performance

LITERATURE:

Cheng, S. T., Chow, P. K., Song, Y. Q., Yu, E. C., Chan, A. C., Lee, T. M., & Lam, J. H. (2014). Mental and physical activities delay cognitive decline in older persons with dementia. *The American Journal of Geriatric Psychiatry*, 22(1), 63-74.

Clare, L., Wu, Y. T., Teale, J. C., MacLeod, C., Matthews, F., Brayne, C., ... & CFAS-Wales Study Team. (2017). Potentially modifiable lifestyle factors, cognitive reserve, and cognitive function in later life: A cross-sectional study. *PLoS medicine*, 14(3), e1002259.

Kempermann, G., Fabel, K., Ehninger, D., Babu, H., Leal-Galicia, P., Garthe, A., & Wolf, S. (2010). Why and how physical activity promotes experience-induced brain plasticity. *Frontiers in neuroscience*, 4, 189.

Yaffe, K., Fiocco, A. J., Lindquist, K., Vittinghoff, E., Simonsick, E. M., Newman, A. B., ... & Harris, T. B. (2009). Predictors of maintaining cognitive function in older adults: the Health ABC study. *Neurology*, 72(23), 2029-2035.

EFFECTIVENESS AND SUSTAINABILITY OF A MULTIDIMENSIONAL EXERCISE PROGRAM FOR HEALTHY BUT PHYSICALLY INACTIVE OLDER ADULTS AGED 60+

Anneke SCHUMACHER¹, Marlene KRUMPOLT¹, Kerstin WITTE¹

Department of Sport Science, Otto-von-Guericke-University Magdeburg, Germany

Presenting author: Anneke Schumacher

INTRODUCTION: In light of demographic shifts and the associated rise in life expectancy, maintaining physical activity in older age has become a key priority for public health. Despite growing evidence that structured physical activity mitigates age-related decline in both motor and cognitive functions (Markov et al., 2023), a significant proportion of older adults remains inactive (Guthold et al., 2018; Taylor et al., 2021). This study aimed to develop and evaluate a low-threshold, multidimensional physical activity program specifically targeting healthy, yet physical inactive, individuals aged 60 years and older.

METHODS: A total of 256 participants (66% female; aged 60+; not regularly active) were included; all were generally healthy aside from age-related conditions, with exclusions for acute illness or motor impairments without medical clearance. Each training group followed the same pre-designed six-month training protocol comprising biweekly sessions (2 × 90 minutes per week). The intervention combined structured fitness training (endurance, strength, coordination) with introductory sessions offered by 25 local sports clubs, including a wide range of recreational and popular sports such as Tai-Chi, dance, handball, or karate. Pre- and post-intervention assessments evaluated motor skills, including parameters such as cardiovascular fitness (Physical working capacity 130 W), strength ability (hand dynamometer test, biceps curls, chair stand test), coordination (Karlsruhe health-oriented coordination test), and flexibility (Sit and reach test). Longitudinal follow-up via modified standardized questionnaires was also conducted at four weeks, six months, and twelve months post-intervention to assess sustainability, daily activity levels, and subjective well-being.

RESULTS: 215 participants completing the intervention and final assessments. Four weeks post-completion, 96% of participants reported engaging in regular physical activity, and 73% had joined one of the cooperating sports clubs. The mean weekly activity duration was approximately 200 minutes, thus meeting WHO physical activity guidelines for older adults. Notably, men tended to prefer performance-oriented sports (e.g., bosseln, badminton), while women cited health and social reasons for participation and gravitated towards group-based formats (e.g., yoga, dance). Quantitative outcomes indicated significant improvements for both sexes in cardiovascular parameters (resting heart rate, m : $p = .013$; $d = .35$, f : $p = .028$; $d = .21$) and motor skills (endurance, strength, flexibility, coordination; all $p < .05$). Psychosocial benefits extended beyond sport, with 38% of participants attending more cultural events, 37% engaging in additional physical activities such as hiking or sports events, and 40% increasing social interactions with friends and family.

DISCUSSION: This study demonstrates the efficacy of a multidimensional, low-threshold intervention in promoting sustainable sports activity among older adults. The approach successfully engaged an often hard-to-reach population, including a comparatively high

proportion of male participants. Moreover, it facilitated the formation of new peer-led groups within local sports club structures, underscoring its scalability and long-term potential for public health impact. In view of ongoing demographic developments, such interventions should be recognized as a strategic pillar in the promotion of healthy aging at the population level. This is particularly relevant given that not only the age structure, but also societal perceptions of aging have undergone significant changes in recent decades. Today's older adults are more active, resilient, and capable of engaging in physical activities (Geyer & Eberhard, 2022) that extend beyond the conventional scope of age-specific exercise programs.

Keywords: Healthy aging, Movement promotion, Low-threshold sport programs, Sustainable in physical activity interventions.

LITERATURE:

Markov, A., Hauser, L., & Chaabene, H. (2023). Effects of Concurrent Strength and Endurance Training on Measures of Physical Fitness in Healthy Middle-Aged and Older Adults: A Systematic Review with Meta-Analysis. 53(2), 437–455.

Guthold, R., Stevens, G. A., Riley, L. M. & Bull, F. C. (2018). Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1,9 million participants, in: THE LANCET Global Health, Volume 6, Issue 10

Taylor J, Walsh S, Kwok W et al (2021). A scoping review of physical activity interventions for older adults. *Int JBehavNutrPhysAct* 18(1):82

Geyer S, Eberhard S (2022). Compression and Expansion of Morbidity. *Dtsch Arztebl Int* 119(47):810–815

(NON)CONGRUENCE BETWEEN DATA ON BODY COMPOSITION, SOMATOTYPE, PHYSICAL ACTIVITY AND CARDIORESPIRATORY FITNESS IN YOUNG ADULTS

Žana SOTELŠEK¹ and Tatjana ROBIČ PIKEL¹

¹Department of Biology, Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia

Presenting author: Žana Sotelšek

INTRODUCTION: In recent years, the assessment of physical fitness and body composition in young adults has gained significant scientific interest, particularly in preventive healthcare and the early detection of risk factors associated with non-communicable chronic diseases. Body composition, physical activity, and cardiorespiratory fitness (CRF) are key health indicators in young adults and are often studied independently. Subcutaneous fat measurements and the Heath-Carter (H-C) somatotype provide insight into body structure, while the International Physical Activity Questionnaire (IPAQ) and fitness testing reflect activity levels and aerobic capacity. However, little is known about how these indicators relate to each other. This study aimed to examine their interrelationships and identify which parameters most accurately reflect body composition.

METHODS: The study included over 700 university students aged 18 to 25 years between 2013 and 2025. Anthropometric measurements (body mass, body height, body widths, circumferences of waist, hip, upper arm, forearm, thigh and calf, and skinfolds of triceps, biceps, subscapular, iliac crest, supraspinale, abdominale, thigh and calf) were used to calculate body composition and H-C somatotype. Physical activity was assessed via the IPAQ, and cardiorespiratory fitness was determined using the cycloergometer test. Pearson correlation coefficients were used to evaluate associations among variables. The study protocol was approved by the National Medical Ethics Committee.

RESULTS: Higher BMI values were closely associated with greater body mass ($p < 0.001$; $r = 0.94$), all measured circumferences and skinfolds ($p < 0.001$; $r = 0.69$), and more pronounced endomorphic and mesomorphic components ($p < 0.001$; $r = 0.72$ and $r = 0.19$). Among females, higher BMI was also linked to lower CRF ($p < 0.001$; $r = -0.16$). Categorization by H-C somatotype showed that endomorphic individuals had significantly higher body mass ($p = 0.006$), BMI ($p < 0.001$), circumferences ($p < 0.001$), and skinfolds ($p < 0.001$), along with lower CRF ($p = 0.003$), compared to mesomorphs and ectomorphs. Participants with better CRF had lower body mass ($p = 0.002$), BMI ($p = 0.003$), circumferences ($p = 0.002$), and skinfolds ($p = 0.007$), and showed a lower prevalence of endomorphy ($p = 0.011$) than participants with lower CRF. Among females, higher CRF was also linked to greater ectomorphy ($p = 0.035$). Categorization based on physical activity (IPAQ) revealed no major differences in body composition among females, except for triceps ($p = 0.022$) and abdominal ($p = 0.030$) skinfolds, where individuals with lower physical activity levels exhibited significantly higher values compared to their more active counterparts. More active males had lower body mass ($p = 0.015$) and trunk circumferences ($p = 0.025$) than less active males.

DISCUSSION: The results suggest that cardiorespiratory fitness and H-C somatotype components are more informative predictors of body composition than self-reported physical

activity. Objective physiological and anthropometric parameters offer a clearer reflection of individual health status and may be more appropriate for identifying young adults at risk of reduced fitness or unfavorable body structure. These findings support the use of direct measurements in preventive health assessment.

Keywords: body composition, somatotype, physical activity, cardiorespiratory fitness.

LITERATURE:

Aryanto AF, Tinduh D, Pawana Putra PA, Melaniani S, Wuri Handayani V. (2024). Relationship between assesment of physical activity with body mass index and maximum oxygen volume in adult men with overweight and obesity. *Romanian Medical Journal*, 71(3), 267-272.

Musijowska M, Kwilosz E. (2024). Association between physical activity level, body composition, and phase angle in university students from bioelectrical impedance analysis (BIA). *Journal of Clinical Medicine*, 13(10)

THE ROLE OF SPORT IN SUPPORTING CHILDREN WITHOUT PARENTAL CARE: RESIDENTIAL AND SCHOOL CONTEXTS

Petar Mihail SPAIĆ¹, Radenko M. MATIĆ¹, Ivana M. MILOVANOVIĆ¹

¹Faculty of Sport and Physical Education, University of Novi Sad, Serbia

Presenting author: Ivana M. Milovanović

INTRODUCTION: This study presents a qualitative analysis of the attitudes and experiences of professionals (N = 11) working in residential care institutions for children without parental care in Belgrade and Sremska Kamenica (Republic of Serbia). The focus is on sport-recreational and inclusive activities implemented by educational institutions and civil society organizations in collaboration with social welfare institutions.

METHODS: The study applied thematic analysis methods based on data collected through semi-structured interviews. The emphasis was placed on educators' and teachers' perceptions of the impact of sports activities on the psychosocial development of children.

RESULTS: Sports programs, especially those conducted within the "Sportić" initiative, as well as thematic activities at the "Jovan Jovanović Zmaj" school in Sremska Kamenica, contribute to children's inclusion in the community, the reduction of stigma, and the promotion of self-confidence. Educators and teachers emphasize that such programs have a preventive effect on early school dropout and the emergence of risky behaviors.

DISCUSSION: The analysis highlights the importance of continuous, structured, and sensitively designed programs that enable children and youth to develop healthy lifestyle habits, emotional stability, social skills, and a sense of belonging. Cooperation between schools, residential care homes, sports clubs, and civil society organizations is shown to be crucial for establishing a supportive environment in which children without parental care can realize their full potential. Consistent training of external collaborators is also of great importance. The findings support the need for systemic and long-term support through sports and educational activities as key mechanisms for healthy development and social integration of children without parental care.

Keywords: sport and inclusion, children without parental care, psychosocial support, civil society, intersectoral cooperation, healthy development.

LITERATURE:

Abu-Ras W, AbuLaban AA, AlQaisi ST, AlQaisi MTH, Decker E. (2023). Orphans in Syria and Iraq juggling balls: Wars, COVID-19, and the NGO's financial crisis. *Int J Qual Stud Health Well-being*, 18(1): 2170010.

Bettmann JE, Mortensen JM, Akuoko KO. (2015). Orphanage caregivers' perceptions of children's emotional needs. *Child Youth Serv Rev*, 49: 71–79.

Ismiyanov VV, Rybina LD. (2023). Problems of sports education and socialization of orphans in Russia and ways to solve them (on the example of the Republic of Sakha Yakutia). *Teor Prakt Fiz Kult*, 7: 71–73.

Alizadeh S, Raheb G, Mirzaee Z, Hosseinzadeh S. (2020). Effect of social competence training on tendency towards high-risk behaviors in male adolescents living in welfare boarding centers. *Arch Rehabil*, 21(1): 54–72.

Schenk KD. (2009). Community interventions providing care and support to orphans and vulnerable children: A review of evaluation evidence. *AIDS Care*, 21(7): 918–942.

ENHANCING LONG-TERM PHYSICAL ACTIVITY ENGAGEMENT THROUGH PERSONALITY-BASED PSYCHOLOGICAL INTERVENTIONS: A HEXACO MODEL

Arzu SULEYMANOVA¹

¹Department of Sports medicine research laboratory, Azerbaijan Sport Academy, Azerbaijan

Presenting author: Arzu Suleymanova

INTRODUCTION: While physical inactivity has become a global health concern, recent evidence suggests that even physically active youth are not immune to psychological and behavioral risk factors that undermine long-term engagement in sport and exercise. Among student-athletes, common challenges such as burnout, emotional fatigue, low stress tolerance, and extrinsic motivation often lead to decreased participation over time. This study examines how a structured psychological training program based on the HEXACO personality model can promote sustained physical activity by enhancing emotional resilience, intrinsic motivation, and identity development in physically active students in Azerbaijan.

METHODS: The study involved 100 student-athletes aged 17–28, representing six sports disciplines (football, volleyball, judo, wrestling, cycling, and triathlon). Participants were randomly assigned to either an intervention or control group. The intervention group underwent a 12-month psychological development program incorporating the culturally adapted HEXACO-PI-R personality inventory, biweekly emotional check-ins, reflective peer dialogues, and storytelling techniques grounded in local values. The training focused on emotional regulation, self-reflection, and values-based motivation. The control group continued with their regular sports training and academic activities and did not receive any additional psychological input during the study period. To control for contact hours, the control group was invited to monthly neutral health-related seminars (e.g., nutrition, sleep hygiene) to balance participant interaction time without introducing psychological components. Data collection was conducted at three time points (baseline, 6 months, and 12 months) and included personality profiles, perceived stress levels, and self-reported physical activity consistency and motivation. No long-term follow-up beyond 12 months was conducted in the current phase, though a follow-up is planned.

RESULTS: After 12 months, the intervention group demonstrated statistically significant positive changes in Emotionality (increased emotional awareness and regulation), Extraversion (greater social engagement), and Conscientiousness (improved discipline and goal-setting). Participants also reported decreased emotional fatigue, improved self-regulation, and a more stable motivation to remain physically active. Notably, the control group showed no significant psychological or behavioral improvements during the same period.

DISCUSSION: The results support the hypothesis that personality-informed psychological interventions can be effective in sustaining physical activity and preventing future dropout among youth. By addressing individual emotional and motivational profiles, such programs help transform temporary engagement into long-term health behavior. These findings underline the importance of integrating personality psychology and emotional education into sports and health promotion frameworks. In contexts where physical activity is emphasized

but emotional development is overlooked, tailored psychological training may serve as a vital bridge to sustainable active lifestyles. To assess the persistence of these effects, a follow-up phase was initiated and a 6-month post-intervention evaluation is currently ongoing, focusing on the maintenance of emotional regulation, motivation, and physical activity levels among participants.

Keywords: physical activity, psychological resilience, HEXACO, intrinsic motivation, youth engagement, prevention of inactivity

LITERATURE:

Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review*, 11(2), 150–166. <https://doi.org/10.1177/1088868306294907>

McCrae, R. R., & Terracciano, A. (2005). Personality profiles of cultures: Aggregate personality traits. *Journal of Personality and Social Psychology*, 89(3), 407–425. <https://doi.org/10.1037/0022-3514.89.3.407>

Dishman, R. K., Heath, G. W., & Lee, I-M. (2013). *Physical Activity Epidemiology* (2nd ed.). Human Kinetics.

Ekkekakis, P. (2013). *The measurement of affect, mood, and emotion: A guide for health-behavioral research*. Cambridge University Press.

ACUTE EFFECTS OF HIGH-INTENSITY INTERVAL TRAINING ON OXIDATIVE STRESS MARKERS AND BRAIN-DERIVED NEUROTROPHIC FACTOR LEVELS IN YOUNG PROFESSIONAL ATHLETES AND NON-ATHLETE UNIVERSITY STUDENTS

Eszter SZKLENÁR¹, Zalán BÁCS¹, Tibor PÖSZMET¹, Eszter BÍRÓ¹,
József MÁRTON PUCSOK¹, Ágnes GYETVAI², Ádám DIÓS², Gábor PAPP^{1,2},
László BALOGH¹

¹Institute of Sport Sciences, University of Debrecen,

²Division of Clinical Immunology, Institute of Internal Medicine, Faculty of Medicine,
University of Debrecen,

Presenting author: Eszter Szklenár

INTRODUCTION: During exercise, increased oxygen consumption leads to elevated production of reactive oxygen species. If the antioxidant system is unable to counteract this surge in reactive oxygen species, oxidative stress occurs. Excess reactive oxygen species can oxidize lipids, proteins, and nucleic acids, impairing their structure and function. In addition to cardiovascular diseases, excessive oxidative stress is also linked to the development of cognitive dementia. Physical activity, however, is a complex biological process that affects not only reactive oxygen species production but also its elimination. Therefore, the intensity of exercise and the individual's prior adaptation level determine its effects on the oxidative-antioxidant balance. While moderate aerobic exercise is commonly used to enhance antioxidant capacity and reduce the risk of chronic diseases, recent studies suggest that high-intensity interval training may be even more effective in promoting health. To explore the physiological responses induced by high-intensity interval training, we investigated the effects of a single high-intensity interval training session on oxidative stress markers and brain-derived neurotrophic factor levels in young professional athletes and non-athlete university students.

METHODS: Blood samples were collected before and immediately after a high-intensity interval training session from eleven male professional athletes (mean age: 22.1 ± 4.5 years) and ten male non-athlete control students (mean age: 21.6 ± 2.3 years). Serum samples were analyzed for the activity of antioxidant enzymes (catalase, superoxide dismutase, and glutathione peroxidase), total serum nitrite/nitrate levels, lipid peroxidation products, and brain-derived neurotrophic factor levels.

RESULTS: In professional athletes, a significant increase was observed in the activity of superoxide dismutase ($p=0.037$) and catalase enzymes ($p=0.034$) after exercise, whereas no significant changes were found in the control group. Total serum nitrite/nitrate levels significantly increased in both groups after exercise (athletes: $p=0.029$ and controls: $p=0.016$). An increasing trend in post-exercise brain-derived neurotrophic factor levels has been observed among athletes, while no substantial change was detected in the control individuals.

DISCUSSION: Our findings support the notion that long-term training adaptations in professional athletes enhance the efficiency of the antioxidant system. The marked increase in level of brain-derived neurotrophic factor following exercise among regularly training

individuals further underlines the importance of training-induced adaptation for effective neurobiological responses.

This research was supported by the National Research, Development and Innovation Fund of Hungary (TKP2021-EGA-20).

Keywords: high-intensity interval training, oxidative stress, antioxidant enzymes, brain-derived neurotrophic factor.

LITERATURE:

Powers SK, Duarte J, Kavazis AN, Talbert EE. (2010). Reactive oxygen species are signalling molecules for skeletal muscle adaptation. *Exp Physiol*, 95(1): 1-9.

Radak Z, Ishihara K, Tekus E, Varga C, Posa A, Balogh L, Boldogh I, Koltai E. (2017). Exercise, oxidants, and antioxidants change the shape of the bell-shaped hormesis curve. *Redox Biol*, 12: 285-290.

Buzdagli Y, Ozan M, Baygutalp N, Oget F, Karayigit R, Yuce N, Kan E, Baygutalp F, Ucar H, Buzdağlı Y. (2024). The effect of high-intensity intermittent and moderate-intensity continuous exercises on neurobiological markers and cognitive performance. *BMC Sports Sci Med Rehabil*, 16(1): 39.

ALTERATIONS IN SKELETAL MUSCLE PROPERTIES AFTER HABITUAL AND EXPERIMENTAL DISUSE

Boštjan ŠIMUNIČ¹, Fabio SARTO^{2,3}, Martino FRANCHI², Elena MONTI^{2,5}, Rado PIŠOT¹,
Marco V NARICI^{1,2,4}

¹ Institute for Kinesiology Research, Science and Research Centre Koper, Koper, Slovenia

² Department of Biomedical Sciences, University of Padova, Padua, Italy

³ Centre of Studies and Activities for Space "Giuseppe Colombo", University of Padova, Padua, Italy

⁴ CIR-MYO Myology Center, University of Padova, Padua, Italy

⁵ Baxter Laboratory for Stem Cell Biology, Department of Microbiology and Immunology, Stanford University School of Medicine, Stanford, California, USA

Presenting author: Boštjan Šimunič

INTRODUCTION: Changes in muscle structure and function have been observed following periods of bed rest. When aging is combined with such disuse periods, these changes become more pronounced, with severely limited recovery. Tensiomyography (TMG), a method for assessing skeletal muscle contractile properties, has been shown to detect early, pre-atrophic changes, not seen by other methods. This study aimed to identify early TMG alterations during a 10-day bed rest, followed by a 30-day recovery, and to compare these changes to those observed after the COVID-19 lockdown.

METHODS: Ten young males (22.9 ± 5.0 years) participated in a 10-day horizontal bed rest followed by a 30-day recovery. After obtaining ethical approval (No. 0120-123/2023/9), all participants provided written informed consent. TMG was assessed at baseline (BDC), on the *i*-th day of bed rest (BR_{*i*}), on the *i*-th day of recovery (R+*i*), and after the COVID-19 lockdown (Covid-19) in six muscles. Vertical jump performance was evaluated using countermovement jump (CMJ) and squat jump (SJ). Lower back pain was assessed using a visual analog scale.

RESULTS: All participants completed the bed rest study and assessments without complications. By BR10, we found 1.5 kg mass loss, characterized by a 3.8% increase in fat mass and a 0.76 kg decrease in lean muscle mass. While all anthropometric parameters returned to BDC levels, by R+30, fat mass increased again by 3.9% at Covid-19. At BR10, CMJ height decreased by 10.1%, recovered to BDC values by R+30, with no further changes observed at Covid-19. TMG-derived delay and contraction times increased in the vastus lateralis at BR10 but decreased in the erector spinae. In the biceps femoris, similar increase was observed at BR10 and persisted during Covid-19. TMG amplitude increased in all lower limb muscles from BR1 to BR4, recovered to BDC levels, but increased again at Covid-19, albeit to a lesser extent. In the erector spinae, TMG amplitude initially decreased at BR1, returned to BDC levels by BR4, and was associated with increased lower back pain during the same period.

DISCUSSION: Changes in delay time have not been previously reported. We show inconsistencies across the measured muscles. Neuromuscular delay is influenced by action potential generation, the time it needs to reach the muscle, any slack within the muscle before detectable tension is produced. Contraction time followed a similar pattern to delay time, except in the biceps femoris, where it increased after BR4 and did not recover. Given that contraction time is correlated with the proportion of MHC-I fibers and jumping power, this finding has

significant implications for overall health. The increase in displacement was consistent with previous studies; however, it was detected much earlier than atrophy with imaging techniques. Notably, this was the first study to report a decrease in Dm in the erector spinae, which was associated with lower back pain, commonly observed in initial days of bed rest or spaceflight.

Keywords: Skeletal muscle, Atrophy, Bed rest, COVID-19 lockdown, Tensiomyography.

LITERATURE:

Šimunič, B., Koren, K., Rittweger, J., Lazzer, S., Reggiani, C., Rejc, E., Pišot, R., Narici, M.V., Degen, H. (2019). Tensiomyography detects early hallmarks of bed-rest-induced atrophy before changes in muscle architecture. *Journal of applied physiology* 126(4): 815-822.

Monti, E., Reggiani, C., Franchi, M., Toniolo, L., Sandri, M., Armani A., Zampier, S., Šimunič, B., Pišot, R., Narici, M.V., et al. (2021). Neuromuscular junction instability and altered intracellular calcium handling as early determinants of force loss during unloading in humans. *The journal of physiology* 599(2): 3037-3061.

ASSOCIATION BETWEEN PATIENT-REPORTED OUTCOMES AND OBJECTIVE MEASURES OF FUNCTION IN PATIENTS AFTER TOTAL HIP ARTHROPLASTY - SECONDARY ANALYSIS OF DATA FROM A RANDOMIZED CONTROLLED TRIAL

Iva ŠKLEMPE KOKIĆ¹, Matko VUKSANIĆ², Tomislav KOKIĆ³

¹Faculty of Kinesiology Osijek, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia

²Bizovacke Toplice Rehabilitation Hospital, Bizovac, Croatia

³General County Hospital Vinkovci, Vinkovci, Croatia

Presenting author: Iva Šklempe Kokić

INTRODUCTION: Patient-reported outcome measures (PROMs) are used in research and clinical practice, but there is still some inconsistency regarding their association with objective measures of functional abilities after joint replacement surgery. This study aimed to investigate association between PROMs and objective measures of function in patients in their first year after total hip arthroplasty (THA).

METHODS: This is a secondary analysis of data from a randomized controlled trial that examined the effects of electromyographic biofeedback in patients after THA (ACTRN12622001130752). Eighty-three patients were included in this secondary analysis (mean age: 63.9 ± 8.9 ; 60.2% males; mean postoperative day: 95.8 ± 41.3). Outcome measures were taken after 21 days of rehabilitation. PROMs included The Hip Disability and Osteoarthritis Outcome Score (HOOS), Numeric Rating Scale (NRS), and two summary measures of Short Form Health Survey-36, physical component summary (PCS) and mental component summary (MCS). Objective functional measures included 30 s Chair Stand Test (CST) as well as the Timed Up and Go (TUG) test. Pearson correlation coefficients were used to assess the association between PROMs and objective measures.

RESULTS: PROMs and objective functional measures were not strongly correlated. Weak but significant correlations were found between CST and HOOS subscales Pain, Activities of Daily Life (ADL), Function in Sports and Recreational Activities (Sports) and Quality of Life (QoL) ($p=0.25-0.34$), all with $p<0.05$. Also, weak correlations were found between CST and NRS ($p=0.24$; $p=0.003$), and PCS ($p=0.33$; $p=0.003$). Furthermore, weak correlations were found between TUG and HOOS subscales Pain, ADL, Sports, and QoL, as well as PCS ($p=0.31-0.4$; $p<0.05$). Moderate correlation was found between TUG and NRS ($p=0.49$, $p<0.001$). Moderate correlations were found in the female subsample between CST and HOOS subscales Pain, ADL, Sports, and QoL, as well as NRS ($p=0.46-0.51$; $p<0.05$). Similarly, moderate correlations were found between TUG and HOOS subscales Pain, Symptoms, ADL, Sport, QoL, as well as NRS ($p=0.46-0.68$; $p<0.05$). Weak correlations were found between CST and HOOS subscale Symptoms ($p=0.38$; $p=0.029$) and TUG and HOOS subscale QoL ($p=0.35$; $p=0.049$). Weak correlations were found in the males subgroup between CST and TUG with PCS ($p=0.31$; $p=0.031$; $p=0.32$; $p=0.025$), and TUG and HOOS subscales Pain, ADL, and Sports ($p=0.30-0.34$; $p<0.05$).

DISCUSSION: There is not a strong association between PROMs and objective measures among patients after THA, especially among male patients. Patients' appraisal of their

function and observed reality of their function are at most moderately correlated. Therefore, PROMs should not be used as a single outcome measure even when they have multiple domains, and especially not for evaluation of physical function. PROMs and objective measures are complementary and should be used in combination for evaluation of the outcomes after THA.

Keywords: arthroplasty, functional outcome, hip replacement, outcome measures.

LITERATURE:

Kokic, T., Pavic, R., Vuksanic, M., Jelica, S., Sumanovac, A., Banic, T., ... Sklempe Kokic, I. (2023). Effects of Electromyographic Biofeedback-Assisted Exercise on Functional Recovery and Quality of Life in Patients after Total Hip Arthroplasty: A Randomized Controlled Trial. *Journal of personalized medicine*, 13(12), 1716. <https://doi.org/10.3390/jpm13121716>

Stratford, P. W., Kennedy, D. M., Maly, M. R., & Macintyre, N. J. (2010). Quantifying self-report measures' overestimation of mobility scores postarthroplasty. *Physical therapy*, 90(9), 1288–1296. <https://doi.org/10.2522/ptj.20100058>

Terwee, C. B., van der Slikke, R. M., van Lummel, R. C., Benink, R. J., Meijers, W. G., & de Vet, H. C. (2006). Self-reported physical functioning was more influenced by pain than performance-based physical functioning in knee-osteoarthritis patients. *Journal of clinical epidemiology*, 59(7), 724–731. <https://doi.org/10.1016/j.jclinepi.2005.11.019>

PREVALENCE OF ENERGY DRINK CONSUMPTION AMONG PRIMARY SCHOOL CHILDREN IN SLOVENIA

Tjaša ŠVIGELJ¹, Gregor JURAK², Petra GOLJA³

¹Department of Food Science and Technology, Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia,

²Faculty of Sports, University of Ljubljana, Ljubljana, Slovenia

³Department of Biology, Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia

Presenting author: Tjaša Švigelj

INTRODUCTION: Energy drinks are non-alcoholic beverages marketed for their alleged or actual benefits as stimulants, performance enhancers, and sources of energy. The popularity of energy drinks among teenagers is growing, as is the number of emergency hospital admissions due to their consumption. The acute negative effects of energy drink consumption are caused by excessive caffeine intake. Milder consequences include sleep disorders, while serious consequences can result in death. The study aimed to examine the prevalence of energy drink consumption in 6- to 14-year-old children of Slovenian primary schools.

METHODS: The data were collected as part of the ACD.Si 2023/24 study (Analysis of Child Development Trends in Slovenia), which took place in September 2023. A study was conducted on a national representative sample of 2086 children, who reported the frequency of their energy drink consumption. A chi-square test was used to assess gender differences in energy drink consumption, while correlation analysis examined age-related variation.

RESULTS: Energy drinks are consumed by 18% of primary school children, of whom 6% consume energy drinks several times a year, 7% several times a month, 4% several times a week, and approximately 1% every day. Boys (22%) consume energy drinks more frequently than girls (14%) ($p < .001$). The prevalence of energy drink consumption increases ($p < .001$) with the children's age: 42% of 14-year-olds and 4% of 6-year-olds consume energy drinks.

DISCUSSION: In a 2013 European Union study including Austria, Belgium, Cyprus, Czech Republic, Germany, Greece, Finland, France, Hungary, Italy, Poland, Romania, Spain, Sweden, Netherlands, and United Kingdom, 55% of children aged 10 to 14 reported the consumption of energy drinks, while in our survey, 25% of children in the same age group reported the same. Although the prevalence is lower than in the European Union study, it is worrying that very young children are already consuming energy drinks. The results highlight the importance of raising awareness among children, parents, educators, and the general public about the excessive consumption of energy drinks in early childhood and adolescence. In particular, awareness among young people about the harmful effects of energy drinks needs to be raised, so that they can protect themselves from the risks of energy drinks consumption.

Keywords: energy drinks, prevalence, caffeine consumption, children, teenagers, health risk.

LITERATURE:

Breda, J. J., Whiting, S. H., Encarnação, R., Norberg, S., Jones, R., Reinap, M., Jewell, J. (2014). Energy Drink Consumption in Europe: A Review of the Risks, Adverse Health Effects, and Policy Options to Respond. *Frontiers in Public Health*, 2. <https://doi.org/10.3389/fpubh.2014.00134>

Li, P., Haas, N.A., Dalla-Pozza, R., Jakob, A., Oberhoffer, F.S., Mandilaras, G. (2023). Energy Drinks and Adverse Health Events in Children and Adolescents: a literature review. *Nutrients*, 15(11), 2537. <https://doi.org/10.3390/nu15112537>

Ruiz, L.D., Scherr, R.E. (2018). Risk of Energy Drink Consumption to Adolescent Health. *American Journal of Lifestyle Medicine*, 13 (1), 22 – 25. <https://doi.org/10.1177/1559827618803069>

Zucconi, S., Volpato, C., Adinolfi, F., Gandini, E., Gentile, E., Loi, A., Fioriti, L. (2013). Gathering consumption data on specific consumer groups of energy drinks: *EFSA Supporting Publications*, 10(3), <https://doi.org/10.2903/sp.efsa.2013.EN-394>

ASSOCIATIONS BETWEEN PHYSICAL FITNESS AND COGNITION IN FORMER ATHLETES AND SEDENTARY ADULTS: PRIMARY FINDINGS FROM THE MINA STUDY

Songxin TANG¹, Marta SUÁREZ-PINILLA², Ivan Kholokholov FILYK¹, Javier MODREGO^{1,3}, Bryan STRANGE², Marcela GONZÁLEZ-GROSS^{1,3,4}, Raquel PEDRERO-CHAMIZO^{1,3}

¹ImFINE Research Group, Department of Health and Human Performance, Universidad Politécnica de Madrid, Madrid, Spain.

²Laboratory for Clinical Neuroscience, Center for Biomedical Technology, Universidad Politécnica de Madrid, Madrid, Spain.

³Physical Exercise and Health Research Network, EXERNET. Madrid, Spain.

⁴Biomedical Research Center of Pathophysiology of Obesity and Nutrition-CIBERObn, Carlos III Health Institute, Madrid, Spain.

Presenting author: Songxin Tang

INTRODUCTION: Whether body-composition markers and specific motor-fitness skills influence cognition in a straight line or follow a dose-response curve that peaks and then declines remain unclear. Therefore, we tested both patterns in mid-life adults.

METHODS: The cross-sectional MINA study recruited 49 former athletes and 40 sedentary adults (40–75 y; 55 ± 9 y) in Spain who had maintained their exercise pattern or inactivity, respectively, for ≥ 6 months and had no major neurological, psychiatric or medical disorders. All volunteers completed various validated neuropsychological, physical fitness and body composition test: (a) executive function was the composite of Trail-Making Test-B, phonemic fluency (F-A-S) and Stroop interference; Attention combined Digit Span Forward (WAIS-IV) and Trail-Making Test-A; Working memory was quantified with Digit Span Backward (WAIS-IV); (b) Lower-limb strength by the mid-thigh pull test and a force-platform protocol (Tanita), the latter also was used to assess balance and stand-up speed; Agility was measured using the Timed Up-and-Go test; as well as (c) fat and muscle mass was determined by bioimpedance. All statistical analyses were performed by SPSS version 29.

Results: Linear terms alone explained little variance ($< 4\%$ in any domain). Curved terms were decisive. Primary analyses revealed that body-composition curves alone explained up to 12% of variance: height showed an inverted-U with attention (peak = -0.19 SD), and waist-to-hip ratio a U-shape with executive function (valley = 0.18 SD). Fitness terms were stronger: balance power and lower-limb strength raised attention R^2 by 0.276 (peak = -0.19 SD). Lower-limb strength displayed an inverted-U with executive function (peak = -0.18 SD). However, none of the physical fitness parameters predicted working memory. When all the cognitive tests were merged into a single factor (named global cognition, 58% variance explained), stand-up speed, balance power and strength showed an inverted-U profile ($\Delta R^2 = 0.228$, sharpest peak = -0.39 SD at stand-up speed fitness). Adding fitness curves after body-composition curves still increased R^2 by 11% for attention and 15% for global cognition (both $p < 0.001$).

Discussion: Physical fitness may predict cognitive performance in midlife better than body composition, and this predictive relationship is curvilinear: the best scores were slightly

below the sample mean for each trait. Programs that refine balance, strength and explosiveness, rather than maximize them, may yield the greatest cognitive benefits.

Keywords: *physical fitness, exercise, cognitive function, brain health,*

Funding: Madrid Innovative Neurotech Alliance (MINA-CM) is funded by the Region of Madrid, I+D in BIOMEDICINE Programm 2022. Ref. S2022/BMD-7236.

LITERATURE:

Lezak, M. D., Howieson, D. B., Bigler, E. D., & Tranel, D. (2012). *Neuropsychological assessment* (5th ed.). New York, NY: Oxford University Press.

ACTIVE AGEING - THE IMPACT OF PHYSICAL ACTIVITY AND NUTRITION ON HEALTH IN LATER LIFE

Kaja TERAŽ^{1,2}, Saša PIŠOT¹, Katarina PUŠ¹, Boštjan ŠIMUNIČ¹, Rado PIŠOT¹

¹Institute for Kinesiology Research, Science and Research Centre Koper, Slovenia

²Clinical University Department of Medical, Surgical, and Health Sciences, University of Trieste, Italy

Presenting author: Kaja Teraž

BACKGROUND: Ageing is usually accompanied by a gradual loss of muscle mass, strength and metabolic efficiency. However, appropriate lifestyle strategies can help to mitigate these effects. Regular physical activity and balanced dietary habits — especially adherence to the Mediterranean diet — are crucial for supporting metabolic health and maintaining functional abilities in older adults. This summary presents the main findings related to physical activity, body composition and dietary behaviour in older adults in Slovenia.

METHODS: In a longitudinal cohort study, 52 physically active older adults (mean age: 68.4 ± 5.6 years; 42.3% men) were followed over eight years. Functional performance tests (hand-grip strength, gait speed), body composition using bioelectrical impedance analysis (BIA), physical activity measured objectively with accelerometers and dietary habits were analysed. A second cross-sectional study included 521 older adults (mean age: 69.6 ± 6.3 years; 31.1 % men) from 12 statistical regions in Slovenia. In this study, adherence to the Mediterranean diet was assessed using the validated MEDLIFE index and the relationship between adherence to the diet and body composition was analysed using multiple linear regression.

RESULTS: Over eight years, participants experienced significant decreases in handgrip strength, muscle mass index, and gait speed ($p < 0.001$). Participants also reported decreased physical activity and increased sedentary time. Although overall activity levels remained high (average $>10,000$ steps/day), almost half of the cohort had an increased body fat percentage, suggesting that physical activity alone may not be sufficient to prevent age-related changes in body composition. The second study found that women were significantly more likely to adhere to the Mediterranean diet ($p = 0.002$). Regression analyses revealed significant associations between dietary behaviour (e.g., consumption of processed meat, olive oil, and snacking habits) and body composition parameters, but only in women ($p < 0.001$).

CONCLUSIONS: The results emphasise the multifaceted relationship between physical activity, diet and body composition in ageing populations. Integrated interventions that combine structured physical activity and evidence-based nutritional counselling are crucial to support healthy ageing effectively.

Keywords: ageing, physical activity, Mediterranean diet, body composition, older adults

LITERATURE:

Cacciatore, S., Calvani, R., Marzetti, E., Picca, A., Coelho-Júnior, H. J., Martone, A. M., Masaro, C., Tosato, M., & Landi, F. (2023). Low Adherence to Mediterranean Diet Is Associated

with Probable Sarcopenia in Community-Dwelling Older Adults: Results from the Longevity Check-Up (Lookup) 7+ Project. *Nutrients*, 15(4), 1026. <https://doi.org/10.3390/nu15041026>

Teraž, K., Marusic, U., Kalc, M., Šimunič, B., Pori, P., Grassi, B., Lazzer, S., Narici, M. V., Blenkuš, M. G., Di Prampero, P. E., Reggiani, C., Passaro, A., Biolo, G., Gasparini, M., & Pišot, R. (2023). Sarcopenia parameters in active older adults – an eight-year longitudinal study. *BMC Public Health*, 23(1), 917. <https://doi.org/10.1186/s12889-023-15734-4>

Teraž, K., Pus, K., Pišot, S., Cikač, A., & Šimunič, B. (2024). Relationship Between Mediterranean Diet Adherence and Body Composition Parameters in Older Adults from the Mediterranean Region. *Nutrients*, 16(21), 3598. <https://doi.org/10.3390/nu16213598>

MOVING SMARTER: THE IMPACT OF COMPETENCY-BASED PHYSICAL EDUCATION ON YOUTH FITNESS AND ENGAGEMENT

Meng-Chieh TSENG¹, Mei-Yao HUANG¹

¹National Taiwan Sport University/Graduate Institute of Physical Education,

Presenting author: Meng-Chieh Tseng

INTRODUCTION: In the pursuit of more effective physical education (PE), competency-based physical education (CBPE) has emerged as a promising pedagogical approach. The CBPE emphasizes meaningful engagement, autonomy, and skill progression rather than repetitive drills. This study aims to examine the impact of competency-based physical education on students' physical activity levels and cardiorespiratory fitness, and to compare these outcomes with those resulting from traditional instructional methods.

METHODS: A quasi-experimental pretest-posttest design with nonequivalent control groups was conducted at a public junior high school in Taipei City, Taiwan. Two intact classes were purposively selected based on scheduling compatibility and teacher consent. One class ($n = 23$) received competency-based physical education (CBPE) instruction, while the other class ($n = 25$) received traditional physical education instruction. The intervention lasted five weeks, comprising ten 50-minute lessons. Accelerometers were used to measure Metabolic Equivalent Task (MET) levels and the duration of moderate-to-vigorous physical activity (MVPA). Cardiorespiratory fitness was assessed using standardized fitness tests, specifically the 20-meter PACER test (Progressive Aerobic Cardiovascular Endurance Run) as recommended by Taiwan's Ministry of Education Sports Administration. Statistical analyses included paired-sample t-tests to examine within-group changes and analysis of covariance (ANCOVA) to evaluate between-group differences, with pretest scores used as a covariate.

RESULTS: Both groups primarily engaged in moderate-intensity activities (MET 3–6) throughout the intervention. However, beginning with Lesson 7, the CBPE group demonstrated progressively higher levels of vigorous-intensity activity compared to the traditional group. By the final lesson, 22% of CBPE students' activity time involved vigorous-intensity exercise versus only 13% for the traditional group. MVPA duration also favored the CBPE group (21.02 minutes vs. 20.33 minutes in Lesson 10). Cardiorespiratory fitness significantly improved within the CBPE group ($t = -8.32$, $p < .001$). ANCOVA indicated a significant difference between groups in posttest performance favoring the CBPE group ($F = 6.102$, $p = .017$, Partial $\eta^2 = .122$).

DISCUSSION: Competency-based physical education effectively enhanced both immediate physical activity engagement and cardiorespiratory fitness outcomes among junior high school students. While both instructional approaches achieved MVPA levels meeting health guidelines, CBPE demonstrated superior results in promoting vigorous-intensity activity and fitness improvements. These findings suggest that pedagogical design significantly influences student outcomes, with CBPE's emphasis on skill mastery and student autonomy contributing to enhanced physiological benefits. The results support the implementation of competency-based approaches in physical education settings, though future research should explore long-term effects on student motivation and sustained physical activity.

participation across diverse educational contexts. Nevertheless, the repeated in-class use of accelerometers presented logistical challenges that occasionally disrupted instructional flow. Future studies should consider continuous daily wear protocols to ensure more efficient, ecologically valid data collection. Additionally, long-term investigations are warranted to explore CBPE's impact on student motivation, behavioral change, and curriculum integration across diverse school contexts.

Keywords: movement competence, physical education pedagogy, adolescent health, accelerometry, instructional effectiveness

LITERATURE:

Chung, M.-H. (2022). Correspondence of learning assessment in QPE. *School Physical Education*, (188), 59–67.

Ministry of Education. (2018). *Curriculum guidelines of 12-year basic education: Health and physical education domain – Physical education*. New Taipei City: National Academy for Educational Research.

Sports Administration, Ministry of Education. (2022). *Quality physical education (QPE) curriculum and instruction project: Competency-based teaching materials*. Retrieved June 30, 2025, from <https://sportsbox.sa.gov.tw/2022QPE-bookcase/bookcase.html>

World Health Organization. (2020). WHO guidelines on physical activity and sedentary behaviour. Geneva, Switzerland: World Health Organization.

Zhong, M.-H. (2020). Principles of competency-based physical education teaching. *School Physical Education*, (181), 11–20.

FLOW-MEDIATED SLOWING AS A TOOL FOR DETECTING ACUTE VASCULAR RESPONSES TO HIGH- AND MODERATE-INTENSITY AEROBIC EXERCISE: PRELIMINARY FINDINGS

Gašper TURNŠEK¹, Simon ISKRA¹, Kristina DROLE¹, Armin PARAVLIČ^{1,2,3}

¹Faculty of Sport, University of Ljubljana, Ljubljana, Slovenia

²Science and Research Centre, Koper, Institute for Kinesiology Research, Koper, Slovenia

³Faculty of Sport Studies, Incubator of Kinanthropology Research, Masaryk University, Brno, Czech Republic

Presenting author: Gašper Turnšek

INTRODUCTION: Flow-mediated slowing (FMS) is a novel measure of endothelial function that evaluates changes in pulse wave velocity (PWV) in response to reactive hyperemia. While traditionally compared to flow-mediated dilation (FMD), recent evidence supports FMS as a feasible, operator-independent alternative for assessing vascular responses. Exercise induces shear-stress-mediated vascular adaptations, where acute endothelial responses play a key role in long-term cardiovascular remodeling. Assessing these immediate responses provides valuable insights into endothelial functional capacity. In this study, we investigated the acute effects of two distinct aerobic exercise modalities, including high-intensity interval training—HIIT, and moderate-intensity continuous training—MICT, on endothelial function measured via FMS. Additionally, we evaluated the baseline changes in PWV and the moderating role of sex.

METHODS: A total of 9 healthy adults (5 women, 4 men; mean age 23 ± 2.4 years) were randomly allocated to either HIIT or MICT. The HIIT protocol consisted of four 4-minute cycling bouts at 95% of the power corresponding to the predetermined second ventilatory threshold (VT₂), interspersed with 3-minute active recovery, while MICT involved 30 minutes of continuous cycling at 65% of VT₂. FMS was calculated as the difference in brachial–radial PWV before and immediately after a 5-minute occlusion of the brachial artery. PWV was measured using the oscillometric technique (Vicorder; Skidmore Medical, UK). Data were analyzed using univariate ANCOVA, with exercise modality and sex as between-subject factors, and baseline changes in PWV included as a covariate.

RESULTS: There was no significant main effect of exercise modality ($p = 0.491$) or sex ($p = 0.825$) on changes in FMS. The interaction between sex and exercise modality was also non-significant ($p = 0.838$). Nonetheless, descriptive data showed greater FMS changes following MICT (2.63 ± 1.53 m/s) than HIIT (1.09 ± 1.53 m/s), and greater responses in women (2.11 ± 1.46 m/s) than in men (1.61 ± 1.63 m/s). Although the association between baseline PWV changes and FMS changes did not reach statistical significance ($p = 0.161$), a negative trend was observed ($B = -3.385$), with a moderate effect size (partial $\eta^2 = 0.145$).

DISCUSSION: The results of this exploratory analysis suggest that acute FMS responses to aerobic exercise may not differ significantly between HIIT and MICT modalities or between sexes. Although not statistically significant, the association between changes in baseline PWV and changes in FMS aligns with prior evidence suggesting that acute exercise induces acute and transient alterations in arterial stiffness, which may attenuate further endothelial responses detected by FMS. Despite non-significant group effects, observed trends indicate

meaningful physiological variability, warranting further research. FMS may serve as a promising tool for capturing vascular adaptations, but future studies with larger samples are required to confirm its sensitivity in detecting exercise-induced endothelial changes.

Acknowledgements: The authors would like to thank the participants for their involvement in this study.

Funding: The research is part of projects funded by the University of Ljubljana's Development Fund titled "The role of physical Activity in Cardiovascular disease risk reduCTiOn for Non-communicable diseases. Do non-responders to exercise really exist?" (Project ID: 005-1/2023) and "The role of physical Activity in Cardiovascular disease risk reduCTiON – On the way to personalized exercise prescription (ACT-ON)" (project ID: 802-15/2023-5).

Keywords: Flow-mediated slowing, endothelial function, pulse wave velocity, aerobic exercise.

LITERATURE:

Cauwenberghs, Nicholas, Yenthel Heyrman, Lutgarde Thijs, Wen Yi Yang, Fang Fei Wei, Zhen Yu Zhang, Jan A. Staessen, and Tatiana Kuznetsova. 2018. "Flow-Mediated Slowing of Brachial-Radial Pulse Wave Velocity: Methodological Aspects and Clinical Determinants." *Artery Research* 21(1):29–37. doi:10.1016/J.ARTRES.2017.12.001/METRICS.

Naka, Katerina K., Ann C. Tweddel, Sagar N. Doshi, Jonathan Goodfellow, and Andrew H. Henderson. 2006. "Flow-Mediated Changes in Pulse Wave Velocity: A New Clinical Measure of Endothelial Function." *European Heart Journal* 27(3):302–9. doi:10.1093/EURHEARTJ/EHI619;

Pereira, Telmo, Armindo Almeida, and Jorge Conde. 2018. "Flow-Mediated Slowing as a Methodological Alternative to the Conventional Echo-Tracking Flow-Mediated Dilation Technique for the Evaluation of Endothelial Function: A Preliminary Report." *Mayo Clinic Proceedings: Innovations, Quality & Outcomes* 2(2):199–203. doi:10.1016/j.mayocpiqo.2018.02.002.

Stoner, Lee, Keeron Stone, Gabriel Zieff, Jade Blackwell, Jake Diana, Daniel P. Credeur, Craig Paterson, and Simon Fryer. 2020. "Endothelium Function Dependence of Acute Changes in Pulse Wave Velocity and Flow-Mediated Slowing." *Vascular Medicine (United Kingdom)* 25(5):419–26. doi:10.1177/1358863X20926588.

Thijssen, Dick H. J., N. Timothy Cable, and Daniel J. Green. 2011. "Impact of Exercise Training on Arterial Wall Thickness in Humans." *Clinical Science (London, England : 1979)* 122(Pt 7):311. doi:10.1042/CS20110469.

CORTICAL DYNAMICS DURING RESISTANCE EXERCISE - EFFECTS OF DIFFERENT INTENSITY LEVELS ON BRAIN ACTIVATION PATTERNS

Anton VISSER¹, Tim LEHMANN¹, Jochen BAUMEISTER¹

¹Exercise Science and Neuroscience, Department Exercise and Health, Paderborn University, Paderborn, Germany

Presenting author: Anton Visser

INTRODUCTION: The neural mechanisms underlying resistance training are shaped by the different features of a training stimulus. Although both long-term neuronal adaptations and acute neuronal responses to resistance exercise demonstrate pronounced stimulus specificity, the modulation of underlying cortical activation patterns through different intensity levels remains unexplored. Physiological markers for understanding brain-based training responses will enable more precise and personalized training program design tailored to individual neural responses. Therefore, the purpose of this study was to investigate brain dynamics associated with varying intensity levels during acute resistance exercise.

METHODS: Fifteen healthy young adults (11 female / 4 male, 25.34 ± 2.98 years) participated in two sessions examining brain dynamics during knee exercise. Participants completed 11 blocks of isokinetic knee extension and flexion (10 trials per block) in a standardized seated position. Sessions differed with regards to intensity, as modulated by movement velocity (60°/s versus 180°/s). Measurements included isokinetic torque (BTE Primus RS, Baltimore, USA), muscle activity (5-channel electromyography, Noraxon, USA), and brain activity (64-channel electroencephalography, LiveAmp, Brain Products, Germany).

RESULTS: Mean torque during knee extension and flexion was significantly lower at 180°/s compared to 60°/s angular velocity ($p < .05$). Conversely, mean EMG activity of the vastus medialis and vastus lateralis muscles was significantly higher at 180°/s compared to 60°/s angular velocity ($p < .05$). Event-related spectral perturbations revealed distinct brain dynamics, characterized by differences in timing and frequency associated with angular velocity of the movement.

DISCUSSION: The preliminary data analysis revealed that specific resistance exercise stimuli, manipulated through varying intensities, results in distinct patterns of both muscle and brain activation. This is evidenced by lower torque output but higher muscle activity at faster velocities, accompanied by intensity-specific cortical processing and motor control mechanisms. These findings provide physiological indicators of neuromuscular performance, advancing our understanding of different exercise intensities stimuli and responses from a neurophysiological perspective. Ultimately, new insights into the relationship between training stimuli and responses facilitate the development of more effective, evidence-based rehabilitation and treatment protocols that can be personalized based on individual neuromuscular responses.

Keywords: EEG, Motor control, Strength Training, Exercise load.

LITERATURE:

Bird, S. P., Tarpenning, K. M., & Marino, F. E. (2005). Designing resistance training programmes to enhance muscular fitness: A review of the acute programme variables. *Sports Medicine (Auckland, N.Z.)*, 35(10), 841–851. <https://doi.org/10.2165/00007256-200535100-00002>

Visser, A., Piskin, D., Büchel, D., & Baumeister, J. (2024). Electrocortical activity during resistance exercises in healthy young adults-a systematic review. *Frontiers in Sports and Active Living*, 6, 1466776. <https://doi.org/10.3389/fspor.2024.1466776>

IMMEDIATE EFFECTS OF DIFFERENT RECOVERY STRATEGIES ON POST-EXERCISE FATIGUE

Pei-Hsuan WANG¹, En-Yu CHANG¹, Hei-Tung LAU¹, Chi-Chang HUANG¹

Graduate Institute of Sports Science, National Taiwan Sport University, Taoyuan City, Taiwan

Presenting author: Pei-Hsuan Wang

INTRODUCTION: Post-exercise muscle fatigue and delayed onset muscle soreness are major barriers to maintaining regular physical activity. To address these issues, various recovery strategies such as massage, static stretching, and dynamic stretching are commonly applied. In recent years, Blood Flow Restriction and Proprioceptive Neuromuscular Facilitation have received growing attention for their potential in enhancing recovery. Blood Flow Restriction promotes reactive hyperemia and metabolic clearance by applying intermittent pressure to the proximal limbs, while Proprioceptive Neuromuscular Facilitation enhances neuromuscular relaxation through autogenic inhibition mediated by the Golgi tendon organ. As both methods are considered beneficial for post-exercise fatigue reduction, this study aims to compare their immediate effects on fatigue recovery and explore their potential to support long-term exercise adherence.

METHODS: Eight physically active males aged 18 to 24 were recruited to participate in two recovery interventions, with a one-week interval between the two sessions. One intervention involved proprioceptive neuromuscular facilitation, and the other involved blood flow restriction. Participants first performed two 30-second Wingate anaerobic cycling tests to induce fatigue, with a 5-minute rest between efforts. Muscle function was assessed using Tensiomyography at three different time points: before the anaerobic tests (Time 1), after the tests (Time 2), and after either the proprioceptive neuromuscular facilitation or blood flow restriction intervention (Time 3). The muscles evaluated were the rectus femoris and biceps femoris.

Statistical analyses were conducted using paired-sample t-tests in SPSS software (version 25.0; IBM Corp., Armonk, NY, USA). Differences in Tensiomyography (TMG) parameters between the two recovery methods were analyzed, with the level of statistical significance set at $\alpha = 0.05$.

RESULTS: This study compared the immediate effects of two recovery interventions on muscle function following high-intensity exercise. Both strategies significantly improved the delay time and relaxation time of the biceps femoris. In the proprioceptive neuromuscular facilitation group, significant improvements were found in both parameters ($p = .031$; $p = .013$), and similar effects were observed in the blood flow restriction group ($p = .031$; $p = .014$). Additionally, the blood flow restriction group showed significant improvements in the rectus femoris, including delay time ($p = .019$) and relaxation time ($p = .048$), suggesting potential benefits for quadriceps neuromuscular recovery.

DISCUSSION: This study demonstrated that both proprioceptive neuromuscular facilitation and blood flow restriction recovery effectively improved neuromuscular function after high-intensity exercise, particularly by significantly enhancing delay time and relaxation time of the biceps femoris. Blood flow restriction also showed positive effects on the rectus

femoris. These findings indicate that both interventions provide immediate recovery benefits, help reduce exercise-induced fatigue, and may lower the risk of training interruption, thereby promoting sustained participation in physical activity.

Keywords: Neuromuscular function, Tensiomyography, Wingate anaerobic cycling test.

LITERATURE:

Oliva-Lozano, J. M., Patterson, S. D., Chiampas, G., Maybury, E., & Cost, R. (2024). Blood flow restriction as a post-exercise recovery strategy: A systematic review of the current status of the literature. *Biology of sport*, 41(3), 191-200.

Sbardelotto, G. A. E. B., Weissahn, N. K., Benincá, I. L., de Estéfani, D., e Lima, K. M. M., & Hauptenthal, A. (2022). Hold-relax PNF is more effective than unilateral lumbar mobilization on increasing hamstring flexibility: A randomized clinical trial. *Journal of Bodywork and Movement Therapies*, 32, 36-42.

García-García, O., Cuba-Dorado, A., Riveiro-Bozada, A., Carballo-López, J., Álvarez-Yates, T., & López-Chicharro, J. (2020). A Maximal Incremental Test in Cyclists Causes Greater Peripheral Fatigue in Biceps Femoris. *Research quarterly for exercise and sport*, 91(3), 460–468.

BODY COMPOSITION CHANGES OVER THE SUMMER IN FOURTH-GRADE PUPILS WITH DIFFERENT LEVELS OF PHYSICAL FITNESS

Klemen ZUPET¹

¹Faculty of Education, University of Maribor, Maribor, Slovenia

Presenting author: Klemen Zupet

INTRODUCTION: Summer holidays often lead to a decline in daily physical activity due to the absence of school routines and the temporary interruption of organized sports training, even among athletic children. These changes may affect body composition; however, it is unclear whether the effects differ depending on the child's fitness level. This study explores how body composition changes over the summer in children with lower versus higher levels of endurance.

METHODS: The sample group consisted of 70 children—32 boys and 38 girls. The mean age of the group was 9.56 years ($SD = .551$). The parents provided consent after being informed about the study's objectives and methods. Firstly, based on the results of the beep test, maximum oxygen consumption was calculated, and participants were divided into two groups: low performers and high performers. Bioelectrical impedance analysis was used to measure body composition on two occasions—before and after the summer holidays. The two measurements were compared using the independent variables of physical fitness and gender. SPSS statistical software was used to perform the t-test for dependent samples and to determine the statistical significance of the differences.

RESULTS: Results show that, regardless of physical fitness, all dependent variables: height, weight, muscle mass, skeletal mass, body fat mass and body water have increased during the summer holidays. There was a higher increase in all variables in boys with lower physical fitness compared to boys with higher physical fitness. Girls showed a similar pattern, with all variables—except height—increasing more in those with lower physical fitness.

DISCUSSION: The most notable finding of our study is the increase in all dependent variables over the summer holidays, regardless of the participants' level of physical fitness. As expected, we conclude that physical fitness plays a significant role in influencing changes in body composition over the summer.

Keywords: body composition, summer holidays, physical fitness.

LITERATURE:

Rokicka-Hebel, M. in Bielec, G. (2023). The effect of summer holidays on body composition and respiratory muscle strength in pubescent swimmers. *Sportis Scientific Journal of School Sport, Physical Education and Psychomotricity*, 9(2), 262-283 <https://doi.org/10.17979/sportis.2023.9.2.9296>

Volmut, T., Pišot, R., Planinšec, J., in Šimunič, B. (2021). Physical activity drops during summer holidays for 6- to 9-year-old children. *Frontiers in Public Health*, 8(631141). <https://doi.org/10.3389/fpubh.2020.631141>

Weaver, R. G., Beets, M. W., Brazendale, K., in Brusseau, T. A. (2018). Summer Weight Gain and Fitness Loss: Causes and Potential Solutions. *American journal of lifestyle medicine*, 13(2), 116–128. <https://doi.org/10.1177/1559827617750576>

**PROFESSIONAL PAPERS /
STROKOVNI PRISPEVKI**

POBEG IZ RAZREDA ESCAPE FROM CLASS

Tanja BOHINC¹

¹Osnovna šola Dobrova, Ljubljana, Slovenija

Predavateljica: Tanja Bohinc

IZHODIŠČA: Gibanje spodbuja prekrvavitev možganov, kar pozitivno vpliva na pozornost, spomin in sposobnost reševanja problemov. Gibanje pri pouku je lahko tudi odličen način za povezovanje učencev v razredu. Kadar učenci delajo v skupinah, s pa se učijo medsebojnega poslušanja, sodelovanja in reševanja konfliktov.

PROBLEM/NAMEN: Pouk v šolah še vedno večinoma poteka na klasičen način, kar pomeni, da učenci dopoldneve v večini presedijo. V šoli opažamo, da ima vedno več otrok težave tudi s pozornostjo. Naloga nas učiteljev je, da k aktivnemu poslušanju in razmišljanju vključimo čim več učencev, za kar uporabljamo različne pristope. Eden izmed boljših pristopov je vključevanje gibanja v ure rednega pouka.

METODE: Ure matematike večkrat načrtujemo tako, da pri pouku izvedemo čim več različnih dejavnosti, ki vključujejo gibanje. V letošnjem šolskem letu smo v 6. razredu izvedli uro utrjevanja obsega, ploščine, površine in prostornine kot uro »pobega iz razreda«. Učenci so se razdelili v pet skupin po pet učencev. Na začetku smo vsaki skupini dali svojo nalogo. Naloge so bile matematične, nekatere so vključevale tudi gibanje. Nekaj nalog je bilo tudi praktičnih, torej, da so učenci morali izmeriti podatke in šele potem so lahko izračunali obseg ali ploščino. Če so učenci pravilno rešili nalogo, so prišli do namiga, kje se nahaja njihova naslednja postaja. Pravilno rešene naloge in gesla so učence vodila od postaje do postaje. Postaje so bile v garderobah, na otroškem igrišču, nogometnem igrišču in zadnja postaja je bila pri vseh skupinah spet v razredu, kjer je učence čakala nagrada. Skupina, ki je prva pravilno opravila z vsemi nalogami, je dobila za nagrado še obeske.

UGOTOVITVE: Učenci so pri učni uri zelo dobro sodelovali in bili izjemno motivirani za delo. Velika večina učencev je pri tovrstnih dejavnostih bolj motivirana za delo kot pa če bi enake naloge reševali na učnih listih. Glede na to, da so bile vključene tudi naloge merjenja, so učenci poleg matematike in gibanja, dobili tudi merske predstave.

ZAKLJUČEK: Vsaka učna ura, ki jo izvedemo z gibanjem, pri učencih vzbudi veliko zanimanja. To nam pove, da se učenci radi gibajo, naša naloga pa je, da jim to čim večkrat omogočimo tudi pri pouku. Ukvarjanje s športom namreč sprošča različne napetosti in v določeni meri odpravlja tesnobo, jezo, strah in druge težave, ki se pri današnjih otrocih pogosto kopičijo.

Ključne besede: gibanje, matematika, naloga, otroci, obseg, ploščina

LITERATURA:

Podgornik, K. (2013). Matematika v naravi. Diplomsko delo. Univerza na Primorskem: Pedagoška fakulteta. Pridobljeno s <https://repozitorij.upr.si/lzpisGradiva.php?lang=slv&id=810>.

Marentič Požarnik, B. (2012). Psihologija učenja in pouka. Ljubljana: DZS.

ŠPORTNA PODROČJA – VSAK MESEC NOVA IZKUŠNJA V 1. RAZREDU

SPORTS AREAS – A NEW EXPERIENCE IN 1ST CLASS EVERY MONTH

Eva BOŽIČ¹

¹OŠ 8 talcev Logatec

Predavateljica: Eva Božič

IZHODIŠČA: V 1. razredu osnovne šole je gibanje ključno za celostni razvoj otroka. Učni načrt za športno vzgojo v 1. razredu predvideva razvijanje osnovnih gibalnih sposobnosti, spoznavanje osnov različnih športnih dejavnosti ter ustvarjanje pozitivnega odnosa do gibanja. Odločila sem se, da skozi celotno šolsko leto učencem vsak mesec predstavim eno športno področje in njemu pripadajoče športne pripomočke ter jim omogočim raznolika, zanimiva in razvojno primerna gibalna doživetja.

PROBLEM/NAMEN: Glavni cilj projekta je bil približati različna športna področja najmlajšim učencem na igriv, izkustven in celosten način. Želela sem razvijati njihove osnovne gibalne spretnosti, razširiti obzorja o možnostih športnega udejstvovanja, obenem pa krepiti vrednote, kot so vztrajnost, sodelovanje, spoštovanje pravil in zdrav življenjski slog. Želela sem spodbuditi ustvarjalnost in timsko delo skozi izdelavo razrednih plakatov, predstavitev znanih slovenskih športnikov in spoznavanje športnih pripomočkov.

METODE: Vsak mesec sem izbrano športno področje učencem predstavila skozi: gibalne dejavnosti (ure športa z različnimi pripomočki), spoznavanje športne opreme, predstavitev slovenskih športnikov, ustvarjalno delo (izdelava plakata). Izbrana športna področja so bila: atletika, gimnastika, igre z loparjem, borilne igre, pohodi, rolanje in vožnja s skirojem.

UGOTOVITVE: Učenci so z veliko radovednostjo in veseljem sodelovali v vseh dejavnostih. Plakati, ki so jih ustvarili, so pokazali razumevanje osnovnih značilnosti športov in navdušenje nad izbranimi športniki. Posebej spodbudno je bilo opaziti, da so se tudi otroci z manj gibalne samozvesti dejavno vključili v vadbo, saj je bila ta predstavljena na igriv, sproščen in netekmovalen način. Pozitivne odzive smo prejeli tudi s strani staršev, ki so izrazili zadovoljstvo nad raznolikostjo dejavnosti in navdušenjem otrok.

ZAKLJUČEK: Projekt je uspešno prispeval k uresničevanju ciljev učnega načrta za športno vzgojo v 1. razredu, hkrati pa razvijal širše zavedanje o pomenu gibanja za zdravje in dobro počutje. Otroci so razvijali osnovne gibalne spretnosti, razširili svoje vedenje o športu, pridobili izkušnje iz različnih športnih zvrsti in skozi ustvarjalno delo razvijali socialne veščine in občutek skupnosti. Spoznali so, da šport ni le tekmovanje, temveč tudi sodelovanje, vztrajnost, zabava in način življenja. Izkazalo se je, da lahko že najmlajšim na dostopen in privlačen način predstavimo raznolikost športa ter jih spodbudimo k aktivnemu in zdravemu življenjskemu slogu.

Ključne besede: šport, športna področja, športni pripomočki, ustvarjalnost, gibanje

LITERATURA:

Marjeta Kovač in sodelavci. Učni načrt. Program osnovna šola. Športna vzgoja. (2011). Ljubljana: Ministrstvo za šolstvo in šport: Zavod RS za šolstvo.

Pistotnik, B., Pinter, S., Dolenc, M. (2002). Gibalna abeceda. Ljubljana. Fakulteta za šport.

Športni program Zlati sonček. Priročnik (2022). Ljubljana: Zavod za šport Planica.

VIKEND SMUČARSKA ŠPORTNA ŠOLA V OSNOVNI ŠOLI

WINTER SPORTS SCHOOL IN PRIMARY SCHOOL

Nika COX¹

¹OŠ Tabor I Maribor, Maribor

Predavateljica: Nika Cox

IZHODIŠČA: Na osnovni šoli Tabor I vzporedno z rednim programom izvajamo tudi dodatni športni program. To je nadstandardni program, s katerim želimo spodbujati in razvijati zdrav način življenja, spodbujati gibanje v naravi in nadgraditi znanja iz različnih športov. Ker se zavedamo pomena športnega pedagoga že v nižjih razredih osnovne šole, ga izvajajo športni pedagogi ob pomoči učiteljic razrednega pouka. Program vsebuje redne ure športa, kjer so učenci v program vključeni eno uro na teden (po urniku), nato pa se jim tekom šolanja ponudi tudi tečaje plavanja, drsanja, smučanja, rolanja. Izvajajo se tudi pohodi, ki se v vsakem razredu nadgrajujejo. V okviru programa se od 4. -9. razreda izvaja tudi zimska športna šola, kjer učenci nadgrajujejo svoje znanje v smučanju in teku na smučeh. V tem prispevku bom predstavila smučarsko športno šolo, ki jo za 6. in 7. razred izvajamo na Rogli.

NAMEN: Namen prispevka je podrobneje predstaviti eno izmed dodatnih ponujenih športnih šol, ki jo ponuja naša šola.

METODE: Predstavitev smučarske športne šole s primeri dobre prakse in mnenjem učencev. Kot zgoraj omenjeno, dodatni športni program poleg rednih ur športa, ki jih izvajamo v telovadnici, vključuje tudi tečajne oblike smučanja, drsanja in plavanja, pohode ter športne šole, ki jih izvajamo med vikendom. Ena od teh športnih šol je smučarska športna šola na Rogli, ki jo ponudimo šestošolcem in sedmošolcem, ki so vključeni v program. Program na Rogli vključuje učenje tehnike, igre na smučeh, učenje obeh tekaških tehnik, igre na tekaških smučeh, štafetne igre na tekaških smučeh, tekmovalje v teku na smučeh, sinhrono smučanje po parih, trojkah in velikih skupinah, delo v parih na smučeh. Športna šola poteka tri dni (od petka do nedelje), nastanjeni pa smo v domu Jelka na Rogli. Ostale vsebine, ki jih v času šole izvajamo so: nočni pohod, plezanje na umetni steni in športne igre v telovadnici. V času bivanja poleg športnih aktivnosti med drugim spodbujamo zdrave medosebne odnose, navajamo na samostojnost, druženje brez mobilnih telefonov, strpnost, sprejemanje drugačnosti, medsebojno spodbujanje pri premagovanju večjih naporov in razvijanje vztrajnosti. Pred odhodom izvedemo sestanek s starši, kjer jim predstavimo načrt dela, obvezno opremo, ki jo potrebujejo, opozorimo na pomen primerne obnašanja in na pomen primerne prehrane, ki jo učenci prinesejo s seboj. Kot po ostalih športnih šolah z učenci izvedemo evalvacijo ter se pogovorimo o pozitivnih in negativnih vplivih.

UGOTOVITVE: Smučarska športna šola pozitivno vpliva na otrokovo samopodobo in zvišuje njihovo samozavest. Učence med seboj poveže, saj so zaradi odsotnosti mobilnih telefonov v pristnejših stikih med seboj, kjer se več pogovarjajo in igrajo družabne igre, obenem pa so na svežem zraku. Sicer opažamo, da je smučanje postal šport »elite«, ki dandanes predstavlja velik strošek za ljudi, ravno iz tega razloga pa imamo vsako leto otroke, katerih starši si smučanja za celo družino ne morejo privoščiti, jo pa zato privoščijo svojim otrokom in za mnoge je to edino smučanje v celotni zimi. Na športni šoli izvajamo tudi tek na smučeh, kar je finančno bolj dostopno od smučanja in marsikateri od učencev se tako navduši za ta

šport, da se tudi sami nato odpravijo. Smučanje in tek na smučeh predstavljata ene izmed najlepših športov, ki jih v zimskem času lahko izvajamo na prostem ima tudi pomembno tradicijo v Sloveniji in iz tega vidika želimo ta dva športna približati čim večjemu številu mladih.

ZAKLJUČEK: Ta prispevek lahko veliko doprinese k športni stroki, saj se lahko njen program izvede tudi na ostalih šolah, v času po pouku (med vikendom). S predstavitvijo so tudi ostali udeleženci morda dobili idejo za tovrstno ponudbo.

Ključne besede: šola, šport, smučanje, tek na smučeh, gibanje, narava, športna oprema

LITERATURA:

Pišot, R. in Videmšek M. (2004). Smučanje je igra. Ljubljana: Zveza učiteljev in trenerjev smučanja Slovenije

Rajšp, M., Kolar, R., Vrh, J., Novak, H. in Cox, N. (2020). Dodatni športni program, pravila delovanja. Maribor: OŠ Tabor I Maribor.

Šimunič, B. (2008). Otrok med vplivi sodobnega življenjskega sloga – gibalne sposobnosti, telesne značilnosti in zdravstveni status slovenskih otrok. Koper: Znanstveno-raziskovalno središče Koper, Inštitut za kineziološke raziskave.

Videmšek, M. in Pišot, R. (2007). Šport za najmlajše. Ljubljana: Fakulteta za šport, Inštitut za šport.

Videmšek, M. (2024). Igrivo smučanje; Učenje smučanja mlajših otrok. Šport (Ljubljana).

OBLIKOVANJE GIBALNIH IGER SKOZI SPEKTER STILOV POUČEVANJA

CREATING THE MOVEMENT GAMES THROUGH SPECTRUM OF TEACHING STYLES

Nadja ČERNE in Tjaša ROJKO

Predavateljica: Nadja Černe

IZHODIŠČA: Da bi učenci učinkovito pridobivali znanje, morajo učitelji uravnoteženo uporabljati različne stile poučevanja, saj tako lažje zadostijo raznolikim učnim stilom učencev (Awla, 2014). Mosston in Ashworth (2002) navajata, da učitelji športne vzgoje uporabljajo stile poučevanja, ki se gibljejo od direktnega in avtorskega do indirektnega in laissez-faire poučevanja ter teh 11 stilov poučevanja razvrstijo na spektru (ang. *Spectrum of Teaching styles*) glede na količino in vrsto vključenosti učitelja in učenca v ustvarjanje, izvedbo ter evalvacijo posamezne učne dejavnosti. Izbira stila poučevanja je odvisna od namena in ciljev izobraževalnega procesa. Učiteljevo vedenje, ki podpira učenčev avtonomijo, ima pomembno vlogo pri razvoju učenčevih veščin in motivacije (Hein idr., 2012), prav tako pa je dokazano, da se motivacija učencev za telesno dejavnost v okviru šolske športne vzgoje prenaša v prosti čas (Hagger idr., 2009). Igra je ena od organizacijskih oblik, ki se jo uporablja tako pri pouku športne vzgoje kot v prostem času in v kateri po Gray (2011) učenec skozi socialne in zabavne dejavnosti razvija tudi zmožnost sprejemanja odločitev, reševanja problemov, samonadzora, upoštevanja pravil, in uravnavanja čustev, kar je pomembno za nadaljnjo učenje.

PROBLEM: V projektu zMIGAJ! je eden od ciljev uporaba sooblikovanja (ang. *Co-design*) v učni proces ustvarjanja novih inovativnih iger (t. i. Hudo dobrih iger). Učitelji (N = 49), ki izvajajo vadbene programe, poročajo, da so seje sooblikovanja izvajali v manjši meri, predvsem zato, ker se dijakom ta pristop ne zdi zanimiv. Ob tem izpostavljajo tudi pomanjkanje primerov dobre prakse, ki bi jim olajšali izvajanje sooblikovanja z dijaki. Slednje verjetno izhaja iz pogostejše uporabe reproduktivnih stilov v primerjavi s produktivnimi v učnem procesu, v katerem nastopajo v vlogi učitelja (Hein idr., 2012) in katerega so bili deležni kot učenci (Chicoine, 2004).

UGOTOVITVE: Glede na ugotovljeni problem smo oblikovali učne situacije za posamezni stil poučevanja na dveh vsebinskih področjih: a) pri razvoju nove igre, skozi katero krepimo dotično gibalno sposobnost in b) pri prilagajanju pravil sojenja pri že obstoječi igri. Primeri po posameznih stilih poučevanja nudijo oporo učiteljem pri sooblikovanju iger. Učenec se skozi posamezne stile v učnem procesu postopno osamosvaja, kar celostno gledano pripomore k bolj kakovostnem usvajanju znanja.

ZAKLJUČEK: Uporaba spektra stilov poučevanja učiteljem omogoča učinkovitejše prilagajanje učnega procesa zastavljenim ciljem in zmožnostim učencev. V okviru projekta zMIGAJ! se je izkazalo, da je pri vključevanju učencev v sooblikovanje ključno, da učitelji dobro razumejo značilnosti posameznih stilov ter učenec postopoma prepuščajo večjo vlogo pri ustvarjanju.

Ključne besede: gibalne igre, sooblikovanje, aktivna udeležba, stili poučevanja, zMIGAJ!

LITERATURA:

Awla, H. A. (2014). Learning Styles and Their Relation to Teaching Styles. *International Journal of Language and Linguistics*, 2(3), 241–245. doi: 10.11648/j.ijll.20140203.23

Chatoupis, C. (2009). Contributions of the Spectrum of Teaching Styles to research on teaching. *Studies in Physical Culture and Tourism*, 16(2), 193–205.

Chicoine, D. (2004). Ignoring the Obvious: A Constructivist Critique of the Traditional Teacher Education Program. *Educational Studies: Journal of the American Educational Studies Association*, 36(3), 245–263. https://doi.org/10.1207/s15326993es3603_4

Gray, P. (2011). The Decline of play and the rise of psychopathology in children and adolescents. *American Journal of Play*, 3(4), 443–463.

Hagger, M., Chatzisarantis, N. L. D., Hein, V., Soós, I., Karsai, I., Lintunen, T. in Leemans, S. (2009). Teacher, peer and parent autonomy support in physical education and leisure-time physical activity: A trans-contextual model of motivation in four nations. *Psychology & Health*, 24(6), 689–711. <https://doi.org/10.1080/08870440801956192>

Hein, V., Ries, F., Pires, F., Caune, A., Heszteráné Ekler, J., Emeljanovas, A. in Valantiniene, I. (2012). The relationship between teaching styles and motivation to teach among physical education teachers. *Journal of sports science & medicine*, 11(1), 123–130.

GOZDNA POT TELESA IN ČUTA

FOREST PATH OF THE BODY AND THE SENSES

Damjana DEBENEC¹

¹OŠ Naklo

Predavateljica: Damjana Debenec

IZHODIŠČA: Številni avtorji poudarjajo koristi učenja v naravi, saj otrokom omogoča možnosti za raziskovanje. Raziskave tudi potrjujejo, da učenje v naravi pozitivno vpliva na telesni, čustveni in kognitivni razvoj otrok. Ti izsledki so še bolj pomembni v današnjem času, saj sodobni način življenja pogosto omejuje otrokovo naravno potrebo po prosti igri in gibanju zunaj, hkrati pa otroci vse več časa preživijo v sedečih položajih ter znotraj učilnic.

PROBLEM/NAMEN: Kljub jasnim dokazom o pozitivnih učinkih učenja v naravi pa slovenski šolski sistem še ne omogoča sistematične vključitve teh pristopov. Namen prispevka je prikazati, kako se koncept utelešenega učenja v gozdu lahko izvaja pri prvošolcih in analizirati učinke na njihovo pozornost, ustvarjalnost in socialne veščine. Z gozdno potjo telesa in čuta smo otrokom dali možnost gibanja, čutnega zaznavanja ter naravo kot učilnico.

METODE: Uporabili smo metode učenja z izkušnjo, saj so se učili skozi lastno aktivno udeležbo v naravnem okolju. Namesto razlage so dobili izziv ter nato delili svoje ugotovitve. Učili so se osredotočanja na trenutek in zavedanja svojih čutnih zaznav. V gibanje smo vključili naravne oblike gibanja ter kratke igre. Z različnimi nalogami so usmerjeno raziskovali. Za vse dejavnosti smo uporabljali gozdne zvezke, ki so bili rdeča nit skozi mesece in so služili kot osebni dnevniki doživetij otrok.

UGOTOVITVE: Otroci so se v gozd vračali z navdušenjem, kar je bilo razvidno iz njihove spontanе pripravljenosti, pričakovanja pred odhodom ter živahnih refleksij. Izboljšana koncentracija je bila ugotovljena z opazovanjem vedenja otrok med nalogami. V začetnih mesecih so otroci dejavnosti pogosto hitro prekinjali in prehajali k novi aktivnosti, kasneje pa so dalj časa ostali pri nalogi. Čustveno stanje otrok se je izboljšalo, kar smo ugotovili na podlagi opazovanja otrok, evalvacijami ter risbami v gozdnih zvezkih. Prav tako smo ugotovili večjo pripravljenost otrok za skupinsko delo in manj konfliktov med dejavnostmi.

ZAKLJUČEK: Analiza gozdnih zvezkov otrok je razkrila, da so otroci skozi šolsko leto postopoma poglobljali svoje opazovanje in izražanje – od enostavnih risb in kratkih zapisov v začetnih mesecih do bogatejših opisov čutnih zaznav in raznolikih likovnih izrazov ob zaključku. Refleksije otrok ob koncih dejavnosti so potrdile, da naravno okolje deluje kot spodbuden učitelj gibanja, zavedanja in umirjenosti.

Ključne besede: gibanje, narava, čuječnost, letni časi, razvoj otrok

LITERATURA:

Frontiers in Public Health. (2024). Supporting children's wellbeing through outdoor time. Frontiers. <https://www.frontiersin.org/journals/public-health>

MOVEOUT. (2025). Learning in the outdoors enhances students' movement – a new study confirms. Outdoor Play Canada. <https://www.outdoorplaycanada.ca>

S PRAVLJIČNO JOGO LAHKO RAZVIJAMO RAVNOTEŽJE

YOGA PROVIDES AN OPPORTUNITY TO CULTIVATE PHYSICAL BALANCE

Azra DUKIĆ¹

¹Vrtec Kurirček Logatec

Predavateljica: Azra Dukić

IZHODIŠČE: Jogo oziroma jogijske položaje z otroki v vrtcu izvajamo že nekaj mesecev. Sposodili smo si nekaj položajev in oponašali živali. Za večino položajev je zelo pomembno ohranjanje ravnotežja. Pravljična joga je vadba skozi pravljice in zgodbe. Otroci z jogijskimi položaji oponašajo na primer živali, ki so lahko podkrepljeni z glasbo ali improviziranim besedilom. Z vadbo smo razvijali koordinacijo, ravnotežje, gibljivost, telesno moč in motoriko. Vadba pozitivno deluje tudi na držo telesa, nas sprošča in usmerja k ustvarjalnosti. Učiteljica joge za odrasle in otroke navaja: »Pravljična joga je igra in vadba za otroke, ki upošteva vsa jogijska načela. Otroci se spoznavajo s svojim telesom, z možnostmi, ki jih ponuja, naučijo se osnovnih jogijskih položajev in preprostih dihalnih tehnik ter se ob tem odlično zabavajo.«

PROBLEM/NAMEN: Ali joga oziroma jogijski položaji vplivajo na gibalne sposobnosti otrok na področju ravnotežja? Preverili smo s testom »flamingo«. Ravnotežje je opredeljeno kot sposobnost hitrega oblikovanja dopolnilnih oziroma nadomestnih gibov, ki so potrebni za vračanje telesa v ravnotežnostni položaj, kadar je porušen. Vložena sila, ki je za to potrebna, mora biti sorazmerna sili, ki izzove odklone telesa v stabilnem položaju, drugače se ravnotežni položaj poruši v nasprotno stran. Eden izmed dejavnikov ki pogojuje ravnotežje je čutilo vida in omogoča zaznavanje grobih odmikov težišča telesa od stabilnega položaja, zato morajo v prostoru obstajati fiksne, stalne točke, na katere se oprejo naše zaznave za prepoznavanje položaja telesa v prostoru. Če teh točk ni ali pa zapremo oči, ni več prave predstave o položaju telesa in je s tem ohranjanje ravnotežja oteženo.

METODE: Pri izvajanju joge smo uporabili dve učni metodi. Metoda demonstracije ima pri vodenju procesa zelo pomembno vlogo. Učinkovito usvajanje novih gibalnih znanj temelji na kakovostni demonstraciji učne vsebine, saj tako otroci kot odrasli preko opazovanja modela razvijejo ustrezno mentalno reprezentacijo gibanja, kar predstavlja ključen predpogoj za uspešno izvedbo. Metodo razlage pa smo uporabili v obliki pojasnjevanja po izvedbi demonstracije, saj je bilo potrebno otrokom posredovati dodatne informacije o gibanju s katerim so se srečevali prvič. Učna oblika je bila individualna, saj smo s testom »flamingo« na tleh in ne na drogu, merili koliko časa lahko stoji otrok na eni nogi. Položaj je podoben ravnotežnemu položaju pri jogi »drevo«.

UGOTOVITVE: Pri raziskavi smo opazovali 30 otrok, 15 iz skupine, ki ne izvajajo joge in 15 iz naše skupine, kjer izvajamo jogijske položaje nekaj mesecev. Cilj je bil da poskušajo držati ravnotežje v položaju drevesa oziroma flaminga kolikor lahko in si zapisali meritve. Nato smo test še otežili in so morali v istem položaju zapreti oči. »Razvoj sposobnosti ohranjanja ravnotežnega položaja temelji na rušenju ravnotežja, pri čemer naj na telo delujejo zunanje sile, ali se izključujejo čutila (predvsem vid in sluh) ter z zmanjševanjem podporne ploskve.« Na podlagi meritev smo ugotovili da so tisti otroci, ki

izvajajo jogijske položaje, lažje in dlje časa držali v položaju flaminga. Občutna razlika je bila, ko smo test otežili z izključitvijo čutila (vid). Otroci, ki niso izvajali jogijskih položajev, so že po nekaj sekundah zaključili s testom ali pa ravnotežja sploh niso mogli vzpostaviti.

ZAKLJUČEK: Test smo izvedli na manjšem številu otrok, a lahko na podlagi meritev in teorije zaključimo da so otroci, ki izvajajo jogijske položaje, bolj spretni pri vajah za ravnotežje in da joga pozitivno vpliva na gibalno sposobnost otrok.

Ključne besede: joga, test flamingo, ravnotežje, vrtec

LITERATURA:

Botič, U. (2012). Pravljična joga. Ljubljana: Mladinska knjiga Založba d.d.

Pistotnik, B. (2017). Osnove gibanja v športu. Osnove gibalne izobrazbe. Ljubljana: Fakulteta za šport.

Videmšek, M. in Pišot, R. (2007). Šport za najmlajše. Ljubljana: Fakulteta za šport, Inštitut za šport.

GIBANJE NE POZNA MEJA: INOVATIVNI PRISTOPI H GIBANJU V BOLNIŠNIČNI ŠOLI

NO LIMITS TO MOVEMENT: INNOVATIVE APPROACHES TO PHYSICAL ACTIVITY
IN HOSPITAL SCHOOL

Ana DOBOVIČNIK¹

¹OŠ Ledina, bolnišnični šolski oddelki

Predavateljica: Ana Dobovičnik

IZHODIŠČA: Dolgotrajno bolni otroci v bolnišnici se zaradi bolezni pogosto srečujejo z omejenimi možnostmi gibanja, kar vpliva na njihov celostni razvoj. V bolnišnični šoli smo gibanje prepoznali kot nujno razvojno potrebo, zato ga načrtno vključujemo v vsakdanje pedagoško delo, saj krepi otrokovo samostojnost, čustveno stabilnost, občutek normalnosti in pripadnosti.

PROBLEM/NAMEN: Ker je v bolnišničnem okolju tradicionalna športna vzgoja neizvedljiva, iščemo bolnišnični učitelji prilagojene in ustvarjalne oblike gibanja, ki so za dolgotrajno bolne otroke in mladostnike varne, motivacijske in razvojno smiselne. Namen prispevka je prikazati, kako bolnišnična šola z inovativnimi pristopi in projekti uspešno vključuje gibalne dejavnosti v vsakdanjo pedagoško prakso, zakaj je to pomembno in kakšne pozitivne učinke ima to na bolne otroke.

METODE: V bolnišnični šoli izvajamo gibanje v skladu z načelom "vsako gibanje šteje". V praksi to pomeni vključevanje:

- *gibalnih mikroaktivnosti* za otroke na postelji,
- *gibanja v učno uro*,
- *projektnih oblik* Minutke za zdravje in Minutke za sproščanje,
- *strukturiranih dnevov dejavnosti* (športni dnevi),
- *športne prireditve* Bolnišnične olimpijske igre.

UGOTOVITVE: Gibalne aktivnosti znotraj bolnišnične šole pri dolgotrajno bolnih otrocih pomembno zmanjšujejo fizične posledice dolgotrajnega ležanja, spodbujajo telesno samostojnost, zmanjšujejo občutke izolacije in stresa. Praksa kaže, da so otroci po gibalnih dejavnostih bolj osredotočeni, sodelovalni in sproščeni. Učenci ob gibanju doživljajo uspehe, kar pozitivno vpliva na njihovo samopodobo. Gibanje zmanjšuje napetost, izboljšuje razpoloženje in otroku omogoča občutek nadzora nad telesom.

ZAKLJUČEK: Izkušnje iz bolnišnične šole kažejo, da gibanje ne pozna meja – niti bolniške postelje. Inovativni pristopi k spodbujanju gibanja v bolnišnični šoli potrjujejo, da lahko tudi v omejenem prostoru in pod posebnimi pogoji ustvarimo spodbudno učno in gibalno okolje. Gibanje v bolnišnični šoli je načrtovana pedagoška praksa, katere namen ni le, da ohranja telesne funkcije pri bolnem otoku, temveč ustvarjanje pogojev za celostni razvoj otroka, da ohrani stik s seboj, z vrstniki in z življenjem izven bolnišnice.

Ključne besede: bolnišnična šola, dolgotrajno bolni otroci in mladostniki, gibanje, športni dnevi bolnišnične olimpijske igre.

LITERATURA:

Pinter S. (2021). Bolnišnične olimpijske igre. V M. Žugman (ur.), *Zbornik ob 70-letnici Bolnišnične šole* (str. 71–73). Ljubljana: Bolnišnična šola. Dostopno na: https://www.bolnisnicna-sola.si/files/2021/11/ZBORNIK-70-let_C.pdf

Dobovičnik A. (2021). Dnevi dejavnosti v bolnišnični šoli. V M. Žugman (ur.), *Zbornik ob 70-letnici Bolnišnične šole* (str. 74–78). Ljubljana: Bolnišnična šola. Dostopno na: https://www.bolnisnicna-sola.si/files/2021/11/ZBORNIK-70-let_C.pdf

OŠ Ledina, Bolnišnični šolski oddelki. (n.d.). Uradna spletna stran Bolnišnične šole. Pridobljeno 23. junija 2025 s <https://www.bolnisnicna-sola.si/>

TEK ZA ZDRAV TELESNI RAZVOJ

RUNNING FOR HEALTHY BODY DEVELOPMENT

Ana FERRARI¹

¹Vrtec Viški gaj, Ljubljana

Predavateljica: Ana Ferrari

IZHODIŠČA: Skupina otrok je izkazovala nadpovprečno zanimanje za gibanje ter hitro usvajanje osnovnih gibalnih spretnosti in tekaških dosežkov na krosu vrtec. To je omogočilo sistematično nadgradnjo tekaških tehnik skozi daljše časovno obdobje.

PROBLEM/NAMEN: Namen je predstaviti pomen, načine izvajanja in primerno prilagojene metode teka za predšolske otroke v vrtčevskem okolju ter preučiti vpliv rednega vključevanja teka v vsakodnevno gibalno dejavnost otrok. Tekuško sposobna skupina otrok je predstavljala idealno okolje za opazovanje učinkov načrtovanega in postopno zahtevnejšega programa tekaških dejavnosti, usmerjenih v razvoj splošne gibalne kompetentnosti pred vstopom v šolo.

METODE: Raziskava je potekala v homogeni skupini otrok, spremljanih tri leta – od njihovega tretjega do šestega leta starosti. Vzorec je zajemal 20 otrok, ki so sodelovali v strukturiranem programu tekaških dejavnosti, vključenem v redni gibalni kurikulum. Metodološki pristop je temeljil na sistematičnem opazovanju otrok, analizi doseženih ciljev ter nadgradnji zahtevnosti. Dejavnosti so bile prilagojene starosti: v prvem letu so bile vključene osnovne oblike teka (tek z naravnim tempom, tek v paru, tek z ovirami iz mehkih materialov, kros vrtcev). V drugem letu so sledile tehnike teka z ritmičnimi spremembami in štafetne igre, v tretjem letu pa kompleksnejše oblike kot so orientacijski tek, tek z nalogami in elementarne igre z vključevanjem tekmovalnosti. Dejavnosti so se izvajale načrtovano 1-2x mesečno po 30 minut ter spontano ob različnih priložnostih.

UGOTOVITVE: Rezultati so pokazali, da je načrtovana in redna izvedba tekaških dejavnosti pozitivno vplivala na razvoj koordinacije, vzdržljivosti in osnovne motorične kontrole. Otroci so z večjo lahkotnostjo izvajali tek na krajše razdalje, izboljšala se je njihova telesna drža, gibanje rok in nog je postalo bolj usklajeno. To je vodilo v vse večjo telesno samozavest in višjo stopnjo telesne pripravljenosti. Poleg fizičnih koristi so bili opaženi tudi pozitivni psihosocialni učinki – večja motivacija za gibanje, večja vztrajnost pri nalogah in izboljšano sodelovanje med vrstniki.

ZAKLJUČEK: Tek predstavlja pomembno in uporabno obliko gibalne dejavnosti, ki jo je mogoče enostavno vključiti v vsakodnevne dejavnosti. Kot naravna oblika gibanja je ključna za razvoj splošne vzdržljivosti, koordinacije in orientacije v prostoru. Za optimalen učinek je ključnega pomena, da dejavnosti potekajo strukturirano, s poudarkom na postopnem napredovanju in prilagajanju sposobnostim posameznih otrok. Priporočljivo je, da vzgojitelji uporabljajo pester nabor tehnik teka, kot so tek s preprekami, tek v igri in orientacijski tek, s čimer povečajo zanimanje otrok in spodbujajo njihov celostni razvoj.

Ključne besede: gibalni razvoj, predšolski otrok, tek v vrtcu, motorične sposobnosti, telesna dejavnost.

LITERATURA:

Čoh, M. (1992). Atletika: Tehnika in metodika nekaterih atletskih disciplin. Ljubljana: Fakulteta za šport.

Kurikulum za vrtce (1999). Ljubljana: Ministrstvo za šolstvo in šport, Urad RS za Šolstvo.

Videmšek, M. in Visinski, M. (2001). Športne dejavnosti predšolskih otrok. Ljubljana: Univerza v Ljubljani, Fakulteta za šport, Inštitut za šport.

VKLJUČEVANJE GIBALNIH DEJAVNOSTI V POUK ANGLEŠČINE V PRVEM VZGOJNO-IZOBRAŽEVALNEM OBDOBJU

INTEGRATING PHYSICAL ACTIVITIES INTO ENGLISH LESSONS IN THE FIRST TRIAD

Mirjana FRAS¹

Osnovna šola Hruševac Šentjur

Predavateljica: Mirjana Fras

IZHODIŠČA: Celostni razvoj otroka zajema tako kognitivni, čustveni, gibalni, socialni kot tudi telesni vidik. V prvem vzgojno-izobraževalnem obdobju je otrokova potreba po gibanju zelo izrazita, kar pomeni, da učenje ne more temeljiti zgolj na sedečem delu. Vključevanje gibalnih dejavnosti dokazano pozitivno vpliva na otrokovo učno uspešnost, pozornost in vedenje v razredu, na ta način se povečuje tudi motivacija za učenje. Pri pouku tujega jezika so učenci še posebej dovzetni za učenje preko igre, petja in gibanja.

PROBLEM/NAMEN: Učenci prvega vzgojno-izobraževalnega obdobja še ne zmorejo dlje časa sedeti pri miru. Njihova sposobnost koncentracije je omejena na kratke časovne intervale, ki so pogosto še krajši pri dejavnostih, ki jim niso blizu. Pouk tujega jezika je sicer prilagojen njihovi starosti, vendar lahko hitro postane preveč „sedeč“, še posebej kadar vključuje poslušanje in utrjevanje besedišča brez aktivnega sodelovanja. Otroci pogosto izgubijo pozornost, če so predolgo gibalno nedejavni. Prav zato je pomembno, da je pouk angleščine igriv, sproščen in vključuje gibalne dejavnosti, ki otroka motivirajo in mu omogočajo naravno usvajanje jezika.

METODE: Pri pouku angleščine lahko gibanje vključimo na številne načine, in sicer kot kratke gibalne vložke za sprostitev ali kot del učne vsebine. Gibalne dejavnosti smo vključevali skozi celotno šolsko leto. Uporabljali smo jih kot uvodno motivacijo, pri usvajanju novega besedišča, ponavljanju in utrjevanju ter kot sprostitvene dejavnosti. V nadaljevanju navajamo nekaj dejavnosti, ki smo jih vključevali v pouk: pesmi z gibi, igra »Simon says«, freeze game, pantomima, iskanje po prostoru, dan-noč, zadeni tarčo, igra z muhotepci, hot and cold ... Izvajali smo tudi aktivnost »show me ali touch sth«, pri kateri učitelj izreče določeno angleško besedo, učenci pa morajo pokazati ustrezen predmet ali se ga dotakniti. V učne ure smo vključevali tudi krajše odmore (1-3 minute), med katerimi so učenci izvajali preproste raztezne vaje ali vaje za umirjanje dihanja.

UGOTOVITVE: Opazili smo, da učenci s takšnim načinom pouka izkazujejo večjo motivacijo za delo pri angleščini, bolj aktivno sodelujejo in si hitreje zapomnijo novo besedišče. Vključevanje gibanja je omogočilo lažje usvajanje nove učne snovi in večjo sproščenost pri izražanju v angleščini. Prav tako gibanje zmanjšuje moteče vedenje v razredu, izboljšuje medosebne odnose in prispeva k boljši učni klimi. Tovrsten pristop je pozitivno vplival na gibalno dejavnost otrok v času šolskega pouka.

ZAKLJUČEK: Gibalne dejavnosti so ključne za aktivno, zanimivo in učinkovito učenje angleščine. Učitelji se moramo zavedati pomena gibanja ter ga načrtno vključevati v pouk. S tem se izboljšujejo učni rezultati, učenje tujega jezika pa se otrokom približa na igriv in priazen način. Pri tem pa je pomembno, da učitelj prepozna učinkovite metode, jih prilagaja skupini in jih dosledno vključuje skozi celotno šolsko leto.

Ključne besede: angleščina, gibalne dejavnosti, prvo vzgojno-izobraževalno obdobje, motivacija za učenje, celostni razvoj učenca

LITERATURA:

Dennison, P. E., Dennison, G. E. (2007). Telovadba za možgane. Ljubljana: Rokus Klett.

Fonda, K., Kuštrin, V., Požar, S., Prink, V. (2010). Minuta za gibanje v razredu. Ljubljana: Inštitut za varovanje zdravja, Piran: OŠ Cirila Kosmača.

Škof, B. (2016). Šport po meri otrok in mladostnikov: pedagoški, didaktični, psihosocialni, biološki in zdravstveni vidik športne vadbe mladih. Ljubljana: UL, Fakulteta za šport.

Zurc, J., Marjanovič Umek, L. in Planinšec, J. (2008). Biti najboljši: pomen gibalne aktivnosti za otrokov razvoj in šolsko uspešnost. Radovljica: Didakta.

Ministrstvo za vzgojo in izobraževanje RS (2024). Učni načrt za tuji jezik v 1. razredu osnovne šole. Dostopno na: <https://www.gov.si/assets/ministrstva/MVI/Dokumenti/Osnovna-sola/Ucni-nacrti/obvezni/TUJI-JEZIK-V-1.-RAZREDU-2024.pdf>

NADGRADNJA ŠPORTNE VZGOJE Z DEJAVNOSTMI V NARAVI

EXTENDING PHYSICAL EDUCATION WITH OUTDOOR ACTIVITIES

Irena GAAL¹

¹OŠ Rada Robiča Limbuš

Predavateljica: Irena Gaal

IZHODIŠČA: V slovenskih učnih načrtih je zapisano, da imajo otroci v I. triadi osnovne šole v predmetniku samo tri ure športa tedensko, kar je premalo za njihov učinkovit motorični in kognitivni razvoj. Vedno bolj se zavedamo, da je gibanje zelo pomembno za psihofizični razvoj otroka. Zato na OŠ Rada Robiča Limbuš izvajamo kot nadstandardno dejavnost dodatne ure športa v 2. razredu. Vodiva jih profesor športa in profesor razrednega pouka. V prispevku je opisan način, s katerim povečamo tri ure športa tedensko na pet ur ter kako to izvedemo. Opažamo, da večina otrok, ki obiskuje dodatne ure športa bolj spretno opravlja določene gibalne naloge in se lažje znajde v določenih novih gibalnih situacijah. Dodatni uri športnega programa sta izvedeni na način, da je ena ura tedensko redno opravljena v šolski telovadnici po urniku, druga ura pa je izvedena projektno v večih tematskih sklopih tekom celega leta.

NAMEN: Namen prispevka je podrobneje predstaviti delo in potek dodatnih ur športa, ki so izvedene projektno.

METODE: Predstavitev programa izven telovadnice s primeri dobre prakse. Dvakrat letno izvedemo *pohodništvo*. V mesecu septembru se odpravimo iz Limbuša na Pečke. Pot sicer ni zahtevna, je pa relativno dolga. Opažamo, da otroci potrebujejo veliko pozitivnih spodbud in motivacije učitelja za daljšo hojo. Za zaključek dodatnih ur športa se ob koncu tedna dobimo pod Pohorjem, kjer se z gondolo odpeljemo na vrh Pohorja. Z nahrbtniki se odpravimo peš do hotela Zarja, kar pomeni približno dve uri hoje. Cilj je naučiti otroke (ob pomoči staršev) priprave nahrbtnika, izbire primernih oblačil in obutve glede na vremensko napoved. Po poti jim skušamo približati osnove orientacije v naravi. V hotelu prespimo in se prihodnje jutro po zajtrku odpravimo nazaj. Izvedemo tudi kolesarjenje, saj je v neposredni bližini šole lepa kolesarska steza, ki je speljana do Ruš in meri 8 kilometrov. Kolesarimo v večji skupini, kjer morajo biti otroci še posebej pozorni na dogajanje pred njimi. Vsaj enkrat letno izvedemo *nordijsko hojo* na Grajski grič, ki je v neposredni bližini šole. Meseca oktobra se z avtobusom odpeljemo na *premagovanje ovir* v pustolovski park. Otroci imajo vodeno izobraževanje za plezanje, nato se sami preizkusijo v plezanju glede na svoje sposobnosti. Pustolovski park v Mariboru včasih zamenjamo z *Motorikparkom* v Avstriji. V zimskih mesecih obiščemo *bowling*, Otroci se navajajo na pravilno rokovanje s kroglo in zadevanje cilja. Izvedemo tudi *drsanje*. Upoštevamo vse korake in pripomočke za pravilno izvedbo učenja drsanja. Drsalke si izposodijo v dvorani ali prinesejo svoje. Ponudimo jim tudi možnost preizkusiti se v *plezanju* na plezalnih stenah. Pri tej veščini se otroci soočijo s skoraj neskončno kombinacijo gibov in problemov, saj je skoraj nemogoče najti dve smeri, ki bi bili popolnoma enaki. Med vikendom načrtujemo tudi *alpsko smučanje* in *tek na smučeh* na Mariborskem Pohorju. V šoli imamo kompletne opreme (alpske in tekaške) ki jo brezplačno posodimo svojim učencem. Kadar je dovolj snega in dovolj opreme za *tek na smučeh*, načrtujemo ob ugodnih snežnih razmerah tudi to učno vsebino. Na naši šoli v 3. razredu izvedemo šolo v naravi

(tek na smučeh). Opažamo, da je otrokom, ki so se s to vsebino že seznanili pri dodatnih urah športa, na začetku veliko lažje. Otroci so v tej starosti pripravljeni odlično usvojiti novo obliko gibanja na snegu in to zmeraj uspe prav vsem brez izjeme.

UGOTOVITVE: Pri takšnem načinu dela skozi celotno leto opažamo, da dodatne športne dejavnosti pozitivno vplivajo na otrokovo samopodobo in zvišujejo njihovo samozavest. Učenci so med seboj bolj povezani in si nudijo pomoč v težavnejših situacijah.

ZAKLJUČEK: Pri dodatnih urah športa se otroci naučijo veliko različnih novih gibalnih spretnosti, prav tako pa spoznajo različne športne aktivnosti, ki jih redni učni načrt ne zajema. S tem pripomoremo k njihovem celostnemu razvoju in z učenjem različnih športnih dejavnosti vplivamo na psihofizični razvoj otroka ter boljšo samopodobo.

Ključne besede: šola, šport, motorika, smučanje, tek na smučeh, gibanje, narava

LITERATURA:

Starc, G. (2019). Pomen gibanja za učno uspešnost otrok. Vodenje v vzgoji in izobraževanju 17(1), 9-25. Pridobljeno s: <https://www.dlib.si/stream/URN:NBN:SI:DOC-38ZF7GIU/9ac478db-6e81-464f-b67d-bcf30ad5ffbf/PDF>

Šimunič, B. (2008). Otroci potrebujemo gibanje: otrok med vplivi sodobnega življenjskega sloga: gibalne sposobnosti, telesne značilnosti in zdravstveni status slovenskih otrok (str. 186). (2010). Univerza na Primorskem, Znanstveno-raziskovalno središče, Inštitut za kineziološke raziskave, Univerzitetna založba Annales.

Videmšek, M. in Pišot, R. (2007). Šport za najmlajše. Ljubljana: Fakulteta za šport, Inštitut za šport.

Čoh, M. (2019). Pomen gibalne dejavnosti za razvoj otroka. Šport (Ljubljana) 66(1/2), 9/14. Pridobljeno s: <https://www.dlib.si/stream/URN:NBN:SI:DOC-F5C5BA5L/71d46f11-6977-4ebc-8a10-4a7b38bdd635/PDF>

SPROSTITVENE GIBALNE AKTIVNOSTI MED PODALJŠANIM BIVANJEM IN VARSTVOM KOT POMEMBEN DEJAVNIK ZA BOLJŠE POČUTJE IN KREPITEV SOCIALNIH VEZI MED UČENCI

RELAXING PHYSICAL ACTIVITIES DURING EXTENDED STAYS AND CARE AS AN
IMPORTANT FACTOR FOR BETTER WELL-BEING AND STRENGTHENING SOCIAL TIES
AMONG STUDENTS

Jasmina GUJTMAN¹

¹JVIZ OŠ Toneta in Franceta Kralja, Dobropolje

Predavateljica: Jasmina Gujtman

IZHODIŠČE: V skladu s strokovnimi ugotovitvami, da je raven gibalnih sposobnosti novodobnih otrok v primerjavi z preteklimi generacijami nižja, predvsem na račun vse bolj sededečega načina življenja otrok in mladostnikov. Učitelji v šoli s spodbujanjem gibanja pozitivno vplivamo na učence in na njihovo zavedanje pomena gibanja za splošno telesno in psihično zdravje človeka, na OŠ Toneta in Franceta Kralja Dobropolje in na PŠ Struge med izvajanjem varstva otrok pred ali med poukom in med poukom podaljšanega bivanja po narejeni domači nalogi z učenci v redno izvajamo sprostitvene gibalne dejavnosti v telovadnici. Učenci različnih razredov skupaj po lastni izbiri izberejo vsak svojo aktivnost in jo izvajajo. Z vključevanjem gibalnih in športnih dejavnosti v tako postane tudi priložnost za krepitev medsebojnih socialnih stikov med učenci različnih razredov, kar pozitivno vpliva tako na njihove telesne zmogljivosti in dobro počutje kot tudi na socialni razvoj učencev, ki z neformalnim druženjem ob športnih dejavnostih krepijo svoje gibalne sposobnosti, ustvarjalnost in tudi socialne spretnosti.

PROBLEM: Učenci z nizko ravno telesnega fitnesa se pogosto poskušajo izogniti gibalnim dejavnostim v času varstva. To so običajno učenci s prekomerno težo, ki na splošno niso preveč gibalno aktivni. Ti učenci lahko namenoma zavlačujejo delanje domače naloge, da ne bi rabili iti v telovadnico, saj niso vajeni gibanja. Pomemben dejavnik pozitivne motivacije vrstnikov postanejo učenci, ki so za gibalno dejavnost zelo motivirani, tako da vzpodbujajo prejšnje, da nalogo naredijo čim prej in jim pri delanju naloge tudi pomagajo z nudenjem razlage.

METODE: Edina metoda, ki jo uporabljamo učitelji pri izvajanju varstva in podaljšanega bivanja v telovadnici, je metoda opazovanja in primerjalna metoda pedagoškega raziskovanja. Učitelj ima vlogo opazovalca med prosto igro učencev. Učenci se sami spomnijo, kaj bi želeli početi, pri čimer morajo uporabiti svojo domišljijo. Učitelji na obeh šolah, na OŠ Toneta in Franceta Kralja Dobropolje in na podružnici ugotavljamo, da učenci v jutranjem varstvu na PŠ Struge že več generacij običajno jutranje varstvo aktivno preživljajo z igranjem dodge ball-a, učenci v podaljšanem bivanju pa so glede na spol precej razdeljeni. Učenci skoraj praviloma izberejo igranje nogometa, le redko se zgodi, da dva učenca skupaj v varstvu igrata košarko. Učence nižjih razredov običajno izberejo prosto igro, kot je vožnja s triciklom, skakanje kolebnice, skupno gradnjo gradu iz blazin, v katerih se potem nekaj časa družijo, ples in ritmično gimnastiko. Učence predmetne stopnje so popolnoma zadovoljne, če si v krogu podajaj žogo za odbojko ali občasno igrajo nogomet.

UGOTOVITVE: Učenci so med igro v telovadnici sproščeni, kljub temu, da so na podružnici pomešani učenci od 1. do 9. razreda, drug do drugega so spoštljivi in zato redko pride do konflikta ali poškodbe. Aktivnosti učenci izvajajo previdno, da se ne poškodujejo. Pri tem le redko pride do kakršnega koli problema, saj se učenci med seboj večinoma znajo sami dogovoriti. Učitelji imamo vlogo nadzornika in mediatorja v primeru konflikta. Učenci tako ob gibanju krepijo tako svojo ustvarjalnost kot tudi medsebojne stike, saj se lahko neobremenjeno spoznavajo in družijo med seboj, česar jim v času preživljanja popoldanskega prostega časa na družbenih omrežjih vse bolj primanjkuje. Žal pa ugotavljamo, da večina učencev z nizko ravnijsko telesnega fitnesa vse do konca šolskega leta ni kazala večjega zanimanja za gibalne dejavnosti.

ZAKLJUČEK: Prosta igra v telovadnici v času izvajanja varstva ali podaljšanega bivanja ima izredno pozitiven učinek na učence, saj krepi njihovo telesno pripravljenost, ustvarjalnost in socialne spretnosti. S tem pa na šoli delno prispevamo tudi k zdravju in boljšemu počutju učencev.

Ključne besede: prosta igra, gibalne dejavnosti, socialne spretnosti, varstvo

LITERATURA:

Prgič, (2018). Kinestetični razred. Griže: Svetovalno-izobraževalni center MI.

<https://nijz.si/zivljenjski-slog/telesna-dejavnost/>

<https://www.dobertekslovenija.si/wp-content/uploads/2017/10/Smernice-slovenske.pdf>

<https://www.vetervlaseh.si/?t=3310001587>

MEDSEBOJNO SPOZNAVANJE DIJAKOV SKOZI GIBANJE

BUILDING INTERPERSONAL RELATIONSHIPS AMONG HIGH SCHOOL STUDENTS THROUGH MOVEMENT-BASED ACTIVITIES

Marko JANŽIČ¹

¹III.gimnazija Maribor

Predavatelj: Marko Janžič

IZHODIŠČA: Medosebni odnosi vrstnikov imajo ključno vlogo pri oblikovanju osebne identitete, samozavesti in socialnih veščin, kar vpliva na dijakov razvoj. V obdobju adolescence dijaki iščejo sprejetost, razumevanje in povezovanje z vrstniki, kar pomembno vpliva na njihovo psihosocialno dobrobit. Telesna aktivnost pomembno vpliva na zdravje in tudi socialno povezovanje, saj dijaki ob različnih telesnih aktivnostih razvijajo medsebojno zaupanje in sodelovanje, izboljšujejo komunikacijo, okrepi se tudi njihov občutek pripadnosti skupini. III. gimnazija Maribor dijakom prvih letnikov omogoča t. i. Spoznavni tabor, na katerem se imajo dijaki priložnost spoznati in povezati ob različnih telesnih aktivnostih. Izvajajo se odlaganje uteži na nestabilno mizo, pohod, ples, disk golf in športne igre z žogo. Predstavljene so telesne aktivnosti in njihov doprinos k spoznavanju in krepitvi medosebnih odnosov dijakov na dvodnevem Spoznavnem taboru, ki so se ga udeležili dijaki prvih letnikov srednjega strokovnega izobraževanja. Podrobneje je predstavljena telesna aktivnost pohod.

PROBLEM/NAMEN: Zanimalo nas je, ali telesne aktivnosti doprinašajo k preprostejšemu navezovanju stikov in vplivajo na krepitev povezanosti med dijaki. V strokovnem prispevku je bilo raziskano in prikazano, kako telesna aktivnost kot neformalna oblika učenja prispeva k medsebojnemu spoznavanju dijakov, h krepitvi odnosov in k zmanjševanju socialne izključenosti. Predstavljena je telesna aktivnost pohod, ki se je izkazala za učinkovito.

METODE: Za zbiranje podatkov sta bila uporabljena kvalitativni in kvantitativni pristop. Najprej je bila uporabljena metoda opazovanja s prisotnostjo opazovalca, vključenega v situacije v naravnem okolju. Dogodki, sodelovanje dijakov v izbranih telesnih aktivnostih, so bili zapisani. Opazovanih je bilo 62 dijakov. Izvedeni so bili tudi vodeni pogovori z dijaki ob vnaprej pripravljenih vprašanjih (intervju). V vodenih pogovorih je sodelovalo 30 dijakov. Opazovanje in intervjuvanje je potekalo na Spoznavnem taboru meseca septembra leta 2024. Po izvedenem Spoznavnem taboru je bila uporabljena metoda zbiranja podatkov z anketiranjem. Na 22 vprašanj odprtega in zaprtega tipa je odgovarjalo 32 dijakov. Anketiranje je potekalo septembra leta 2024, brez prisotnosti anketarja in je bilo anonimno.

UGOTOVITVE: Ugotovljeno je bilo, da sodelovanje dijakov v raznovrstnih telesnih aktivnostih, poleg pozitivnega učinka na zdravje, doprinaša k razvoju ključnih socialnih veščin – komunikacije, sodelovanja, empatije, reševanja konfliktov, spoštovanja pravil. Skupinske telesne aktivnosti vplivajo tudi na preprostejše navezovanje stikov, vzpostavljanje medosebnih odnosov in krepitev občutka pripadnosti skupini.

ZAKLJUČEK: Telesne aktivnosti spodbujajo sproščenost in spontano ravnanje, kar olajša navezovanje stikov oz. vzpostavljanje medosebnih odnosov. Sodelovanje v raznovrstnih telesnih aktivnostih doprinaša k hitrejšemu povezovanju med dijaki in sklepanju prijateljstev.

Tovrstno medsebojno spoznavanje dijakov pozitivno učinkuje na razvoj dobre razredne klime, kar je pomembno tudi v nadaljnjem izobraževalnem procesu.

Ključne besede: telesna aktivnost, medosebni odnosi, dijaki, Spoznavni tabor.

LITERATURA:

Kovač, M. (2011). Didaktika športa. Ljubljana: Fakulteta za šport, Univerza v Ljubljani.

Kovač, M., Jurak G. (2012). Izpeljava športne vzgoje: didaktični pojavi, športni programi in učno okolje. Ljubljana: Fakulteta za šport, Univerza v Ljubljani.

Pišot, R., et al. (2004). Telesna dejavnost in zdravje otrok in mladostnikov. Koper: Univerza na Primorskem, ZRS.

Strelec I., Kapus J., Šoukal S. (2015). Oblikovanje skupine z impro igrami socialnih spretnosti: igre za zabavne večere, za popestritev ur športa in še za marsikaj ... Šport: revija za teoretična in praktična vprašanja športa, 63(1/2), 33–41.

KO LUČKE ZAŽARIJO, OTROCI ZAŽIVIJO

WHEN THE LIGHTS SHINE, KIDS COME ALIVE

Petra JELENC¹

¹Osnovna šola Naklo

Predavatelj: Petra Jelenc

IZHODIŠČA: V prvem izobraževalnem obdobju je gibalni razvoj otroka ključen za oblikovanje zdravih življenjskih navad, osnovnih gibalnih sposobnosti ter pozitivnega odnosa do gibanja. V učnem načrtu je pri športu poudarjen pomen razvijanja osnovnih gibalnih sposobnosti, pri čemer naj bi se telesne aktivnosti izvajale na čimbolj raznolik in zanimiv način. V današnjem času otroci preveč časa preživijo pred zasloni (TV, pametni telefoni, tablični računalnik...), ki s svojo svetlobo in hitro menjajočo vsebino pritegnejo njihovo pozornost, kar pa žal vodi v zmanjšane telesne aktivnosti, socialno odsotnost in posledično slabšo koncentracijo. Inovativni pripomoček BlazePod (interaktivni sistem svetlobnih lučk) predstavlja uspešno rešitev, ki na zabaven način združuje svetlobne učinke z igro, ki otroka pritegne h gibanju. BlazePod naj bi torej razvijal osnovne gibalne sposobnosti, spodbujal otrokovo aktivnost ter hkrati krepil njihovo notranjo motivacijo za telesno aktivnost oz. gibanje.

PROBLEM/NAMEN: Že pri mlajših otrocih je možno opaziti močan upad motivacije za gibanje in pomanjkanje telesne aktivnosti. Namen uporabe BlazePoda pri pouku športa, je bil spodbuditi razvoj gibalnih sposobnosti, povečati motivacijo in zanimanje za šport, kar naj bi pripeljalo tudi do boljšega sodelovanja pri dejavnostih. Z opazovanjem otrok med uporabo tega pripomočka se je ugotavljalo, ali je primeren za najmlajše v šoli.

METODE: Pri urah športa je bilo izvedenih več različnih gibalnih dejavnosti (Lov na barve, Časovna dirka...), ki vključujejo BlazePod kot glavni pripomoček. Z uporabo tega svetlobnega pripomočka smo z različnimi aktivnostmi krepili hitrost reakcije, zbranost, koordinacijo celega telesa, orientacijo v prostoru in gibanje v različnih smereh... Med izvajanjem aktivnosti se je napredek, motiviranost in sodelovanje otrok spremljalo z beleženjem opažanj.

UGOTOVITVE: BlazePod se je pri urah športa izkazal kot izjemno zanimiv in motivacijsko učinkovit pripomoček, saj so otroci pokazali večje navdušenje in veselje za ure športa, ki so združevale elemente igre, svetlobne in barvne dražljaje. Opažena je bila tudi večja zbranost pri izvajanju le-teh ter izboljšanje osnovnih gibalnih sposobnosti.

ZAKLJUČEK: BlazePod ne spodbuja le razvoja osnovnih gibalnih sposobnosti, temveč povečuje tudi motivacijo in sodelovanje med otroki ter prispeva k pozitivnemu odnosu do gibanja. Je učinkovit in otrokom privlačen pripomoček in ga je smiselno vključiti v različne športne dejavnosti kot tudi v druge predmete v šoli kot so matematika, slovenščina...

Ključne besede: BlazePod, gibanje, motivacija, gibalne sposobnosti, sodelovanje

LITERATURA:

UNŠ (2011). Učni načrt: Šport. Program osnovna šola. Ljubljana: Zavod RS za šolstvo.

Jurak, G., Kovač, M., Strel, J., Starc, G., Leskošek, B. (2015). Gibalni razvoj otrok in mladine v Sloveniji. Fakulteta za šport, Ljubljana.

BlazePod. *BlazePod*. <https://blazepod.eu>

BlazePod. *The game-changing workout for your kids*. https://blazepod.eu/blogs/all/the-game-changing-workout-for-your-kids?utm_source=organic&utm_medium=redirect

LOGAŠKIH 7 – VSAK MESEC NA NOV VRH

THE LOGATEC SEVEN – A NEW PEAK EACH MONTH

Katja JUG¹¹Osnovna šola 8 talcev Logatec

Predavateljica: Katja Jug

IZHODIŠČA: Po uspešno zaključenem lanskem projektu *Na Sekirico za zdravo telo*, ki je spodbudil učence k rednemu gibanju v naravi, sva se s sodelavko odločili, da v šolskem letu 2024/25 projekt nadgradimo. Glavni cilj novega projekta je bil ohraniti navdušenje nad pohodništvom in razširiti dejavnost na več lokacij v naši občini.

PROBLEM/NAMEN: V prejšnjem projektu sva ugotovili, kako velik vpliv ima redno gibanje v naravi na izboljšanje telesne pripravljenosti in samozavesti otrok. Številni učenci, ki so redno obiskovali Sekirico, so opazno napredovali v fizični pripravljenosti in gibalni samozavesti. Želeli sva nadaljevati s spodbujanjem zdravega načina življenja, hkrati pa razširiti poznavanje lokalnega okolja in dodatno povezati šole v občini Logatec. V šolskem letu 2024/25 smo projekt poimenovali Logaških 7 – vsak mesec na nov vrh. V njem so sodelovale vse tri osnovne šole v logaški občini. Naloga učencev je bila, da se vsak mesec povzpnejo na en izmed sedmih izbranih hribov v občini Logatec. Na vsakem hribu jih je pričakala označena planinska pot in kovinska skrinjica s posebnim žigom. Hribovska potovanja so se začela v jeseni in trajala vse do pomladi. Imena hribov, ki so jih učenci obiskali, so bila skrbno izbrana tako, da so bila varna, raznolika in dostopna tudi najmlajšim. Žigi so bili tematsko oblikovani in vsak je predstavljal specifičnost posameznega vrha. Projekt je presegel šolske okvire, saj smo k sodelovanju pritegnili vse tri logaške osnovne šole. Skupaj z Občinsko športno zvezo Logatec smo ob zaključku organizirali skupno srečanje, kjer so učenci, ki so osvojili vse vrhove, prejeli posebne pohvale in simbolične nagrade. Namen dogodka ni bil le priznanje najvztrajnejšim, temveč tudi krepitev občutka skupnosti in pomena telesne dejavnosti za dobrobit posameznika.

METODE: Knjižica za žige, v kateri so učenci beležili obiskane vrhove, redni vzponi (enkrat mesečno) na izbrane hribe, uporaba označenih poti in spodbudno spremljanje s strani učiteljev ter staršev.

UGOTOVITVE: Projekt je bil znova izjemno uspešen. Učenci so z navdušenjem pričakovali vsak nov mesec in izziv novega vrha. Pohodništvo je postalo stalnica družinskega preživljanja prostega časa. Zbrani žigi so otrokom predstavljali dosežek, hkrati pa jih motivirali za nadaljnje gibanje. Pohvale so prejeli tudi starši, ki so se projektu pogosto pridružili in s tem dodatno okrepili medgeneracijsko povezovanje ter odnos do narave in gibanja. Najpomembnejša ugotovitev pa je bila, da so se tudi učenci z gibalnimi težavami, ob primeri ni spodbudi, uspešno vključevali v vse pohode. **ZAKLJUČEK:** Projekt *Logaških 7 – vsak mesec na nov vrh* je še en dokaz, da lahko z enostavnimi, a dosledno načrtovanimi aktivnostmi dolgoročno vplivamo na zdrav življenjski slog otrok. Skupni cilj vseh sodelujočih šol je bil več kot dosežen – otroci so gibanje vzeli za del vsakdana, medtem ko so spoznavali naravne lepote svoje občine. Zaključimo lahko z isto mislijo, ki nas še vedno vodi: „*Kdor išče cilj, bo ostal prazen, ko ga bo dosegel, kdor pa najde pot, bo cilj vedno nosil v sebi.*“ (Nejc Zaplotnik)

Ključne besede: gibanje v naravi, medšolsko tekmovanje, lokalna skupnost

LITERATURA:

O'Mara, S. (2020). Hvalnica hoji. Ljubljana, Mladinska knjiga založba.

Thelen, E. (2000). Motor development as foundation and future of the developmental psychology. *International Journal of Behavioral Development*, 24 (4), 385-397.

DAN ŠPORTA

SPORTS DAY

Tomaž KARČE¹

Gimnazija Ledina, Ljubljana

Predavatelj: Tomaž Karče

IZHODIŠČE: Na Gimnaziji Ledina imamo vsako leto dva športna dneva. Na pobudo dijaške skupnosti smo na šoli uvedli še dodatni dan namenjen športu. Vsako leto ga izvajamo meseca maja, da se dijaki razgibajo, sprostijo in razvedrijo od napornega učenja ob zaključnem delu šolskega leta. Dijaki imajo na izbiro različne športne panoge namenjene tekmovanju in tudi rekreaciji.

PROBLEM: Vse več je gibalne neaktivnosti med mladimi ter prekomernega gledanja v zaslon, zgolj za zabavo. Kako dijake navdušiti in pritegniti, da bodo uživali, se družili v živo, spoznali pomen gibanja ter radosti življenja in tudi na kakšen način vključiti poškodovane oziroma oproščene dijake pri športni vzgoji.

METODE: Učitelji športne vzgoje in predstavniki dijaške skupnosti smo si na sestanku razdelili naloge in jih kasneje še usklajevali. Dogovorili smo se za športne panoge namenjene medrazrednemu tekmovanju: nogomet in košarka (dijaki), odbojka (mešano in dijakinje), namizni tenis (dijaki in dijakinje) ter vlečenje vrvi (mešano). Netekmovalne dejavnosti za vse ostale (5 km dolg pohod do prizorišča ter tenis, balinanje, badminton in gibalne družabne igre). Izpostavili smo pomen vrednot, kot so poštena igra »fair play«, sodelovanje, spoštovanje nasprotnika ter športno navijanje. V celotno organizacijo dogodka je bilo vključenih 6 dijakov iz dijaške skupnosti, njihova mentorica in 4 športni pedagogi. Priprave so trajale približno mesec dni, v tem času so dijaki poskrbeli tudi za naročilo medalj za tekmovalni del.

UGOTOVITVE: Dijaki so dan športa odlično sprejeli in bili gibalno aktivni. Neaktivni oziroma oproščeni dijaki pa so sodelovali s pisanjem zapisnikov, z upravljanjem semaforjev z rezultati ter s fotografitranjem. Potem so napisali še objave za našo spletno stran, Facebook ter Instagram in so se tako izkazali tudi v vlogi novinarjev.

ZAKLJUČEK: Priprava dneva športa zahteva od sodelujočih dijakov in učiteljev precej časa, veliko idejnih ter organizacijskih spretnosti. Pomembno je, da na dnevu športa sodeluje čim več dijakov in prav tako učiteljev, ker jih želimo navdušiti za šport, medsebojno druženje, saj tako učitelji spoznajo dijake iz drugega zornega kota. Želimo, da ta dan postane tradicija, naša naloga pa je, da ga še nadgradimo in izboljšamo.

Ključne besede: športna vzgoja, dan športa, dijaki, gibalna aktivnost.

LITERATURA:

Novak, J., Lorenci, B., Jurak, G., Klajnšček Bohinec, T., Urbančič, T., Kukman, J. ... Ogrin, B. (2010). Posodobitve pouka v gimnazijski praksi. Športna vzgoja. Ljubljana: Zavod RS za šolstvo.

Gojkovič A. (2009). Vpliv ukvarjanja s telesno aktivnostjo na stres mladostnikov. Diplomsko delo, Ljubljana: Univerza v Ljubljani, Fakulteta za šport.

Rotovnik Kozjek, N. (2018). Kaj je telesna aktivnost. Delo. Pridobljeno iz spletne strani <https://www.delo.si/polet/kaj-je-telesna-aktivnost/>

KEKČEV IZZIV KOT ORODJE ZA SPODBUJANJE SAMOREGULACIJE IN NOTRANJE MOTIVACIJE PRI PREDŠOLSKIH OTROCIH

USING THE 'KEKEC CHALLENGE' TO ENCOURAGE SELF-REGULATION AND INNER MOTIVATION IN PRESCHOOL CHILDREN

Maja KLJAJIĆ¹

¹Vrtec Kurirček Logatec

Predavateljica: Maja Kljajić

IZHODIŠČA: V predšolskem obdobju otroci intenzivno razvijajo sposobnost samoregulacije – zmožnosti uravnavanja čustev, vedenja, ustavljanja, razmišljanja in ukrepanja glede na okolje in lastne cilje (McClelland in Tominey, 2016). Raziskave potrjujejo, da gibanje in stik z naravo prispevata k celostnem razvoju otroka, še posebej kadar potekata v varnem, spodbudnem in čustveno podprtem okolju. Otroci, ki imajo v zgodnjem otroštvu težave s samoregulacijo, se kasneje pogosto soočajo z vrzeli v dosežkih, ki jih je težko nadoknaditi. V praksi manjka primerov, kjer bi bilo gibanje povezano ne le z gibalnim razvojem, temveč tudi s samoregulacijo in notranjo motivacijo.

PROBLEM/NAMEN: Vzgojno-izobraževalni proces v vrtcu potrebuje konkretna in izkustvena orodja, ki otrokom omogočajo razvoj samoregulacije in s tem razvoja notranje motivacije in samostojnosti. Ob tem je ključno, da so dejavnosti naravno vpete v otrokovo doživljanje sveta, da mu omogočajo svobodno izbiro primerno njegovi starosti ob interakciji in podpori z odraslim.

METODE: Projekt Kekčev izziv je nastal v času, ko smo v naši skupini obravnavali tematski sklop Kje živi Kekec?. Ob raziskovanju Gorenjske kot Kekčevega domačega kraja smo prepoznali značilnosti pokrajine – zlasti gore, planine in posledično planinske poti. Naravno se je ponudila priložnost za izvedbo pohodniške izkušnje kot pedagoškega izziva. Izziv je vključeval gibanje v naravi, samostojno odločanje, spremljanje napredka ter aktivno sodelovanje otrok in staršev. V pripravljalni fazi smo v skupino povabili izkušenega pohodnika, ki je otrokom predstavil ustrezno opremo za varno pohodništvo. Nato smo uvedli Kekčev izziv, ki je bil zastavljen kot prostovoljna pohodniška naloga. Otroci so morali v določenem časovnem okvirju opraviti tri pohode. Po opravljenem pohodu so v igralnici na plakatu označili svoj napredek. Kar nekaj otrok se je na izziv takoj odzvalo in začelo z izvedbo. Drugi so sprva le opazovali vrstnike, nato pa so – ob opazovanju njihovega napredka in navdušenja – naknadno vključili v izziv tudi sami.

UGOTOVITVE: Otroci, ki so sodelovali v izzivu, so pokazali večjo samoiniciativnost, zmožnost vztrajanja kljub utrujenosti, čustveno zadrževanje v zahtevnih situacijah (npr. strmina, vremenske razmere), razumevanje lastnih meja in sposobnost refleksije (pogovori po pohodu). Otroci so čutili ponos ob doseženem cilju. Ta spontani odziv kaže na krepitev notranje motivacije in samoregulacije. Sodelovanje je bilo prostovoljno, dostopno vsem in je omogočalo postopno vključevanje, kar je dodatno pripomoglo k občutku varnosti in uspeha.

ZAKLJUČEK: Kekčev izziv se je izkazal kot pedagoško-didaktični pristop, ki spodbuja gibalno aktivnost, krepi notranjo motivacijo in razvija samoregulacijo pri predšolskih otrocih. Njegova vrednost je v enostavni izvedbi, vključevanju družine, povezovanju gibanja s kurikularnimi cilji in dolgotrajnih učinkih na otrokov razvoj. Dejavnost je bila smiselno umeščena v širši okvir tematskega skopa in hkrati podprla področja gibanja, narave, socialne interakcije in čustvenega razvoja. Gre za primer prakse, ki jo je mogoče enostavno prenesti tudi v druge vrtčevske skupine.

Ključne besede: čustvena regulacija, samoiniciativnost otrok, refleksija, pedagoški izziv, kurikularno povezovanje.

LITERATURA:

McClelland, M. M., Tominey, S. L. (Eds.). (2016). *Stop, think, act: Integrating self-regulation in the early childhood classroom*. Routledge.

Ministrstvo za šolstvo in šport in Zavod RS za šolstvo. (1999). Kurikulum za vrtce.

GIBALNA/ŠPORTNA AKTIVNOST MED URO ŠPORTA Z VSEBINO ELEMENTARNIH IGER

PHYSICAL ACTIVITY DURING PHYSICAL EDUCATION CLASSES WITH ELEMENTARY GAMES

Sara KNEZ¹ in Tadeja VOLMUT²

¹Osnovna šola Col

²Pedagoška fakulteta Univerza na Primorskem

Predavateljica: Tadeja Volmut

IZHODIŠČA: Predmet šport ima ključno vlogo pri zagotavljanju redne gibalne/športne aktivnosti (G/ŠA) učencev, saj omogoča doseganje priporočene ravni gibanja, spodbuja razvoj gibalnih sposobnosti in spretnosti ter prispeva k oblikovanju zdravega življenjskega sloga. Posebno mesto v tem okviru imajo elementarne igre, med katerimi se štafetne igre pogosto uporabljajo kot učinkovito didaktično sredstvo.

PROBLEM/NAMEN: Namen prispevka je bil preučiti količino in intenzivnost G/ŠA učencev osnovne šole med izvajanjem štafetnih iger pri pouku športa. Posebej smo se osredotočili na doseganje priporočene ravni srednje do visoke intenzivnosti gibalne/športne aktivnosti (SV G/ŠA) glede na spol in starost učencev.

METODE: V raziskavi je sodelovalo 55 osnovnošolcev, ki obiskujejo 3., 4. in 5. razred. G/ŠA je bila merjena s pomočjo merilnika pospeška, nameščenega okoli pasu med šestimi urami športa. Zbrane podatke smo obdelali s parametričnimi statističnimi metodami.

UGOTOVITVE: Učenci med urami športa s štafetnimi igrami niso dosegli priporočenih 50 % časa SV G/ŠA. Povprečni čas se jepri vseh štafetnih igrah gibal med od 13,7 in 15,85 minutami. Med spoloma ni bilo statistično značilnih razlik, razen pri štafetni igri Koordinacija 2, kjer so dečki v SV G/ŠA preživeli več časa ($p = 0,042$). Povezanost starosti s časom vSV G/ŠA je bila statistično značilna le pri nalogi Koordinacija 1 ($r = 0,319$; $p = 0,031$).

ZAKLJUČEK: Štafetne igre so učinkovito sredstvo za spodbujanje G/ŠA pri predmetu šport, vendar same po sebi ne zadoščajo za doseganje priporočil. Učitelji imajo pri načrtovanju vsebin ključno vlogo, saj lahko z ustrezno izbiro in organizacijo iger povečajo količino ter intenzivnost G/ŠA.

Ključne besede: štafetne igre, merilnik pospeška, intenzivnost, spol, starost.

LITERATURA:

National Association for Sport and Physical Education. (2004). Moving into the Future: National Standards for Physical Education, 2nd edn. NASPE: Reston, VA

Tanaka, C., Tanaka, M. in Tanaka, S. (2018). Objectively evaluated physical activity and sedentary time in primary school children by gender, grade and types of physical education lessons. BMC Public Health 18, 948.

Weaver, G. R., Crimarco, A., Brusseau, A. T., Webster, A. C., Burns, D. R. in Hannon, C. J. (2016). Accelerometry-Derived Physical Activity of First Through Third Grade Children During the Segmented School Day. *The Journal of School Health*, 8

NEZAINTERESIRANOST IN RAVNODUŠNOST DIJAKINJ DO ŠPORTNE VZGOJE

DISINTEREST AND INDIFFERENCE OF STUDENTS TO SPORTS EDUCATION

Ingrid KODARIN¹

¹Srednja ekonomska poslovna šola Koper

Predavateljica: Ingrid Kodarin

IZHODIŠČA: V sodobni družbi se vse pogosteje soočamo s pojavom telesne neaktivnosti med mladimi, kar predstavlja resen izziv za zdravstveni in izobraževalni sistem. Kljub vse večji ozaveščenosti o pomenu gibanja za zdravje in dobro počutje pa številni srednješolci izražajo nezainteresiranost, pasivnost ali celo odpor do sodelovanja pri urah športne vzgoje.

PROBLEM: Po tridesetih letih poučevanja na osnovni šoli sem se odločila nadaljevati moje poslanstvo na srednji šoli. Že več let sem razmišljala o tem prehodu. Naveličala sem se stalnih najstniških konfliktov, sestankov o vzgojnih ukrepih, dežuranjih ... Ob pričetku prvih ur poučevanja na srednji šoli sem spoznala, da je šport dijakinjam odveč. Ogromno dijakinj ima opravičilo za celo šolsko leto. Na opravičilu imajo celo napisano, da lahko telovadijo, če se počutijo, torej po lastni presoji. Ko pridejo na uro, se nočejo ogrevati, češ da jim tega ni treba, ogrevanje je brez veze, nočemo se spotiti ... Dinamika ure je počasna, med igro sploh ne zaigrajo v polnem žaru, vse jim je odveč ...

METODE: Najprej sem se lotila celoletnih opravičil. Poklicala sem starše dijakinj z opravičili na razgovor. Tudi zdravnico, ki je največkrat podpisana na celoletnem opravičilu, sem kontaktirala in jo prosila, da bolje razloži, česa dijakinja ne sme in kaj lahko dela. Prilagodila in individualizirala sem ure, jih povezala s sodobnim načinom življenja (pilates, fitnes, joga, zumba...), večji poudarek sem namenila sodelovanju – ne tekmovanju, aktivno sem jih vključila v načrtovanje ur, za boljšo motivacijo sem uporabljala različno tehnologijo (aplikacija merjenja korakov, merjenje srčnega utripa in zabavne video vadbe).

UGOTOVITVE: Pogovor s starši in dijaki je bil zelo učinkovit. Zmanjšalo se je število celoletnih opravičil. Zaradi poudarka na sodelovanju in ne na tekmovanju so ure bolj zaživele, postalo je bolj zabavno. Z njihovim vključevanjem pri planiranju ur se je povečala motivacija. Pozitivna klima, sodelovalni pristopi in pohvala je povečala angažiranost.

ZAKLJUČEK: Nezainteresiranost in ravnodušnost dijakinj do **športne** vzgoje je večplasten pojav, ki zahteva premišljene in prilagojene rešitve. Ključno je, da **športna** vzgoja ne ostane zgolj obvezni del **šolskega** urnika, temveč postane prostor, kjer se mladi lahko gibajo, razvijajo, izražajo in predvsem uživajo. Nikoli ne smemo obupati. Vse se doseže s pogovorom, ki ne sme biti ukazovalen, nastrojen, vzvišen. Dobra, topla beseda vedno najde pravo mesto. S potrpežljivostjo, doslednostjo in vztrajnostjo mi je na urah **športa** uspelo doseči intenzivnost in tudi neko mero **žara** med igranjem.

Ključne besede: neaktivnost pri urah **športa**, celoletna opravičila, dinamika ure,

LITERATURA:

Završnik, J. in Pišot, R.(2005) Gibalna športna aktivnost za zdravje mladostnika.

Videmšek, M., & Karpljuk, D. (2007). *Motivacija učencev za športno vzgojo v osnovni in srednji šoli. Šport, 55(1/2), 25–29.*

Poročilo o raziskavi o motivaciji slovenskih učencev in dijakov.

AKTIVNI ODMORI V OSNOVNI ŠOLI – S PLESOM DO BOLJŠEGA POČUTJA, UČENJA IN ZDRAVJA

ACTIVE SCHOOL BREAKS WITH DANCE - IMPROVING CHILDREN'S WELLBEING, LEARNING
AND HEALTH

Neža KOKALJ

Predavatelj: Neža Kokalj

IZHODIŠČA: Redno gibanje v otroštvu je ključno za zdrav telesni in duševni razvoj. Šola kot pomembno okolje otrokovega vsakdana ponuja priložnost, da se poleg kognitivnih sposobnosti razvija tudi gibalna učinkovitost. Ples kot oblika gibanja spodbuja izražanje, ustvarjalnost in izboljšuje telesno zmogljivost. Aktivni plesni odmori se kažejo kot učinkovit pristop, ki omogoča učencem, da pouk preživijo bolj kakovostno, se razbremenijo napetosti in izboljšajo svojo koncentracijo.

PROBLEM/NAMEN: Kljub zavedanju o pomenu gibanja v šolskem prostoru je še vedno prisotna težava dolgotrajnega sedenja, ki vpliva na telesno držo, koncentracijo in motivacijo otrok. Izsledki iz raziskave ARTOS (Jurak, Kovač in Starc, 2013; Starc idr., 2015) kažejo, da učence v šoli najbolj obremenjuje ravno gibalna nedejavnost (prekratki odmori med urami in dolgotrajno sedenje) in ne kateri drugi dražljaji. Namen prispevka je predstaviti primer dobre prakse izvajanja aktivnih plesnih odmorov, ki se izvajajo dvakrat tedensko po 15 minut ter izpostaviti njihov vpliv na dobro počutje učencev in učno klimo v razredu.

METODE: Prispevek temelji na opisu primera dobre prakse v osnovni šoli, kjer so bili plesni odmori vključeni v urnik dvakrat tedensko po 15 minut. Dejavnost se je izvajala v avli šole in je bila namenjena učencem od 1. do 5. razreda. Učenci so plesali naučene koreografije kot tudi prosto. Zbrana so bila opažanja učiteljev in povratne informacije učencev, ki nakazujejo pozitivne učinke tovrstne prakse.

UGOTOVITVE: Rezultati kažejo, da že 15-minutni plesni odmori, izvedeni dvakrat tedensko, pozitivno vplivajo na pozornost in motivacijo učencev. Zmanjšujejo občutek utrujenosti in povečujejo pripravljenost za nadaljnje delo. Po plesu učenci poročajo o večji sproščenosti in boljšem razpoloženju, učitelji pa opažajo večjo vključenost in manj težav z disciplino v razredu. Poleg pomembnega vpliva na kognitivne sposobnosti imajo plesni odmori tudi pomembne socialne učinke, saj krepijo sodelovanje, ustvarjalnost in medsebojne odnose.

ZAKLJUČEK: Aktivni plesni odmori, izvedeni dvakrat tedensko po 15 minut, predstavljajo učinkovito prakso za izboljšanje kakovosti šolskega okolja. Omogočajo premagovanje negativnih posledic sedečega življenjskega sloga in prispevajo k celostnemu razvoju učencev. Povečujejo pozornost, zmanjšujejo stres in hkrati spodbujajo gibanje, ki je v današnjem načinu življenja vse bolj zapostavljeno. Za dolgoročen učinek pa je pomembno, da se plesni odmori izvajajo redno, načrtno in vključujejo različne plesne oblike, ki so privlačne za otroke različnih starosti.

Ključne besede: ples, aktivni odmori, osnovna šola, gibanje, zdravje

LITERATURA:

Borowski, M. (2021). Dance and development of social-emotional competence: A review. *Current Psychology*. Advance online publication.

Jurak, G., Starc, G., Kovač, M., Kostanjevec, S., Radi, P., Erjavšek, M., Lovšin Kozina, F., & Krpač, F. (2016). *Uživajmo v zdravju (Priročnik)*. Univerza v Ljubljani.

Zagorc, M. (2006). *Ples v sodobni šoli: prvo triletnje I*. Ljubljana: Fakulteta za šport, Inštitut za šport.

Trebše, K. (2016). *Ples kot sredstvo za spodbujanje kreativnega mišljenja otrok* (diplomsko delo, Fakulteta za šport, Univerza v Ljubljani). Mentorica:izr. prof. dr. Petra Zaletel.

Bergoč, Š. (2019). Pomen gibanja pri učencih na začetku šolanja. *Razredni pouk*, 2, 3–5. Zavod RS za šolstvo.

INTERESNA DEJAVNOST "PLANINEC TONČEK" – SPODBUDA ZA MLADE PLANINCE V PRVI TRIADI

EXTRACURRICULAR ACTIVITY "PLANINEC TONČEK" – ENCOURAGEMENT FOR YOUNG HIKERS IN THE FIRST GRADE

Neža KOKALJ¹

Predavateljica: Neža Kokalj

IZHODIŠČA: Med šolskim letom ob koncu tedna veliko otrok preživi svoj prosti čas v notranjih prostorih ali pred zasloni, kar lahko negativno vpliva na njihovo zdravje ter gibalne in socialne veščine. Gibanje na prostem, kot je hribolazenje, otrokom omogoča razvoj gibalnih sposobnosti, spodbuja zdrav življenjski slog in povezuje otroke z naravo. Učiteljica enkrat v vsakem letnem času odpelje otroke na okoliške hribe, kjer skupaj doživijo značilnosti posameznih letnih časov.

PROBLEM/NAMEN: Pomanjkanje gibalne aktivnosti pri mlajših učencih lahko vodi v slabšo fizično pripravljenost, zmanjšano vztrajnost in slabše socialne veščine. Namen prispevka je predstaviti vlogo učiteljice pri spodbujanju mladih planincev v prvi triadi skozi interesno dejavnost "Planinec Tonček" ter opisati pozitivne učinke te aktivnosti na otrokov razvoj.

METODE: Interesna dejavnost "Planinec Tonček" deluje skozi vse šolsko leto. Učiteljica vodi učence na izlete po okoliških hribih, dostopnih z mestnim avtobusom iz Ljubljane. Aktivnosti potekajo v vseh letnih časih, kar omogoča otrokom spoznavanje narave v različnih vremenskih pogojih. Učenci spoznavajo osnovne veščine orientacije in gibanja v naravi ter se učijo o trajnostnem vedenju. Poleg tega jih učiteljica seznaja z osnovami gorskega bontona, ki vključuje varno obnašanje v gorah, spoštovanje narave, sodelovanje z drugimi udeleženci in odgovorno ravnanje na planinskih poteh.

UGOTOVITVE: Čeprav se dejavnost izvaja le nekajkrat na leto, učenci ob tem preizkušajo svoje telesne sposobnosti, razvijajo vztrajnost in samostojnost ter krepijo socialne veščine, kot so sodelovanje, pomoč in komunikacija s sošolci. Razvijajo povezanost z naravo, spoznavajo njen pomen in se učijo osnov gorskega bontona. Sodelovanje v interesni dejavnosti krepi tudi medosebne vezi med učenci in učiteljico, kar spodbuja motivacijo za nadaljnje vključevanje v dejavnost.

ZAKLJUČEK: Učitelji igrajo ključno vlogo pri oblikovanju vedenjskih vzorcev pri mlajših učencih. Interesna dejavnost "Planinec Tonček" omogoča načrtovano in strukturirano aktivnost, ki spodbuja samostojnost, razvija pomembne socialne veščine ter omogoča otrokom, da se povežejo z naravo. Zaradi izbire okoliških hribov, dostopnih z mestnim avtobusom, je dejavnost dosegljiva za vse otroke, tudi tiste, ki si sicer pohodniških izletov ne bi mogli privoščiti. Omogoča jim doživeti planinske izkušnje, ki jih lahko prenesejo tudi na ostale družinske člane.

Ključne besede: učenci, hribolazenje, interesna dejavnost, spodbuda, učiteljica

LITERATURA:

Bailey, D. P., Fairclough, S. J., Savory, L. A., Denton, S. J., Pang, D., Deane, C. S. and Kerr, C. J. (2012). Relationship between outdoor physical activity and wellbeing in children. *Journal of Science and Medicine in Sport*, 15(6), 544–549.

Cachón-Zagalaz, J., Lara-Sánchez, A. J., Zagalaz-Sánchez, M. L. and Arufe-Giráldez, V. (2021). Effects of physical activity on children's motor skill development: A systematic review of randomized controlled trials. *Preventive Medicine Reports*, 22, 101345.

Gray, C., Gibbons, R., Larouche, R., Sandseter, E. B. H., Bienenstock, A., Brussoni, M., ... and Tremblay, M. S. (2015). What is the relationship between outdoor time and physical activity, sedentary behaviour, and physical fitness in children? A systematic review. *International Journal of Environmental Research and Public Health*, 12(6), 6455–6474.

Zurc, J. (n.d.). *Otroci, gibanje in zgled staršev*. Radio Ognjišče.

Pišot, R. in Planinšec, J. (2005). *Participacija otrok pri dejavnostih na prostem v vrtcu*.

POVEZOVANJE GIBANJA IN GLASBE KOT SPODBUDA ZA UČENJE PRI UČENCIH DRUGEGA RAZREDA

INTEGRATING MOVEMENT AND MUSIC AS A STIMULUS FOR LEARNING IN SECOND GRADE STUDENTS

Stanka KOLENKO¹

¹Osnovna šola Naklo

Predavateljica: Stanka Kolenko

IZHODIŠČA: V zgodnjem osnovnošolskem obdobju je gibanje ena ključnih oblik izražanja in učenja. Glasba in gibanje sta naravno povezana z otrokovim razvojem, hkrati pa dokazano podpirata kognitivne, socialne in čustvene spretnosti. Vse več raziskav potrjuje, da veččutni pristopi, ki združujejo ritmične in gibalne elemente, izboljšujejo koncentracijo, pomnjenje, jezikovni razvoj in učni uspeh.

PROBLEM/NAMEN: Gibanje je otrokova naravna potreba in predstavlja pomemben del njegovega vsakdana. Če se otrok veliko giba, se tudi dobro počuti, je bolj umirjen in je zadovoljen. Gibanje je dejavnost, ki učinkovito nevtralizira negativne posledice sedečega življenjskega sloga in zavira oz. preprečuje povečevanje telesne mase, kar je danes velik problem v celotnem razvitem svetu. Otroci danes preživijo veliko časa v sedečem položaju, kar vpliva na njihovo zbranost in motivacijo. Škodljivi vplivi sedenja so zmanjšani, če se uvedejo gibalne aktivnosti oziroma učenje z gibanjem. Namen prispevka je predstaviti, kako lahko načrtno vključevanje glasbe in gibanja v pouk v 2. razredu spodbuja aktivno učenje, izboljša pozornost ter razvija telesne, jezikovne in socialne spretnosti.

METODE: Izvedli smo več načrtovanih dejavnosti v razredu (gibalni odziv na glasbo, stolčki z nalogo, gibalni telefon, gibalna abeceda, »gibalni kviz« ob glasbi...). Opazovali smo odzive otrok ter analizirali vključenost in uspešnost otrok pri dejavnostih.

UGOTOVITVE: Ugotovili smo, da učenci kažejo večje veselje do učenja, hitrejše pomnjenje učne snovi ter izboljšano sodelovanje v skupini, kadar so dejavnosti podprte z glasbo in gibanjem. Posebej učinkovite so bile dejavnosti, kjer so učenci sami izbirali gibe, usklajevali ritme z nalogami ali poustvarjali pojme skozi gib. Vključevanje gibalno-glasbenih metod je vplivalo tudi na boljše izražanje in socialno interakcijo.

ZAKLJUČEK: Glasba in gibanje sta izjemna pedagoška orodja za učence drugega razreda. Povezovanje obeh spodbuja motivacijo, krepi razumevanje učne snovi in spodbuja celostni razvoj.

Ključne besede: gibanje, glasba, učenje, osnovna šola, aktivno poučevanje

LITERATURA:

Taggart, C. M., Reynolds, A. M., & Sims, W. L. (2021). Integrating music and movement into early childhood education: Evidence from intervention studies. *Early Childhood Research Quarterly*, 56, 231–243.

Juntunen, M.-L. (2020). Embodied Learning and Teaching of Music. *International Journal of Music Education*, 38(1), 5–18.

Koops, L. H. (2022). Movement and musical understanding in young children. *Music Education Research*, 24(2), 123–135.

POMEN GIBANJA PRI POUKU V 1. RAZREDU

THE IMPORTANCE OF MOVEMENT IN 1ST GRADE TEACHING

Nataša KREBELJ REJA¹

¹Osnovna šola Koper

Predavateljica: Nataša Krebelj Reja

IZHODIŠČA: Vključevanje gibanja pri pouku je izjemno pomembno, posebno pri otrocih v 1. razredu, saj prispeva k boljši pozornosti, večji motivaciji za opravljanje dejavnosti, nalog in najpomembneje, zelo pozitivno vpliva na dobro, sproščeno počutje otrok. Otroci te starosti težko zdržijo dlje časa v mirovanju, zato je ključnega pomena, da se gibanje zavestno vključuje v učni proces. Tako se kvalitetnejše in bolj uravnoteženo razvija telesni, čustveni, socialni in kognitivni razvoj.

PROBLEM/NAMEN: Z vključevanjem gibanja v učni proces povečamo pozornost in zbranost otroka in povečamo vnos kisika v telo, zaradi gibalne dejavnosti. Ravno tako gibalne aktivnosti pripomorejo pri koordiniranju informacij (ponavljanje z gibi) in hkrati s tem spodbujamo delovanje možganov, prekrvavitev le-teh. S telesno aktivnostjo zmanjšujemo stres in napetost pri otroku, razvijamo pozitivno razpoloženje in krepimo samozavest. Obenem pa otroku še privzgapamo pozitiven odnos do šole, saj se z bolj dinamičnim in zabavnim delom, bolj veseli pouka.

METODE: Gibanje vključujem v sam proces vsakodnevno in sicer pri različnih predmetih. Dan vedno začnemo z jutranjo telovadbo za možgane – kot smo jo mi poimenovali in sicer z vajami Brain Gym (pace.) Pri urah matematike ob učenju števil, pokažejo z gibi dotično števko. S poskoki, počepi, prikažejo pravilnost računov ali posameznih nalog. Npr.: Počepni, če je račun pravilen ali poskoči, če ni pravilen. Poskoči tolikokrat kot pomeni številka 5- pet poskokov. Pri urah slovenščine je zanimiva dejavnost pojdi-preberi-zapomni si-pojdi- napiši. Otrok se giba do postaje z besedami in povedmi, jo vzame, prebere (stoje ali med hojo), si jo zapomni in odide na mesto in jo zapiše. Pri obeh predmetih je delo po postajah in sodelovalno učenje pozitivno, saj se premikajo od postaje do postaje in na sami postaji opravijo naloge ob pomoči drug drugega. Zanimivo jim je branje v paru na različnih mestih – sede na tleh, leže, v hoji ali stoje. Pri spoznavanju okolja se odpravimo na sprehod in učimo na prostem, z gibi prikažemo pomembne pojme, ki si jih lažje zapomnijo (dele rastlin, pogoji za življenje).. Zelo učinkoviti so tako imenovani aktivni odmori, ko ob zaznavni učni utrujenosti otrok, prekinem z delom in se otroci razgibajo ali z raztezanjem, dihalnimi vajami, masažo Brain gyma, sprehodom po terasi. Otroci imajo vsakodnevno možnost izbire nekatere kinestetične opreme (stoječa miza z nožno gugalnico in gobice za sedenje).

UGOTOVITVE: Vse gibalne aktivnosti, ki so vsakodnevno vključene v sam pouk, so zelo učinkovite, saj pomagajo pri razvoju motorike, spodbujajo koncentracijo in izboljšujejo splošno počutje otrok. Spodbujajo sodelovanje, komunikacijo med otroki, upoštevanje pravil in spoštovanje drug drugega. Zaradi kratkotrajne pozornosti, je gibanje poglobitvega pomena, saj se lažje zberejo, sodelujejo in nenazadnje učinkoviteje učijo – s celim telesom.

ZAKLJUČEK: Na podlagi teorije in izvedene prakse sem ugotovila, da otroci po gibalnih aktivnostih lažje sledijo pouku. Gibanje deluje na osredotočenost k delu, torej »zbudi« možgane.

Večje je pomnjenje in razumevanje in predvsem pomagajo učencem, ki imajo specifične težave(učne, vedenjske, zbranosti...). Delo je bolj raznoliko, zmanjšuje se nemir v razredu in otroci preko telesne aktivnosti krepijo samokontrolo.

Ključne besede: gibalne dejavnosti, učenje po postajah, Brain Gym, kinestetična oprema

LITERATURA:

Pistotnik, B., Pinter, S., Dolenc, M. (2002). Gibalna abeceda. Ljubljana. Fakulteta za šport.

Videmšek, M. in Pišot, R. (2007). Šport za najmlajše. Ljubljana: Fakulteta za šport, Inštitut za šport.

Fonda, K., Kuštrin, V., Požar, S. in Prunk, V. (2010). Minuta za gibanje. Piran: Inštitut za varovanje zdravja in OŠ Cirila Kosmača, 13–16.

Zurc, J. (2008). Biti najboljši: Pomen gibalne aktivnosti za otrokov razvoj in šolsko uspešnost. Radovljica: Didakta.

OTROK Z RAKOM IN VZDRŽEVANJE TELESNE KONDICIJE SKOZI POUK

CHILDREN WITH CANCER AND MAINTAINING PHYSICAL FITNESS THROUGH LESSONS

Darja KREK¹

¹Osnovna šola Ivana Tavčarja Gorenja vas

Predavateljica: Darja Krek

IZHODIŠČA: Kako pri otroku z diagnozo rak poskrbeti za dovolj gibanja

PROBLEM/NAMEN: Deklica je v 7. razredu osnovne šole zbolela za Ewingovim sarkomom, agresivno obliko raka, ki običajno prizadene kosti ali mehka tkiva in se najpogosteje pojavi pri otrocih in mladostnikih. Zdravniki menijo, da je poleg kemoterapije in obsevanja ključna sestavina zdravljenja kvalitetna prehrana in gibalna dejavnost. Poleg fizioterapije, ki so jo deklici zagotovili v bolnici, sem se spraševala, kako lahko tudi sama pripomorem k dekličini večji gibalni aktivnosti. Ker poučujem matematiko in fiziko sem med zdravljenjem ta del šolanja hčere prevzela sama in sem se trudila v čim več učnih vsebin vključiti gibanje.

METODE: Glavna metoda je bila izvajanje pouka zunaj, v naravi, s čim konkretnjšimi izzivi, kolikor je hči zmogla. Primeri učnih vsebin, ki sva jih izvajali v povezavi z gibanjem:

- Merjenje hitrosti hoje in vožnje s kolesom ter primerjanje dobljenih rezultatov (fizika – hitrost in gibanje)
- Hoja po travnati podlagi v supergih in čevljih s peto – udiranje v tla (fizika – tlak)
- S kolesom do bližnje bencinske črpalke in spoznavanje delovanja manometra (fizika – tlak)
- Izlet na Slovensko obalo in obravnava vzgona (plavanje, občutek lahkotnosti v vodi), tlaka tekočine na potopljeno telo (nezmožnost dihanja skozi dolgo dihalo) preverjanje plovnosti teles v sladki in slani vodi (fizika – tlak, vzgon in gostota)
- Računanje višine drevesa, hiše (matematika – sorazmerja)
- Na kateri višini je okno, če 10 m dolgo lestev prislonimo 1 m od hiše (matematika – Pitagorov izrek)
- Met na koš (matematika – zbiranje in obdelava podatkov)

UGOTOVITVE: Ogromno učnih vsebin se da izpeljati v naravi, tako da vključimo gibanje in s konkretnimi problemi pridemo do konkretnih rešitev. Otrok si predano snov mnogo bolj zapomni, razlaga in usvoji, če je podana na konkretnem izzivu, če se le da zunaj učilnice.

ZAKLJUČEK: Obdobje zdravljenja je vsekakor psihično in fizično naporno, zato je tekom zdravljenja zelo pomembna skrb za obe področji. Ampak z vključevanjem gibanja, časa preživetega v naravi in povezovanje učnih vsebin z vsakdanom ne pridobimo le na fizični, ampak tudi na psihični kondiciji. Kot učiteljici mi je ta izkušnja dala ogromno novih spoznanj, kako pouk narediti učencem bolj prijazen, zanimiv in jim sočasno ponuditi tudi gibanje, ki ga nekaterim zelo primanjkuje.

Ključne besede: dolgotrajno bolni, športna dejavnost, naravoslovje

LITERATURA:

Gavin M. L, Dowshen S. A, Izenberg N. (2004). Otrok v formi. Mladinska knjiga.

Dollinger M., Rosenbaum E. H., Cable G. (1995). Življenje z rakom. Tehniška založba Slovenije.

Žigon S, Pintarič M., Jagodic A. (2016). Fizika 8. Mladinska knjiga.

<https://eucbeniki.sio.si/mat8/787/index.html>.

MEDKULTURNO UČENJE SKOZI GIB IN GLASBO

INTERCULTURAL LEARNING THROUGH MOVEMENT AND MUSIC

Mojca KREVEL¹

¹Osnovna šola Hruševci Šentjur

Predavateljica: Mojca Krevel

IZHODIŠČA: Učenci se v sodobnem učnem okolju srečujejo s številnimi kulturnimi vplivi, vendar pogosto nimajo možnosti izkustvenega spoznavanja tujih glasbenih in plesnih praks. Učna tema „Plesi različnih kultur sveta“ se je oblikovala kot odziv na potrebo po večji vključenosti medkulturnih vsebin v predmet glasbena umetnost, pri čemer gib in ples postaneta orodji za razumevanje drugačnosti in spodbujanje strpnosti. Glasba, v kombinaciji s telesnim izrazom, odpira prostor za bolj celostno učenje.

PROBLEM/NAMEN: Glavni namen aktivnosti je bil spodbuditi učence k razumevanju in doživljanju kulturne raznolikosti skozi praktično izkušnjo učenja in izvajanja tradicionalnih plesov različnih kultur. Hkrati pa skozi izkušnjo omogočiti učencu lažje razumevanje glasbenih ritmov, struktur in pomenov, ki jih prinašajo različna kulturna okolja. V ospredju je bila tudi želja, da učenci prevzamejo aktivnejšo vlogo v učnem procesu in razvijejo sodelovalne veščine.

METODE: Učno temo smo izvajali 5 šolskih ur v okviru rednega pouka v 9. razredu osnovne šole. Sodelovalo je 48 učencev iz dveh oddelkov. Delo je temeljilo na praktičnem učenju plesov (afriški sinte, balkansko kolo, indijski bhangra, venezuelski El sebucan, madžarski čardaš, indonezijski Saman, izraelski Hava Nagila). Z metodo analitičnega poslušanja avtentične glasbe so usvajali raznolike ritmične vzorce, ki so jih nato izvajali z gibanjem in z igranjem na Orffova ritmična glasbila. Ob koncu vsake ure smo izvedli refleksijo skozi kratke didaktične igre in pogovor.

UGOTOVITVE: Učenci so pokazali visoko stopnjo motivacije, še posebej v fazi izvajanja plesnih korakov. Izbrani plesi so zelo energični zato so bili učencem v pozitiven izziv in motivacijo. Povezava med gibanjem in glasbo jim je pomagala bolje razumeti ritmične strukture in razlike med posameznimi kulturami. Ugotovljeno je bilo, da je učenje skozi gib spodbujalo samostojnost, sodelovanje in večjo zbranost pri poslušanju glasbe. Prav tako so uspešneje prepoznavali ritmične raznolikosti in utrjevali ritmične vzorce. Aktivnosti so spodbudile strpnost in zanimanje za druge kulture, kar je bilo razvidno tudi iz njihovih refleksij po zaključku dejavnosti.

ZAKLJUČEK: Učenje koreografij ljudskih plesov različnih narodov se je izkazala kot učinkovita oblika poučevanja glasbene umetnosti, ki povezuje več učnih področij (glasbo, gibanje, državljansko vzgojo). Tovrsten pristop omogoča razvoj umetniških, socialnih in medkulturnih kompetenc. Predlagamo, da se aktivnosti razširijo na kulturne dneve, s poudarkom na medpredmetnim povezovanjem in vključijo tudi druge razrede, saj omogočajo avtentično, ustvarjalno in vključujočo učno izkušnjo.

Ključne besede: glasbena umetnost, medkulturnost, ples, gibanje, ritmična raznolikost

LITERATURA:

Barrett M. (2011). Intercultural Arts Education. *Research Studies in Music Education*, 33(2), 107–120.

Campbell P. S. (2004). *Teaching Music Globally: Experiencing Music, Expressing Culture*. Oxford University Press.

Juriševič M., Krek J. (2019). Medkulturna vzgoja in izobraževanje. *Sodobna pedagogika*, 70(2), 54–67.

UPORABA SODOBNE TEHNOLOGIJE, KOT SO INTERAKTIVNI ZIDOVI ALI VR OČALA PRI POUČEVANJU ŠPORTA – KORAK NAPREJ ALI KORAK NAZAJ?

THE USE OF MODERN TECHNOLOGY, SUCH AS INTERACTIVE WALLS OR VR HEADSETS IN PHYSICAL EDUCATION – A STEP FORWARD OR A STEP BACK?

Maja KUGONIČ¹

¹Srednja ekonomsko-poslovna šola Koper

Predavateljica: Maja Kugonič

IZHODIŠČA: V sodobnem času tehnologija vse bolj prežema vse vidike izobraževanja, tudi pouk športne vzgoje in korenito spreminja način poučevanja in učenja. Mednje sodijo tudi navidezna resničnost (VR) in interaktivni zidovi, ki omogočajo nov, bolj angažiran pristop k poučevanju športne vzgoje. Glavno vprašanje, ki se pri tem pojavlja, je, ali takšna tehnologija spodbuja gibanje in učenje gibalnih veščin ali pa odvrča od bistva – celostnega razvoja telesne pripravljenosti in naravne igre.

PROBLEM/NAMEN: Splošno znano je, da se gibalna aktivnost otrok in mladine iz leta v leto zmanjšuje. Učitelji športne vzgoje skušajo na različne načine otrokom približati šport in gibalno dejavnost nasploh – do te mere, da bo postala del njihovega vsakdana. Razvoj sodobne tehnologije omogoča, da le-to uporabljamo tudi pri poučevanju športa. Zanima nas predvsem ali sodobna tehnologija dejansko pripomore k povečanju gibalne aktivnosti otrok in mladine in večji angažiranosti otrok pri športu. Ali je to le sredstvo, ki kratkotrajno zadošči potrebam »sodobnega« otroka in ga kasneje odvrne od bistva – celostnega gibalnega razvoja.

METODE: Analizirali smo aktualne primere uporabe sodobne tehnologije pri športni vzgoji, domače in tuje raziskave ter mnenja učiteljev športne vzgoje. Opravljena je bila kvalitativna analiza intervjujev z učitelji, ki pri poučevanju uporabljajo VR očala in interaktivne zidove, ter opazovanje izvedbe petih učnih ur v osnovni in srednji šoli, kjer je bila tehnologija vključena v učni proces.

UGOTOVITVE: Uporaba VR očal omogoča simulacijo različnih športnih okolij (npr. smučanje, plezanje, reakcijske igre), kar spodbuja zanimanje in motivacijo učencev, zlasti tistih, ki v tradicionalnih športnih dejavnostih manj sodelujejo. Podobno interaktivni zid omogoča razvoj koordinacije, hitrosti reakcije, prostorske orientacije in hkrati vključuje elemente igre in tekmovalnosti.

Učitelji poudarjajo, da je tehnologija lahko dragoceno dopolnilo, saj omogoča individualizacijo pouka, takojšnjo povratno informacijo in priložnost za povezovanje z drugimi predmetnimi področji. Vključevanje elementov informacijsko-komunikacijske tehnologije (IKT) je še posebej učinkovito pri uvajanju novih vsebin, motivaciji učencev s posebnimi potrebami ter vključevanju kognitivnih izzivov v gibalne naloge.

Po drugi strani pa obstajajo tudi pomembne omejitve. Med njimi so visoki stroški opreme, potreba po tehnični podpori, omejen prostor in čas uporabe ter nevarnost, da se fizična aktivnost nadomesti z »digitalnim gibanjem«. Poleg tega lahko pri daljši uporabi VR očal

nastopijo težave z ravnotežjem, slabostjo ali preobremenjenostjo čutov. Telesna pripravljenost, vzdržljivost in socialni vidiki športne igre v digitalnem okolju niso razviti v enaki meri kot pri klasičnem pouku.

ZAKLJUČEK: Sodobna tehnologija pri pouku športne vzgoje predstavlja korak naprej – a le, če jo uporabljamo premišljeno, ciljno usmerjeno in kot sredstvo za krepitev gibanja, ne pa kot njegovo zamenjavo. Ključno vlogo ima pri tem učitelj, ki mora znati uravnotežiti uporabo tehnologije z osnovnim ciljem predmeta: spodbujanje aktivnega in zdravega življenjskega sloga.

Ključne besede: sodobna tehnologija, interaktivni zid, VR očala, gibanje, športna vzgoja

LITERATURA:

Ljubijankić, S. (2020). Tehnologija v športni vzgoji. *Šport* 68(1), Zveza društev športnih pedagogov Slovenije.

Kos, M. (2022). Interaktivna tehnologija v športu – priložnost za več gibanja? *Revija Didakta*.

Thomas, K., & Stratton, G. (2006). Physical education interventions and children's motor skills. *British Journal of Sports Medicine*.

Markun Puhan, N., Jablanov, G., Oblak, T. (2020). »Smernice za uporabo IKT pri predmetih ŠPORT/ŠPORTNA VZGOJA«.

Figelj, P., SIO Novice (15. 1. 2023). »Uporaba IKT tehnologije pri predmetu ŠPORT«.

Idema. (n.d.). *Lü interactive gym*. (16. 6. 2025), iz <https://www.idema.com/en-GB/lu-interactivegym>.

Putranto, J. S., Heriyanto, J., Kenny, A. S., & Kurniawan, A. (2023). *Implementation of virtual reality technology for sports education and training: Systematic literature review*. *Procedia Computer Science*, 216, 293–300. <https://doi.org/10.1016/j.procs.2022.12.139>.

Pagé, C., Bernier, P.M., & Trempe, M. (2019). Using video simulations and virtual reality to improve decisionmaking skills in basketball. *Journal of Sports Sciences*, 37, 2403–2410. <https://doi.org/10.1080/02640414.2019.1638193>.

SODELOVANJE MED ŠOLAMI V ČASU POUKA IZ ŠPORTNE VZGOJE

COOPERATION BETWEEN SCHOOLS IN PE LESSONS

Nino LEGNAR¹

¹Srednja ekonomsko-poslovna šola Koper

Predavatelj: Nino Legnar

IZHODIŠČA : Na srednji ekonomsko-poslovni šoli Koper smo se zaradi prenove šolske telovadnice, ki jo koristita srednja in osnovna italijanska šola, znašli v prostorski stiski. Italijanski šoli sta bili začasno v času pouka iz športa prestavljeni v Areni Bonifika, kjer smo do takrat sami izvajali pouk. Tako so bile potrebne prilagoditve treh šol.

PROBLEM : Zaradi množične zasedenosti športne dvorane, smo bili primorani poiskati rešitve, ki so omogočale nemoten pouk športne vzgoje.

METODE : Naša šola za izvajanje športnih aktivnosti uporablja različne športne površine. V mesecu septembru in oktobru največ koristimo športni park Bonifika, kjer je veliko prostora za vadeče. V maju in juniju večkrat poleg športnega parka koristimo tudi Center športov na mivki Koper. Med novembrom in aprilom smo večino časa v Areni Bonifika, ki nam ponuja več športnih površin, kjer lahko izvajamo pouk. Poleg površin na parketu dvorane imamo na voljo tudi dva predprostora. Koristimo jih predvsem za poučevanje gimnastike, namiznega tenisa, vadbo za moč, aerobiko, judo, ples ipd. Igre z žogo (odbojka, rokomet, nogomet, košarka, floorball, ipd.) izvajamo v zaprtih prostorih, namenjenih za šport. Ker velikokrat istočasno pouk vodimo vsaj trije učitelji naše šole, se predhodno dogovorimo o tem, kdo bo koristil kateri prostor oziroma kateri učni sklop bomo poučevali, da si nebi bili v napoto. S prilagajanjem želimo dijakom omogočiti kar se da kvaliteten in nemoten učni proces. Zaradi prenove italijanske telovadnice, sta osnovna in srednja italijanska šola sklenili dogovor z občno, da bosta v času prenove telovadnice izvajali pouk iz športa v Areni Bonifika. Profesorji in učitelji vseh treh šol smo se zato med seboj dogovorili, kdo bo uporabljal katero površino dvorane. V kasnejšem obdobju smo nekatere skupine tudi pomešali med seboj, da smo sestavili motivirane in tehnično kvalitetne skupine za igranje v določenih ekipnih športih, npr. v odbojki, nogometu in košarki.

UGOTOVITVE : Sodelovanje med našimi šolami je bilo zelo pomembno, saj bi sicer prišlo do velike zmede in številnih nevšečnosti. Ker smo se dobro zorganizirali in osredotočili tudi na pozitivne učinke mešanja naših skupin, smo kvalitetno izpeljali pouk skozi šolsko leto. Opazili smo, da so učenci in dijaki med seboj gojili pozitivno vzdušje, se med seboj spodbujali in si pomagali. Mlajši so se želeli dokazati starejšim, ki so na nek način delovali kot mentorji in se znašli v novi vlogi, ki je od prej niso bili vajeni. Prilagajanje skupin je bilo potrebno le od novembra do aprila, saj nam številčne zunanje športne površine ne povzročajo prostorske stiske.

ZAKLJUČEK : Izkušnja nas je naučila, da prilagajanje ni vedno slabo, zato se bomo sedaj še lažje prilagodili ob podobnih preprekah. Tudi, če kdaj pride do problema zaradi prostorske stiske, bomo dijake še lažje usmerili, kako vseeno na kvaliteten in poučen način nadaljevati pouk.

Ključne besede: prilagajanje, sodelovanje, skupine

LITERATURA:

Šport mladih. (2021). Vključujoči in inovativni pristopi k pouku športne vzgoje in športnim treningom. Ljubljana : Zavod za šport RS Planica.

Zavod RS za šolstvo. (2014). Posodobitev pouka – Šport/Športna vzgoja : didaktična priporočila. Ljubljana : ZRSŠ.

VARNOST OTROK PRI ŠPORTNI VADBI Z UPORABO POSTOPNE VKLJUČITVE: PREDHODNE UGOTOVITVE PROJEKTA SAFESPORT

CHILDREN'S SAFETY IN SPORTS TRAINING THROUGH GRADUAL INCLUSION:
PRELIMINARY FINDINGS OF THE SAFESPORT PROJECT

Arnela LIHIĆ¹, Samo MASLEŠA¹ in Slavisa BRADIC²

¹Judo klub Gorica

²Judo klub Rijeka

Predavatelj: Samo Masleša

IZHODIŠČA: Zaradi zgodnje specializacije, pomanjkljivih kakovostnih gibalnih programov in posledic pandemije COVID-19 se je pri otrocih povečalo tveganje za poškodbe, zmanjšala se je njihova telesna pripravljenost ter motivacija za športno udejstvovanje. Športni strokovnjaki se ob tem pogosto soočajo s pomanjkanjem ustreznega znanja o varni in postopni reintegraciji otrok v strukturirane športne aktivnosti.

PROBLEM/NAMEN: Namen projekta SAFESPORT (ERASMUS-SPORT-2024-SSCP: GA: 101184383) je razvoj in uvajanje celostnega, varnega in vključujočega pristopa h gibalni aktivnosti, zlasti z uporabo inovativnega transverzalnega programa Genius Safe Motor Program (GSMP). Program, ki temelji na vrednotah juda (kot so nadzor padcev, spoštovanje, empatija), otrokom omogoča varno vključevanje v šport in zmanjšuje tveganje za poškodbe, hkrati pa krepi telesno in duševno blagostanje.

METODE: V prvem obdobju projekta smo izvedli pregled obstoječih praks, analizirali raven gibalne aktivnosti, prisotnost poškodb ter vrnitev otrok k športu v sodelujočih državah (Slovenija, Hrvaška, Grčija). Razvili smo smernice za varno vključevanje otrok v športne dejavnosti in izvedli prve mednarodne delavnice, kjer so športni trenerji in učitelji pridobili znanja o izvajanju GSMP. Sledila je priprava priročnika ter video vsebin.

UGOTOVITVE: Predhodni rezultati kažejo na velik interes športnih strokovnjakov za vključitev programa GSMP v obstoječe šolske in športne dejavnosti. Usposobljenih je bilo več kot 40 strokovnjakov iz različnih športnih panog. Udeleženci poročajo o boljši osredotočenosti otrok, večji motivaciji ter večjem občutku varnosti med vadbo. Prve analize nakazujejo tudi na zmanjšanje prijavljenih poškodb v kontroliranem okolju ter na izboljšano telesno koordinacijo otrok.

ZAKLJUČEK: SAFESPORT predstavlja učinkovit pristop za dvig kakovosti športne vadbe otrok v šolskem in klubskem okolju. Vključevanje GSMP prispeva k varnejši, bolj vključujoči in razvojno ustrezni športni vzgoji, kar predstavlja pomemben prispevek k uresničevanju evropskih politik na področju športa in izobraževanja. Nadaljnje faze projekta bodo usmerjene v širjenje programa, oblikovanje nacionalnih priporočil ter krepitev mreže usposobljenih strokovnjakov.

Ključne besede: gibalna aktivnost otrok, varna vadba, zgodnja specializacija, GSMP.

LITERATURA:

Fukuda, D. H., Stout, J. R., Burris, P. M., & Fukuda, R. S. (2011). Judo for children and adolescents: Benefits of combat sports. *Strength & Conditioning Journal*, 33(6), 60-63.

Bradić, S. (2018). Judo for children. In *The Science of Judo* (pp. 41-56). Routledge.

POMEN ŠPORTNEGA PROGRAMA V OSNOVNI ŠOLI

THE IMPORTANCE OF THE SPORTS PROGRAM IN PRIMARY SCHOOL

Nina LUŠA¹

¹Osnovna šola Koper

Predavateljica: Nina Luša

IZHODIŠČA: V današnji družbi, kjer so otroci vse bolj izpostavljeni sedečemu načinu življenja, digitalnim zaslonom in pomanjkanju gibanja, postaja pomen telesne dejavnosti v otroštvu vse bolj očit. Osnovna šola ima ključno vlogo pri spodbujanju zdravega načina življenja, saj ravno v tem obdobju otroci oblikujejo navade, ki jih pogosto ohranijo tudi v odraslosti. Športni program v osnovni šoli ni namenjen le razvijanju gibalnih sposobnosti, temveč ima širšo vzgojno in razvojno funkcijo.

PROBLEM: Kljub dokazanim pozitivnim učinkom športnih dejavnosti se vse več otrok sooča z zmanjšano telesno pripravljenostjo, debelostjo in pomanjkanjem zanimanja za šport. To se še bolj pozna po covid obdobju. Številne šole se srečujejo s pomanjkanjem sredstev, ustrezne infrastrukture ali motivacije učencev. Problem, ki ga obravnava ta prispevek, je vprašanje: **kako pomemben je športni program v osnovni šoli za celostni razvoj učencev in kako ga izboljšati?**

METODE: Pri izdelavi prispevka so bile uporabljeni naslednji metodi: deskriptivna oz. opisna metoda ter primerjalna oz. komparativna metoda.

UGOTOVITVE: Redna gibalna dejavnost pozitivno vpliva na zdravje otrok, vključno z boljšo telesno pripravljenostjo, razvojem mišično-skeletnega sistema in zmanjšanjem tveganja za kronične bolezni. Gibanje vpliva tudi na duševno zdravje, saj zmanjšuje stres, izboljšuje samozavest in pomaga pri obvladovanju čustev. Učenci, ki se redno ukvarjajo s športom, so pogosto bolj socialno vključeni, znajo sodelovati, spoštujejo pravila in lažje rešujejo konflikte. Gibanje lahko pozitivno vpliva tudi na šolski uspeh, saj spodbuja koncentracijo, disciplino in boljše kognitivne funkcije. Kljub temu se pojavljajo izzivi, kot so neenak dostop do športnih dejavnosti, premalo ur športne vzgoje, plačilo dodatnih ur športa, dodatno izobraževanje učiteljev in nezadostna opremljenost šol.

ZAKLJUČEK: Športni program v osnovni šoli je bistvenega pomena za celostni razvoj učencev. Ne gre le za telesno vadbo, temveč za oblikovanje zdravih navad, razvijanje osebnosti, socialnih veščin in vzgojo za življenje. Šole morajo zato zagotavljati raznolike in vključujoče športne programe, ki bodo dostopni vsem učencem. Poleg tega je pomembna tudi vloga staršev, učiteljev in širše skupnosti pri spodbujanju pozitivnega odnosa do gibanja. V prihodnosti bi morali športu v šoli posvetiti še več pozornosti, tako z vidika učnih načrtov kot tudi materialnih pogojev.

Ključne besede: športna vzgoja, telesna dejavnost otrok, gibalni razvoj, šolski športni program, vpliv športa na učence, fizično in duševno zdravje.

LITERATURA:

Starc, G. (2023). Gibalna učinkovitost slovenskih otrok in mladine v šolskem letu 2022/23. Ljubljana: Fakulteta za šport, Univerza v Ljubljani.

Učni načrt za **športno** vzgojo v osnovni **šoli**, Ministrstvo za izobraževanje, znanost in **šport** Republike Slovenije (2023).

RAZLIKE V KAKOVOSTI ŽIVLJENJA MED DEČKI IN DEKLICAMI V PODEŽELSKEM OKOLJU

DIFFERENCES IN QUALITY OF LIFE BETWEEN BOYS AND GIRLS IN A RURAL
ENVIRONMENT

Eva MATEJEK¹

¹ Osnovna šola Rudolfa Maistra Šentilj v Slovenskih goricah

Predavateljica: Eva Matejek

IZHODIŠČA: Celostni razvoj otrok in mladostnikov zahteva razumevanje dejavnikov, ki vplivajo na njihovo subjektivno kakovost življenja. V otroštvu na zaznavanje lastne kakovosti življenja pomembno vplivajo telesna dejavnost, zdravje, samopodoba in socialna vključenost. Poseben izziv predstavljajo razlike med spoloma, ki se lahko kažejo že v zgodnjem obdobju šolanja..

PROBLEM/NAMEN: Namen raziskave je bil ugotoviti, kako učenci, stari 10 in 11 let, zaznavajo kakovost svojega življenja, ter preveriti, ali obstajajo statistično pomembne razlike med spoloma. Rezultati naj služijo kot usmeritev učiteljem razrednega pouka pri oblikovanju diferenciranih pedagoških pristopov in vsebin, ki upoštevajo potrebe učenk in učencev.

METODE: V raziskavi je sodelovalo 38 učencev 4. razreda podeželske osnovne šole, od tega 18 deklic in 20 dečkov. Uporabljen je bil standardizirani vprašalnik Kidscreen-27, ki meri 6 dimenzij kakovosti življenja: telesno počutje, splošno počutje, samospoštovanje, odnosi z družino, vrstniški odnosi ter šolsko okolje. Podatki so bili analizirani s pomočjo deskriptivne statistike in t-testa za neodvisne vzorce.

UGOTOVITVE: Rezultati so pokazali, da deklice v primerjavi z dečki statistično značilno višje ocenjujejo dimenzijo splošno počutje ($p = 0,03$) in odnosi z vrstniki ($p = 0,02$). V drugih dimenzijah razlike niso bile statistično značilne, vendar trendi nakazujejo večje zadovoljstvo deklic tudi pri odnosih z družino in v šolskem okolju. Dečki so nekoliko višje ocenili telesno počutje, vendar razlika ni bila značilna.

ZAKLJUČEK: Ugotovitve kažejo na pomen upoštevanja spolnih razlik pri načrtovanju dela v razredu. Učitelj razrednega pouka lahko na podlagi rezultatov individualizira pristop: npr. pri dečkih spodbuja razvoj socialnih veščin in čustvenega izražanja, pri deklicah pa krepi telesno samozavest. Tak pristop lahko dolgoročno izboljša šolsko izkušnjo vseh otrok in spodbuja boljšo psihofizično kondicijo.

Ključne besede: kvaliteta življenja, pozno otroštvo, spol

LITERATURA:

Ravens-Sieberger, U., Erhart, M., Rajmil, L., Herdman, M., Auquier, P., Bruil, J., ... & European KIDSCREEN Group. (2010). Reliability, construct and criterion validity of the KIDSCREEN-10 score: a short measure for children and adolescents' well-being and health-related quality of life. *Quality of Life Research*, 19(10), 1487–1500.

Moksnes, U. K., Løhre, A., Lillefjell, M., Byrne, D. G., & Haugan, G. (2016). The association between school stress, life satisfaction and depressive symptoms in adolescents: Life satisfaction as a potential mediator. *Social Indicators Research*, 125, 339–357.

Wallander, J. L., & Koot, H. M. (2016). Quality of life in children: A critical examination of concepts, approaches, issues, and future directions. *Clinical Psychology Review*, 45, 13

Z MATEMATIKO V GIBANJE – UČNA URA NA PROSTEM

WITH MATHEMATICS IN MOTION – AN OUTDOOR LESSON

Mojca MEZEG DRMOTA¹¹OŠ Ivana Tavčarja Gorenja vas

Predavateljica: Mojca Mezeg Drmota

IZHODIŠČA: Poučevanje matematike z vključevanjem gibanja in dela v naravi predstavlja edinstveno priložnost za učence, da teoretično znanje povežejo s konkretnimi izkušnjami. Nekateri matematični pojmi, kot sta obseg in ploščina likov, so za učence nekoliko abstraktni. Zato smo učno uro izvedli na prostem, kjer so učenci matematične pojme spoznavali skozi konkretne naloge v naravnem okolju, hkrati pa razvijali socialne veščine in gibalne spretnosti. Namen učne ure je bil, da učenci ne le utrdijo svoje znanje o obsegu in ploščini, temveč da te pojme tudi uporabijo v vsakdanjem življenju.

PROBLEM/NAMEN: Učenci pogosto težko dlje časa sedijo mirno v razredu, zato je pomembno, da čim več učnih vsebin predstavimo zunaj, v naravnem okolju. Tak način dela jim omogoča več gibanja, kar pozitivno vpliva na njihovo zbranost in motivacijo. Hkrati učenci lažje povežejo teoretične matematične pojme z vsakdanjim življenjem, kar prispeva k boljšemu razumevanju snovi.

METODE: Učna ura je potekala na prostem, v okolici šole. Učenci so bili razdeljeni v pet skupin in so se izmenično premikali med učnimi postajami, kjer so reševali naloge. Postaje so bile postavljene na različnih mestih, zato so se morali učenci med njimi tudi sprehajati, kar je dodalo gibalno komponento učni uri. Na vsaki postaji so jih pričakale vrečke z navodili in potrebnimi pripomočki. Dejavnosti so vključevale ponovitev pojmov obsega in ploščine, razvrščanje merskih enot in njihovo uporabo v konkretnih primerih, uporabo obrazcev za izračun obsega in ploščine pravokotnika ter kvadrata, ustvarjanje ploščinsko enakih likov s pomočjo vrvice in tlakovcev ter merjenje obsega in ploščine označenih likov z metrom. V dejavnosti so bile vključene tudi gibalne naloge, kot na primer: merjenje obsega barake z metrom, merjenje obsega teniškega igrišča s štetjem korakov, iskanje pravih parov s pomočjo skokov. Učenci so naloge večinoma reševali samostojno, vloga učitelja pa je bila predvsem usmerjanje, spodbujanje ter preverjanje rešitev.

UGOTOVITVE: Učna ura na prostem se je izkazala za uspešno tako z didaktičnega kot z motivacijskega vidika. Učenci so pokazali visoko stopnjo angažiranosti in zanimanja za naloge, ki so jih reševali v skupinah, z gibanjem in v stiku z naravo.

Izvedba nalog, kot so označevanje obsega in ploščine likov ter merjenje z metrom, jim je omogočila, da so matematične pojme doživeli na konkreten in razumljiv način. Učenci so razumeli, da matematika ni le abstrakten predmet, temveč je tesno povezana z našim vsakdanjim življenjem in svetom okoli nas.

ZAKLJUČEK: Učitelji bi morali pogosteje izvajati dejavnosti v naravi, saj te ponujajo dragocene izkušnje, ki prispevajo k boljšemu razumevanju učnih vsebin. Učna ura na prostem je učencem omogočila, da so matematiko doživeli na nov način – kot povezavo med gibanjem,

naravo in praktičnim znanjem. To je pomembno vplivalo na njihovo motivacijo ter na doje-manje matematike kot uporabnega in zanimivega predmeta.

Ključne besede: obseg, ploščina, narava, gibanje

LITERATURA:

Željko, Verbinc, Vatovec, Štefančič. (2024). Matematika 7. Samostojni delovni zvezek za matematiko v sedmem razredu osnovne šole, 2. del. Ljubljana: Mladinska knjiga Založba.

MALI ANGLEŠKI KNJIŽNI MOLJI NA GOZDNIH PRAVLJIČNIH URICAH

LITTLE ENGLISH BOOKWORMS IN FOREST FAIRYTALE LESSONS

Mateja NOVAK¹

¹Osnovna šola bratov Letonja Šmartno ob Paki, Šmartno ob Paki

Predavateljica: Mateja Novak

IZHODIŠČA: Pravljljice so za mlajše otroke še posebej pomembne, saj spodbujajo njihovo domišljijo, jim omogočajo pridobivanje novih znanj in spoznanj ter jih motivirajo. Zaradi tega jih je smiselno vključevati tudi v zgodnje učenje tujega jezika. Ker je pouk angleščine v 1. triletju omejen zgolj na dve uri tedensko, sem za navdušence nad pravljicami zasnovala interesno dejavnost *Little English Bookworms (Mali angleški knjižni molji)*, kjer je osrednji poudarek predvsem na angleških pravljicah.

NAMEN: Telesna aktivnost in gibanje sta zelo pomembna za otrokovo rast in razvoj kot celoto. Glede na priporočila, bi naj otroci bili telesno aktivni od 60 do 90 minut dnevno. To me je vzpodbudilo, da sem del programa interesne dejavnosti *LEB* zasnovala tako, da smo gibalno – ustvarjalne dejavnosti, ki so sledile obravnavi posebej izbranih pravljic namesto v učilnici izvedli v bližnjem gozdu.

METODE: Za izvedbo gozdnih pravljicnih uric so bile ciljno izbrane pravljjice, kjer je osrednji dogajalni prostor gozd; to so bile pravljjice *Leafman, Oliver Finds his Way, Gruffalo* in *Squirrel's Autumn Search*. Pravljljice so nato bile obravnavane v dveh delih. Učenci so se najprej soočili z jezikovnim delom, ki smo ga načeloma izvedli v učilnici. V tem delu so se seznanili z vsebino pravljic preko branja učiteljice ali starejših učencev, risanege filma, lutkovne igre itd. Temu so sledile jezikovne naloge oz. igre s katerimi so se učenci učili oz. utrjevali ciljno besedišče. V drugem delu so učenci na različne načine poustvarjali vsebino pravljic; likovno ustvarjanje, ples, dramatizacija, gibalne igre itd. Pri gozdno obarvanih pravljicah smo ta drugi del izvedli v gozdu, kjer so učenci dobili niz različnih gibalno - ustvarjalnih izzivov, povezanih z vsebino pravljic oz. njihovimi junaki. Naloge oz. izzivi so temeljili na načelih gozdne pedagogike in NTC sistemom učenja.

NTC sistem učenja (*Nurture of Talented Children*) je pedagoški pristop, ki temelji na spoznanjih o razvoju in delovanju možganov; poudarja pomen igralnih dejavnosti, ki še posebno dobro vplivajo na nastajanje in utrjevanje možganskih povezav (sinaps med nevroni) v času najintenzivnejšega razvoja, od rojstva do približno dvanajstega leta starosti.

UGOTOVITVE: Učenci so v aktivnostih v gozdu uživali in bili zelo motivirani za sodelovanje. Ob končni evalvaciji interesne dejavnosti so ravno pravljjice, pri katerih smo del aktivnosti izvedli v gozdu, pozele največ navdušenja. Učenci so izrazili željo po podobnih aktivnostih tudi v prihodnje. Kljub vsemu je vredno omeniti, da z učiteljskega vidika takšna izvedba ur zahteva bistveno več načrtovanja, priprav ter nenazadnje tudi improvizacije kot v razredu.

ZAKLJUČEK: Učenje in igra v gozdu sta smiselna saj so otroci, ki so v stiku z naravo srečnejši, bolj čustveno in intelektualno stabilni in imajo boljše razvit sistem vrednot. Slovenija je dežela gozdov zato je prav, da dano naravno bogastvo izkoristimo a hkrati tudi spoštujemo.

Ključne besede: angleške pravljice, učilnica na prostem, zgodnje poučevanje tujega jezika, gozdna pedagogika, NTC

LITERATURA:

Rajović, R. (2016). Kako z igro spodbujati miselni razvoj otroka. Mladinska knjiga, Ljubljana.

Železnik, P. Gozdna pedagogika – metoda za spodbujanje gibanja v šolskem okolju? (14. 7. 2025)

Dostopno na svetovnem spletu: https://www.nijz.si/sites/www.nijz.si/files/uploaded/gozdarski_institut_gozda_pedagogika.pdf

MOTIVACIJA ZA ŠPORT V TRETJEM TRILETJU OSNOVNE ŠOLE

MOTIVATION IN PHYSICAL EDUCATION IN THIRD TRIENNIUM OF PRIMARY SCHOOLING

Nina OBERSTAR HORVAT¹

¹Osnovna šola Koper

Predavateljica: Nina Oberstar Horvat

IZHODIŠČA: Telesna dejavnost v otroštvu pomembno vpliva na celostni razvoj posameznika. V zadnjem desetletju se opaža trend upadanja telesne pripravljenosti otrok in mladostnikov.

PROBLEM/NAMEN: Obdobje od 7. do 9. razreda otrok v osnovni šoli zaznamujejo intenzivne spremembe. Zato je ključnega pomena, da je pouk pri športu prilagojen. Vendar pa je kljub temu veliko otrok, ki prinašajo opravičila za šport, katere napišejo starši, vedno več je tudi otrok z zdravniškim opravičilom.

METODE: V raziskavo sem vključila učence, ki jih poučujem redni pouk, skupaj 91 otrok. Za ugotavljanje, zakaj prihaja do večjega števila opravičil in zmanjšane motivacije v zadnjem triletju, sem opravila vrsto razgovorov. Najprej sem pregledala opravičila učenk in učencev in si zabeležila razloge, zakaj se aktivno ne vključujejo v pouk športa. Kasneje sem enako storila tudi z opravičili otrok v prvem triletju. Razredničarke v prvem triletju so mi podale razloge in kako pogosto starši mlajšim otrokom opravičujejo ure športa. Na govorilne ure sem povabila starše otrok tretjega triletja. Na podlagi dogovora s starši, sem pouk prilagodila. Večji poudarek sem namenila oceni individualnega napredka namesto primerjave z vrstniki. Pri atletiki sem shranila vse rezultate preteklega leta in skupaj smo ugotavljali za koliko se je rezultat spremenil. Uporabljala sem merilce aktivnosti in aplikacij, ki spodbujajo samorefleksijo in dolgoročno spremljanje napredka. Na šoli imamo nekaj merilcev aktivnosti, ki sem jih vključevala v obdobju pred pričetkom atletike. Uvajala sem timsko delo in sodelovalne naloge, ki krepijo občutek pripadnosti in zmanjšujejo odpor pri manj samozavestnih učencih. Vnaprej sem pripravila opise nalog in jih razporedila po prostoru. Učenke so krožile in izvajale posamezne vaje v skupinah. Pouk sem popestrila s stikom z vzorniki, saj imajo srečanja s profesionalnimi športniki ali obiski športnih dogodkov močan vpliv na oblikovanje pozitivnega odnosa do gibanja. Na šoli smo dobili nekaj brezplačnih vstopnic za tekme od košarke, rokometu in odbojke, razdelila sem jih otrokom z nižjo motivacijo za šport. Pri organizaciji občinskih in področnih tekmovanj smo na otvoritev povabili znane športnike iz okolice, ki so se učenci kasneje lahko družili z njimi.

UGOTOVITVE: Pri primerjavi med količino opravičil med prvim triletjem in zadnjim triletjem je mogoče ugotoviti, da jih je v zadnjem triletju kar okrog 40% več. Razlogi za opravičeno uro športa v prvem triletju so predvsem okrevanje po boleznih ali poškodbah. Razlogi za ne udeleževanje pri urah športa v zadnjem triletju pa so bolečine pri mesečnem ciklusu, poškodbe, okrevanja po poškodbah ali boleznih in individualni razlogi. Motivacija temelji na notranjih in zunanjih dejavnikih, zato so se spremembe posameznih segmentov med učnimi urami izkazale za pozitivne. Učinkovit je pogovor s starši in otrokom. Število opravičil se je v šolskem letu zmanjšalo za 12% zaradi sodelovalnega in ne tekmovalnega pristopa. Njihova pripravljenost za sodelovanje se je izboljšala, kar je vplivalo na sodelovanje in boljšo klimo v razredu. Učenke/ci, ki so bolj motorično opremljeni se med poukom niso jezili na učence, ki so motorično šibkejši ravno zaradi manj tekmovalnega pristopa.

ZAKLJUČEK: Celostno načrtovani športnovzgojni programi, ki upoštevajo razvojne značilnosti in uporabljajo sodobne motivacijske pristope, so ključni za izboljšanje motivacije otrok za športno udejstvovanje. Med najpomembnejše segmente bi izpostavila: manj tekmovalnih iger in več sodelovalnih, ocenjevanje napredka in ne rezultata, vključevanje dela po postajah in individualen pogovor z učenkami/ci in njihovimi starši.

Ključne besede: upad pripravljenosti, opravičila, diferencijacija, vzroki, motivacija

LITERATURA:

Jurak G., Starc G., Kovač M., Leskošek B., Sila B., Strel J. & Kovač M. (2021). SLOfit poročilo 2020: Gibalni in telesni razvoj otrok in mladine v Sloveniji. Fakulteta za šport, Univerza v Ljubljani.

Ryan, R.M. & Deci, E.L. (2000). Intrinsic and Extrinsic Motivations: Classic definitions and new directions. *Contemporary educational psychology*, 25(1), 54-67.

DAN ŠPORTA- GIBANJE IN DOBRODELNOST ZDRUŽITA MOČI**SPORTS DAY- MOVEMENT AND CHARITY HAND IN HAND**Tevž PAVŠEK¹¹Osnovna šola Škofljica

Predavatelj: Tevž Pavšek

IZHODIŠČA: Šport in gibanje sta zelo pomembna za osnovnošolce. Gibalne dejavnosti vplivajo na otrokov celostni razvoj, tako telesni, gibalni, kot tudi kognitivni, emocionalni in socialni razvoj. Že nekaj gibalne aktivnosti je bolje kot nič, vendar več gibanja prinaša več koristi za zdravje. Svetovna zdravstvena organizacija za zdravje in dobro počutje vseh odraslih priporoča najmanj 150-300 minut zmerno intenzivne aerobne telesne aktivnosti tedensko, za otroke in mladostnike pa povprečno 60 minut dnevno. Nacionalni inštitut za javno zdravje poudarja, da redna gibalna aktivnost ne zmanjšuje le tveganja za kronične nenalezljive bolezni, temveč tudi izboljšuje duševno počutje, kognitivno delovanje in kakovost spanja. Poleg tega je gibalna aktivnost lahko tudi zabavna, zlasti če jo delimo s prijatelji ali družino.

PROBLEM/NAMEN: Na šoli smo z učitelji za šport iskali priložnost za dogodek, s katerim bi dosegli, da bi se otroci gibalni z veseljem, prikazali različne spretnosti naših učencev in hkrati zbirali dobrodelna sredstva z namenom izboljšanja pogojev dela pri pouku.

METODE: Na podružnični šoli Lavrica smo organizirali Dan športa, katerega cilj je bil povezati učence, starše, učitelje in lokalno skupnost skozi različne gibalne aktivnosti. Dogodek je vključeval različne športne igre in tekmovanja, ki so omogočala sodelovanje vsem generacijam ter utrjevala medsebojne odnose. Učenci so imeli priložnost sodelovati z družinskimi člani in lokalnimi prebivalci, kar je prispevalo h krepitvi skupnosti ter spodbujanju zdravega načina življenja. Dogodek je bil poln pozitivne energije, veselja in ekipnega duha ter je zaznamoval uspešen začetek sodelovanja med šolo, starši in širšo skupnostjo. Poleg gibalnih aktivnosti je bil dogodek zasnovan tudi z željo po zbiranju sredstev za nakup smučarske opreme, ki bo olajšala organizacijo zimske šole v naravi. S prijavninami, donacijami, dražbo in srečelovom smo želeli zbrati dovolj sredstev, da bodo lahko v šoli v naravi sodelovali tudi otroci iz socialno šibkejših družin. Med gibalnimi aktivnostmi, ki so se vrstile čez dan, smo v program vključili tudi številne točke, ki smo jih učitelji-mentorji pripravili v šolskem letu. Učenke in učenci so tako predstavili različne gibalne sposobnosti, potrebne za izvedbo točk, in s pestrim repertoarjem obogatili že tako bogat športni in kulturni program.

UGOTOVITVE: Dogodek Dan športa PŠ Lavrica je presegel pričakovanja. Vsi sodelujoči – učenci, starši, učitelji in ostali občani – so bili z dogodkom zelo zadovoljni in obenem presenečeni nad tem, kaj lahko učitelji skupaj z učenci ustvarimo in organiziramo. Ponovno se je pokazalo, da šport presega meje, povezuje ljudi v skupnem duhu igre, sodelovanja in spoštovanja. Ne glede na to, ali gre za profesionalne športnike ali otroke na igrišču, ima šport izjemno moč združevanja ljudi. Ko se mu pridruži še dobrodelnost, za katero smo se Slovenci že večkrat izkazali, dobimo enačbo za uspešen športno-dobrodelni dogodek.

ZAKLJUČEK: Gibanje otrokom pomaga razvijati tudi pomembne socialne veščine. Preko igre s sovrstniki se učijo socialnih interakcij in komuniciranja. Spodbujanje razvoja socialnih veščin omogoča otrokom, da razvijejo samopodobo in samospoštovanje krati pa nudijo priložnost

za sklepanje novih prijateljstev ter krepijo občutek pripadnosti šolski skupnosti. Dan športa PŠ Lavrica je tako primer premišljenega in dobro organiziranega šolskega športnega dogodka, ki hkrati spodbuja zdrav življenjski slog, povezuje ljudi in odpira vrata solidarnosti.

Ključne besede: gibalna aktivnost, gibanje otrok, šola, dobrotelost, lokalna skupnost

LITERATURA:

Bukovec Krenn A. (2017). Pomen proste igre za razvoj socialnih veščin otrok v predšolskem obdobju. Diplomsko delo, Maribor: Univerza v Mariboru, oddelek za predšolsko vzgojo, Pedagoška fakulteta.

Koler K. (2016). Gibalna/športna dejavnost predšolskih otrok v domačem okolju na Goriškem. Diplomsko delo, Ljubljana: Univerza v Ljubljani, Fakulteta za šport.

Nacionalni inštitut za javno zdravje. (2022). Smernice za telesno dejavnost in sedeče vedenje. Nacionalni inštitut za javno zdravje. https://nijz.si/wp-content/uploads/2022/07/who_smer-nice_td_slv.pdf

MOČ GRAVITACIJE – OD VZVODA EVOLUCIJE DO DETERMINANTE ZDRAVJA ČLOVEKA

THE POWER OF GRAVITY – FROM A LEVER OF EVOLUTION TO A DETERMINANT OF HUMAN HEALTH

Rado PIŠOT¹, Uroš MARUŠIČ¹, Boštjan ŠIMUNIČ¹

¹Znanstveno Raziskovalno Središče Koper, Koper, Slovenia

Predavatelj: Rado Pišot

IZHODIŠČA: Gravitacija je sila, ki nas spremlja že od samega začetka življenja na Zemlji. Prav zaradi nje smo se ljudje skozi evolucijo razvili v pokončna bitja z dvonožno hojo, močnimi mišicami nog, hrbtenico s krivinami in posebnim krvnim obtokom, ki možganom dovaja dovolj kisika. Naše telo je torej zgrajeno tako, da se ves čas »upira« gravitaciji – in to predvsem z gibanjem.

PROBLEM/NAMEN: Ko se otroci gibljejo – tečejo, skačejo, plezajo, plazijo, hodijo po neravnem terenu – njihovo telo dela točno tisto, za kar je bilo ustvarjeno: premaga silo gravitacije. S tem krepijo mišice, srčno-žilni in respiratorni sistem ter možgane. Usvajajo elementarne gibalne vzorce, ki jim bodo omogočali opravljanje vsakodnevnih življenjskih aktivnosti. Nasprotno pa predolgo sedenje in gibalna neaktivnost hitro povzročita negativne adaptacije in propadanje skeletnih mišic, slabšo splošno telesno pripravljenost in spremembe v delovanju telesa, ki so podobne staranju. Spiralni model gibalne neaktivnosti, ki nastopi lahko že v zgodnjem otroštvu, sproži negativno verigo odzivov v telesu, ki se sčasoma medsebojno stopnjujejo in vodijo v začaran krog poslabševanja zdravja.

METODE: V študijah vpliva gibalne neaktivnosti na organizem človeka, ki jih v okviru Znanstveno-raziskovalnega središča Koper izvajamo že vrsto let, smo ugotovili, da lahko že krajša obdobja gibalne neaktivnosti vodijo v procese, ki sprožajo mehanizme propadanja in vodijo v občutno izgubo mišične mase in moči ter splošne vzdržljivosti. Vse to pa botruje tudi spremembam na področju motorične kontrole in generalnega upada funkcionalnih zmožnosti.

UGOTOVITVE: Gravitacija je temeljna determinanta in hkrati vzvod zdravega razvoja otroka, saj šele z njenim stalnim in rednim premagovanjem organizem razvija mehanizme funkcionalnih zmožnosti, ki omogočajo telesno in duševno zdravje. Gibanje otrokom ne zagotavlja le močnih mišic in kosti, temveč spodbuja tudi učenje, radovednost, veselje do raziskovanja ter gradi temelje za zdravo dolgoživost. Raziskave jasno kažejo, da gravitacija ni zgolj temeljna in oblikovalna sila življenja, temveč tudi ključen dejavnik zdravja.

ZAKLJUČEK: Bolj intenzivno bi morali opozarjati na tveganja, ki jih prinaša sedeč življenjski slog, dolgotrajna gibalna neaktivnost ali izpostavljenost mikrogravitaciji. Le jasno razumevanje teh procesov omogoča razvoj učinkovitih pristopov s katerimi bomo omejili obdobja gibalne neaktivnosti in zagotovili redno gibalno/športno vadbo. Skupaj z uravnoteženo prehrano bomo tako zagotovili zdrav življenjski slog in opremili otroke in mladostnike z ustreznimi gibalnimi kompetencami. To pa predstavlja najboljši obrambni mehanizem pred pojavnostjo bolezni in poškodb, pripomore ohranjanju vseh telesnih funkcij in zagotavlja podporo dolgoživosti in zdravemu staranju. Za zdravo rast in razvoj otrok je zato ključnega

pomena, da jim omogočamo čim več gibanja: naj bo gibalna aktivnost del vsakdana (gibanje kot komunikacija in aktivni transport, spontano raziskovanje okolice, igra na prostem, športne dejavnosti, ..); naj bo sedenja čim manj in naj se redno prekinja dolgotrajno sedenje in gibalna neaktivnost; in naj gibanje doživljajo kot nekaj prijetnega in povezanega z igro, naj to postane življenjska navada in potreba.

Ključne besede: težnost, vzvodi razvoja, organizem, gibana neaktivnost, intervencije

LITERATURA:

Pišot, R. et al. (2025). Addressing the paradox of rest with innovative technologies. *Slovenian journal of public health : the journal of National Institute of Public Health*. [Online ed.]. 2025, letn. 64, št. 2, str. 68-72.

Pišot, R. (2022). Physical inactivity - the human health's greatest enemy. *Zdravstveno varstvo = Slovenian Journal of Public Health*, 61(1), 1-5.

Di Girolamo, F. G., et al. (2021). The aging muscle in experimental bed rest: A systematic review and meta-analysis. *Frontiers in Nutrition*, 8, 724844.

Plevnik, M., & Pišot, R. (Ured.). (2016). *Razvoj elementarnih gibalnih vzorcev v zgodnjem otroštvu* (217 strani). Koper: Univerzitetna založba Annales. ISBN 978-961-6964-62-3

Lieberman, D. E. (2011). *The evolution of the human head*. Cambridge, MA: Harvard University Press.

POVEZANOST GIBALNE DEJAVNOSTI IN SEDEČEGA VEDENJA Z AKADEMSKIMI DOSEŽKI ŠTUDENTOV

RELATIONSHIP BETWEEN PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, AND STUDENTS'
ACADEMIC PERFORMANCE

Jurij PLANINŠEC¹, Samo FOŠNARIČ¹, Stojan PUHALJ¹

¹Pedagoška fakulteta, Univerza v Mariboru

Predavatelj: Stojan Puhelj

IZHODIŠČA: Življenjski slog univerzitetnih študentov, zlasti gibalna dejavnost in sedeče vedenje, je pomembno povezan z njihovimi akademskimi dosežki. Raziskave kažejo, da zmerna gibalna dejavnost izboljšuje kognitivne sposobnosti, kot so spomin, pozornost in izvršilne funkcije, kar lahko prispeva k boljšemu akademskemu uspehu. Vendar pa pretirana gibalna dejavnost morda zmanjšuje čas za učenje, kar lahko negativno vpliva na ocene. Prav tako je sedeče vedenje, zlasti neproduktivno, povezano s slabšimi akademskimi rezultati, medtem ko lahko strukturirane sedeče dejavnosti, kot je učenje, prinašajo koristi. Razumevanje teh dinamik je ključno za oblikovanje uravnoteženega življenjskega sloga študentov.

PROBLEM/NAMEN: Namen raziskave je bil raziskati povezavo med gibalno dejavnostjo, sedečim vedenjem in akademskim uspehom med univerzitetnimi študenti v Sloveniji v neizpitnem obdobju. Študija je želela razjasniti, ali večja gibalna dejavnost vedno vodi v boljše ocene in kako različne vrste sedečega vedenja vplivajo na akademske rezultate. Poseben poudarek je bil na razumevanju, kako se ti dejavniki obnašajo v kontekstu visokih akademskih pričakovanj in obilice možnosti za rekreacijo, kar je značilno za Slovenijo.

METODE: Raziskava je vključevala 243 študentov (79 % žensk), starih od 18 do 24 let. Telesna dejavnost je bila izmerjena z vprašalnikom IPAQ-SF, ki ocenjuje zmerno do intenzivno (ZVGA) in lahkotno gibalno dejavnost (LGA). Sedeče vedenje je bilo ocenjeno z vprašalnikom SIT-Q-7d, ki zajema čas sedenja med tednom in ob koncih tedna. Akademski uspeh je bil izražen kot povprečna ocena opravljenih izpitov. Podatki so bili zbrani prek spletne ankete v neizpitnem obdobju, da bi odražali običajne življenjske vzorce. Statistična analiza je vključevala enosmerno analizo variance in post-hoc Scheffé teste za primerjavo skupin.

UGOTOVITVE: Rezultati so pokazali, da so študenti z manj kot 150 minutami tedensko ZVGA in LGA dosegali višje ocene ($p = .001$, $\eta^2 = 0.093$ za ZVGA; $p = .001$, $\eta^2 = 0.060$ za LGA) v primerjavi z bolj aktivnimi skupinami. Sedeče vedenje med tednom ni bilo povezano z ocenami ($p = .109$), medtem ko je bilo sedenje ob koncih tedna rahlo povezano z akademskim uspehom ($p = .023$, $\eta^2 = 0.047$), pri čemer so študenti s 361–420 minutami sedenja na dan dosegali najvišje ocene. Te ugotovitve nakazujejo, da lahko prekomerna gibalna dejavnost zmanjša čas za učenje, medtem ko zmerno, strukturirano sedeče vedenje, povezano z učenjem, podpira boljše rezultate.

ZAKLJUČEK: Raziskava kaže, da večja gibalna dejavnost ne vodi nujno do boljšega akademskega uspeha, saj lahko pretirana aktivnost zmanjša čas za učenje. Zmerno sedeče vedenje, zlasti ob koncih tedna, če je povezano z učenjem, lahko koristi akademskim dosežkom. Te ugotovitve poudarjajo potrebo po uravnoteženem življenjskem slogu, ki upošteva tako

gibalno dejavnost kot čas za učenje, in ponujajo podlago za oblikovanje intervencij, ki bi podpirale študente pri doseganju akademskih ciljev ob ohranjanju zdravja.

Ključne besede: gibalna dejavnost, sedeče vedenje, akademski uspeh, univerzitetni študenti

LITERATURA:

Álvarez-Bueno, C., Pesce, C., Caverio-Redondo, I., Sánchez-López, M., Garrido-Miguel, M., & Martínez-Vizcaíno, V. (2017). Academic achievement and physical activity: A meta-analysis. *Pediatrics*, 140(6), e20171498.

Donnelly, J. E., Hillman, C. H., Castelli, D., Etnier, J. L., Lee, S., Tomporowski, P., ... & Szabo-Reed, A. N. (2016). Physical activity, fitness, cognitive function, and academic achievement in children: A systematic review. *Medicine & Science in Sports & Exercise*, 48(6), 1197–1222

Hunter, S., Leatherdale, S. T., & Carson, V. (2018). The 3-year longitudinal impact of sedentary behavior on the academic achievement of secondary school students. *Journal of School Health*, 88(9), 660–668.

GIBANJE, MOTIVACIJA PRI POUKU MATEMATIKE

MOTIVATION THROUGH MOVEMENT IN MATHEMATICS CLASS

Darja PLEŠKO¹

¹Osnovna šola Dobrova

Predavateljica: Darja Pleško

IZHODIŠČA: Pri pouku pogosto zaznavamo učence, ki izkazujejo izrazito telesno nemirnost, kot so nenehno gibanje, pozibavanje na stolu ali igranje z različnimi predmeti. Takšna vedenja lahko učiteljem predstavljajo izziv in so pogosto razumljena kot moteča ali neprimerna za učni proces. Posledično učitelji učence spodbujajo, naj s tovrstnim vedenjem prenehajo in se osredotočijo na šolske obveznosti. Vendar pa sodobne raziskave opozarjajo, da tovrsten pristop ni vedno ustrezen, saj kažejo, da gibanje predstavlja pomemben predpogoj za učinkovito kognitivno delovanje, saj spodbuja aktivacijo možganskih centrov, odgovornih za učenje, pozornost in razmišljanje. Povezovanje telesne aktivnosti z okoljem je tako ključno za optimalno pripravo možganov na učni proces.

PROBLEM/NAMEN: Učitelji pouk matematike večinoma izvajamo frontalno. Izkušamo, da učenci mirno zrejo v nas, a so z mislimi popolnoma odsotni. Še pogosteje pa se srečujemo s hrupom, nemirom in nemotiviranostjo za delo. Ker vemo, da gibanje naredi pouk bolj zanimiv in dinamičen ter poveča motivacijo, učinkovitost in angažiranost učencev, je smiselno vanj uvajati gibanje. Z njim omogočimo razumevanje in utrjevanje učne snovi. Zahteva, da morajo učenci med poukom mirno sedeti, zvišuje njihovo kognitivno obremenitev in tako obremenjuje tudi um. Učenci morajo osredotočenosti in utišanju telesa nameniti več energije, kot primarni nalogi, kar odvrta njihovo pozornost od učenja. Ključni dejavnik razvoja in delovanja možganov ter procesov učenja je gibanje, kar velja za vsa razvojna obdobja. Gibanje telesa priključuje občutke, ki jih um zbira, analizira, jim prireja pomen in jih vrednoti. Prav tako spodbuja pretok krvi v možgane, kar izboljšuje spomin, koncentracijo in reševanje problemov. Vključevanje gibanja naredi pouk bolj zanimiv in dinamičen, kar pri učencih poveča motivacijo in angažiranost. Preko gibanja je mogoče predstaviti matematične koncepte, kar učencem olajša razumevanje in utrjevanje znanja.

METODE: Z devetošolci smo izvedli Devetošolcem sem matematične naloge za utrjevanje in ponavljanje učne snovi na temo sorazmerja in podobnost. Učenci so se razvrstili v pare, glede na rezultate meritev dolžine skoka v daljino, ki so jih izvedli pri uri športa. uri športne vzgoje. Učenci so se postavili v kolono po dva. V paru sta bila učenca z najdaljšim in najkrajšim skokom. Na šolskih klopih smo imeli pripravljenih devet oštevilčenih otokov z naloga-mi, ki so vsebovale pisna navodila. Pri vsaki nalogi je bilo vključeno gibanje (počepi, sklece) ali konkretno delo z materiali (merjenje razdalje v učilnici, na zemljevidu, na modelu kvadrata, pravokotnika), kar je bilo temelj za reševanja posameznega matematičnega problema.

UGOTOVITVE: Pri urah, kjer je učencem omogočeno gibanje, se je izkazalo, da se učenci, ki se nenehno gibljejo, lažje vključijo v proces učenja in so bolj motivirani. Motivacijo poveča tudi delo v paru, saj spodbuja komunikacijo in sodelovanje. Preko gibanja in s konkretnim delom z materiali se učenci lažje osredotočijo na reševanje problema. Delo s konkretnimi

materiali spodbuja in krepí razumevanje obravnavanih pojmov in pri nekaterih učencih omogoči »aha« efekt ter prehod s konkretnega na abstraktno.

ZAKLJUČEK: Po izvedbi ure smo z učenci naredili refleksijo. Povedali so, da je bilo učenje bolj zabavno, da so bili bolj motivirani in da si takih ur pouka še želijo.

Ključne besede: gibanje, motivacija, reševanje nalog, razumevanje pojmov, utrjevanje znanja

LITERATURA:

Učenje skozi igro in gibanje, pridobljeno 23. 4. 2025 s <https://cdn-icons-png.flaticon.com/256/8304/8304962.png>

Neprestano v gibanju: Gibanje in njegov vpliv na učenje, pridobljeno 23. 4. 2025 s <https://www.medvedkiigrace.si/blog/gibanje-ucenje/>

Rajović R. (2016). Kako z igro spodbujati miselni razvoj otroka. Mladinska knjiga, Ljubljana.

POVEČANA GIBALNA AKTIVNOST V JUTRANJEM VARSTVU

ENHANCED PHYSICAL ACTIVITY DURING SCHOOL MORNING CARE

David PLEVNIK¹

¹OŠ Hruševac Šentjur

Predavatelj: David Plevnik

IZHODIŠČA: Jutranje varstvo na naši šoli je organizirano za učence prve triade. Poteka dve uri pred pričetkom pouka. Do sedaj se je izvajalo v razredih, kjer so se otroci igrali predvsem družabne igre. Z letošnjim letom sem ga pričel izvajati v telovadnici.

PROBLEM/NAMEN: Prejšnje leto sem v jutranjem varstvu opazil, da je veliko otrok v šolo prihajalo tik pred pričetkom pouka. Potrebovali so precej časa, da so začeli aktivno sodelovati. Tisti, ki so prihajali prej pa so bili utrujeni in sem jih težje pripravil do kakršnih koli aktivnosti. Veliko jih je čas pred pričetkom pouka izkoristilo za dodaten počitek. Športna aktivnost povzroči pospešeno bitje srca, tako so tudi možgani bolje prekrvavljeni in oskrbljeni z več kisika. Glavni namen je bil otroke čim bolje pripraviti na začetek pouka. Prav tako sem želel povečati število otrok v jutranjem varstvu in jim s tem omogočiti dodatne ure gibanja in lažji začetek pouka.

METODE: Na začetku šolskega leta je v jutranje varstvo prihajalo podobno število otrok kot prejšnja leta. Najprej so imeli na voljo žoge, kolebnice in obroče, ki so jih lahko uporabljali po želji, če s tem niso ovirali drugih. Število otrok se ni bistveno spremenilo, zato smo z otroci, ki so redno prihajali, po postajah posneli različne aktivnosti. Poleg že omenjenih rekvizitov, smo dodali še gradnjo objektov s pomočjo trdih blazin. V razredih prve triade sem otrokom predstavil kaj počnemo zjutraj in jih povabil, da se nam pridružijo. Staršem sem gradivo poslal in jim razložil zakaj je to dobro za njihove otroke. Število prisotnih otrok sem spremljal s pomočjo e-asistenta.

UGOTOVITVE: V prihodnjih tednih se je število otrok v jutranjem varstvu počasi večalo. Dodal sem gimnastično postajo in s tem je prišlo še nekaj novih učencev. Število otrok se je v prvem mesecu podvojilo, v prihodnjih mesecih pa se je počasi večalo. Učiteljice so poročale, da so otroci lažje in bolj osredotočeni pričenjali s poukom. Starši so spremembe v jutranjem varstvu sprejeli pozitivno, nekateri so otroke še sami spodbujali k dodatnemu gibanju.

ZAKLJUČEK: Novost je bila zelo dobro sprejeta s strani vseh. Učiteljice prve triade so bile zadovoljne, ker so bili otroci do pričetka pouka v telovadnici, z delom pa so pričeli takoj ko so prišli v razred. Otroci, ki so redno prihajali v jutranje varstvo, so imeli precej dodatnih ur gibanja na teden, kar bi v prihodnjih letih lahko pomenilo boljše rezultate na nacionalnem testiranju za športno vzgojni karton.

Ključne besede: jutranje varstvo, gibalna aktivnost, gibanje, pouk

LITERATURA

Dežman, B. (1990). *Minuta za zdravje in aktivni odmor z žogo*. Ljubljana: Fakulteta za telesno kulturo.

Kermavt, U. (2019). Pomen gibanja za otroke. *Mavrica*, 5. Pridobljeno s <https://www.druzina.si/icd/spletnastran.nsf/clanek/pomen-gibanja-za-otroke?>

Trapečar Pavšič, J. (b.d.). Pomen gibanja za učenje. Pridobljeno s <https://triminute.si/pomen-gibanja-za-ucenje/>.

SODELOVANJE Z LOKALNO SKUPNOSTJO PRI ZASNOVI IN PRIPRAVI UČNE POTI NA PROSTEM

COOPERATION WITH THE LOCAL COMMUNITY IN DESIGNING AND PREPARING AN
OUTDOOR LEARNING ROUTE

Tanja PLEVNİK PETERNELJ

Predavateljica: Tanja Plevnik Peternelj

IZHODIŠČA: V sodobnem izobraževalnem okolju narašča potreba po vključevanju naravnega prostora kot učnega okolja. Učne poti kot učilnica na prostem omogočajo interdisciplinarno učenje, predstavljajo doprinos k razvoju gibalnih in miselnih sposobnosti ter spodbujajo povezovanje učencev z naravo. Kljub dokazanim prednostim, priložnosti postavitve učnih poti in učilnic na prostem v bližini šol še niso dobro prepoznane in izkoriščane.

PROBLEM/NAMEN: Namen prispevka je predstaviti pomen zasnove in priprave učne poti in učilnice na prostem Stara Štreka na območju Krajevne skupnosti Brezovica oziroma šolskega okoliša krajevne osnovne šole kot pedagoškega orodja, ki povezuje cilje učnega načrta, posebno s področja športa in naravoslovja, z možnostmi aktivnega in izkustvenega učenja za učence.

METODE: Ustrezen pristop k realizaciji pobude, primerna vsebinska zasnova in koraki priprave do izvedbe projekta predstavljajo ključne točke uspešnosti projekta. Pri tem je pomembna analiza izbranih domačih in tujih dobrih praks ter pregled literature o učinkih učenja v naravnem okolju. V središču je vprašanje: katere vsebine naj ima učna pot, da bo lahko učitelj načrtoval vsebine, učenec pa dosegal cilje učnega načrta? Hkrati je potrebno uskladiti strategijo zasnove in priprave od idejne pobude, načrtovanja z arhitekti, dogovorov z lokalno skupnostjo glede možnosti koriščenja zemljišč, financiranja ter končno projektne realizacije.

UGOTOVITVE: Ugotavljamo, da je uspešna izvedba učne poti odvisna od več dejavnikov: ciljno usmerjene zasnove, vključevanja različnih predmetnih področij, ustrezne prostorske umeščenosti, usposobljenosti učiteljev, možnosti financiranja, pa tudi od dozretosti in zavzetosti predstavnikov lokalne skupnosti za realizacijo pobude do izgradnje učne poti kot učilnice na prostem. Ključno je tudi upoštevanje in poznavanje značilnosti financiranja šolskega prostora ter odgovornosti in delovanja lokalne skupnosti. Učne poti kot učilnice na prostem so dragoceno orodje za aktivno učenje na prostem, ki ima mnogotere učinke na več področij razvoja učenca.

ZAKLJUČEK: Zaključimo lahko, da so učne poti in učilnice na prostem na prostem lahko pomembna didaktična strategija za razvijanje kompetenc 21. stoletja – od kritičnega mišljenja, sodelovanja in samostojnosti, do odnosa do narave in trajnostnega ravnanja. Njihova vključitev v šolski kurikulum spodbuja tudi inovativne pristope k učenju ter krepi povezavo med šolo in lokalnim okoljem. Zato je ključno, da šole načrtno razvijajo učne poti v tesnem sodelovanju z različnimi deležniki (lokalne skupnosti, starši, strokovnjaki), ob hkratni podpori izobraževalnih politik, dodatnega strokovnega usposabljanja učiteljev in posluhom lokalne skupnosti. Učna pot in učilnica na prostem ne predstavlja zgolj priložnosti uporabe v šolski praksi, temveč daje tudi možnost lokalnemu okolju, da spodbudi njeno uporabo v

prostem času otrok in njihovih staršev. Tako učna pot kot učilnica na prostem predstavlja dolgoročne vzgojno-izobraževalne in družbene učinke.

Ključne besede: učna pot, kurikulum, lokalna skupnost, načrtovanje, šport

LITERATURA:

Beames, S., Higgins, P., & Nicol, R. (2012). *Learning Outside the Classroom: Theory and Guidelines for Practice*. Routledge.

Rickinson, M., Dillon, J., Teamey, K., et al. (2004). *A review of research on outdoor learning*. National Foundation for Educational Research.

Waite, S., Passy, R., Gilchrist, M., Hunt, A., & Blackwell, I. (2016). *Natural Connections Demonstration Project, 2012–2016: Final Report*. Natural England Commissioned Reports.

UČITELJEVA SPODBUDA UČENCEM ZA AKTIVNO PREŽIVLJANJE POČITNIC

TEACHER'S ENCOURAGEMENT TO STUDENTS TO SPEND THEIR HOLIDAYS ACTIVELY

Tanja PLEVNIK PETERNELJ

Predavateljica: Tanja Plevnik Peternelj

IZHODIŠČA: V času počitnic se pogosto zmanjša redna gibalna aktivnost otrok, saj jim primanjkuje strukturiranih dnevnih rutin in spodbud za gibanje. Raziskave kažejo, da med počitnicami narašča zaslonski čas ter upada raven gibalne aktivnosti, kar dolgoročno negativno vpliva na zdravje in počutje otrok. Šola in učitelji kot pomembni oblikovalci vedenjskih vzorcev imajo edinstveno priložnost, da učencem posredujejo spodbude in konkretne ideje za aktivno preživljanje prostega časa.

PROBLEM/NAMEN: Pomen upada gibalne aktivnosti med počitnicami se v strokovni javnosti vse bolj poudarja. Učitelji lahko učence pomembno spodbudijo za gibalno aktivno preživljanje počitnic, tudi z osveščanjem njihovih staršev o pomenu rednega gibanja v prostem času otroka. Namen prispevka je raziskati vlogo učitelja pri spodbujanju gibalne aktivnosti učencev v času počitnic.

METODE: Skladno z namenom prispevka smo pripravili vprašalnik z 10 vprašanji, ki smo ga preko orodja 1ka.si delili na socialnih omrežjih in poslali na izbran vzorec osnovnih šol iz vseh regij Slovenije. Vprašalnik je bil namenjen učiteljem športne vzgoje in učiteljem razrednega pouka, učitelji so ocenjevali pomembnost/strinjanje na Likertovi lestvici z vrednostmi od 1 do 6. Dobili smo 38 izpolnjenih vprašalnikov, odgovarjalo je 74% učiteljev razrednega pouka in 26 % učiteljev športne vzgoje, povprečna starost anketirancev je bila $45,4 \pm 9,44$ let, povprečna delovna doba pa $20,3 \pm 10,3$ let. Vprašalnik smo analizirali s pomočjo opisne statistike.

UGOTOVITVE: Učitelji ocenjujejo, da so najbolj primerna oblika gibalno aktivnih programov počitniška varstva v obliki športnih kampov (učenje tehnik določenih športov) in v obliki počitnic v naravi (spodbujanje stika z naravi, veščine preživetja). Ocenjujejo, da so za gibalno aktivne počitnice izredno pomembni dejavniki sočasne aktivnosti njihovih staršev oziroma družin, možnosti pomoči starih staršev otrok (npr. kot varstvo ali prevoz na dejavnosti). Menijo tudi, da so otroci med počitnicami bolj aktivni, če so aktivni že tudi med letom. Kot učinke gibalno preživetih počitnic pri povratku v šolo ocenjujejo njihovo višjo gibalno zmogljivost, večjo pripravljenost za šolsko delo, večjo družabnost in večjo vztrajnost pri aktivnostih v začetku šolskega leta.

ZAKLJUČEK: Učitelji imajo pomembno vlogo pri oblikovanju zdravih življenjskih navad. Njihova spodbuda za aktivno preživljanje počitnic je učinkovitejša, kadar vključuje načrtovane, konkretne in spodbujajoče pristope, ki temeljijo na povezavi med učiteljem, učencem in družino. Šole bi se morale sistematično povezati s ponudniki počitniških varstev (društva in druge organizacije) za namen koriščenja šolske infrastrukture v poletnem času, lahko pa bi organizirana počitniška varstva ponudile tudi v samostojni izvedbi, kar nekatere slovenske šole že uspešno izvajajo. Sodelovanje z lokalno skupnostjo, vključevanje učencev v pripravo izzivov in vzpostavitev kulture gibanja so ključni elementi trajnostne spremembe

vedenjskih vzorcev, tudi gibalno aktivnega preživljanja počitnic. Slednje lahko dolgoročno pozitivno vpliva na dvig gibalne pismenosti in zdravja otrok.

Ključne besede: otrok, počitnice, gibanje, spodbuda, učitelj

LITERATURA:

Bailey, R. (2006). Physical Education and Sport in Schools: A Review of Benefits and Outcomes. *Journal of School Health*, 76(8), 397–401.

Brazendale, K. idr. (2017). Understanding differences between summer vs. school obesogenic behaviors. *Preventive Medicine Reports*, 6, 233–239.

Dudley, D. A., Cairney, J. in Kriellaars, D. (2017). Physical Literacy: Understandings, Applications and Future Directions. *Journal of Teaching in Physical Education*, 36(3), 234–240.

Plevnik, M. (ur.) *Aktiven otrok aktivne počitnice*. Koper: Založba Univerze na Primorskem.

Volmut, T., Pišot, R., Planinšec, J. in Šimunič, B. (2021). Physical activity drops during summer holidays for 6-to 9-year-old children. *Frontiers in public health*, 8, 631141.

VPLIV KONTAKTNIH ŠPORTOV NA UM OTROK THE IMPACT OF CONTACT SPORTS ON THE CHILD'S MIND

Adolf RAJTMAJER¹

¹Pedagoška fakulteta Univerza v Mariboru

Predavatelj: Adolf Rajtmajer

IZHODIŠČA: Možgani so organ osebnosti, značaja, emocij in inteligence, kot poudarja Daniel G. Amen (Dispenza, 2019). Vplivajo na vsako našo odločitev in jih lahko primerjamo z računalnikom, ki ima strojno in programsko opremo – oboje se medsebojno močno prepleta. Travmatične izkušnje, zlasti v otroštvu, pomembno vplivajo na delovanje možganov. Pri otrocih in mladini so takšne travme pogosto povezane z učenjem, treniranjem in tekmovanjem v kontaktnih športih, kjer se ponavljajo poškodbe in agresivni fizični stiki. Dr. Amen na osnovi več kot 70.000 kliničnih slikanj možganov (SPECT) opozarja na škodljiv vpliv poškodb, alkohola, nekaterih zdravil in na zgodnje spremembe pri Alzheimerjevi bolezni. Njegova ključna trditev je, da zgodnje ukvarjanje otrok s kontaktnimi športi povzroča možganske brazgotine in neustrezne sinaptične povezave, kar dolgoročno vpliva na njihovo čustveno in socialno delovanje.

METODE: Amenovo delo temelji na kliničnem slikanju možganov z metodo SPECT, ki analizira njihovo fiziologijo. Rezultati kažejo, da ponavljajoče poškodbe in travmatične izkušnje vodijo k pretirani aktivnosti centrov za strah ter k oblikovanju neustreznih nevroloških omrežij. V povezavi z ugotovitvami Joeja Dispenze (2019) lahko delovanje možganov razdelimo v tri sfere:

Neokorteks kot zavestni, razmišljajoči del, ki omogoča učenje, logično sklepanje, ustvarjanje in komunikacijo;

Limbični možgani kot kemični center čustvovanja, kjer čustva ob ponavljanju izkušenj ustvarjajo nove nevronske povezave;

Mali možgani kot središče podzvestnega spomina, kjer se shranjujejo ponavljajoči se gibi, stališča in vedenjski vzorci.

REZULTATI: Negativne izkušnje v kontaktnih športih (npr. udarci, spotikanja, agresivne obrambe) ustvarjajo kemične odzive, ki vodijo do neustreznih čustev (strah, anksioznost, agresija). Te izkušnje se zapisujejo v nevronske omrežje in postajajo del podzvestnega delovanja. Daljše obdobje takšnih ponovitev pri otrocih povzroči utrjevanje negativnih mrež, ki vplivajo na njihove vedenjske vzorce in osebnostni razvoj. Empirične izkušnje športne prakse potrjujejo te trditve: agresivni stiki, poškodbe in frustracije pri mladih športnikih se kažejo v oblikovanju neprimerne nevropsihološkega odziva.

ZAKLJUČEK: Amen opozarja, da zgodnje vključevanje otrok v kontaktne športe, kot so nogomet, hokej, košarka, rokomet, vaterpolo in borilni športi, predstavlja veliko tveganje za zdrav razvoj možganov. V obdobju, ko se oblikujejo ključna nevrološka omrežja, ponavljajoče travme ustvarjajo negativne vzorce, ki se kasneje utrdijo v podzavest. To vodi v povečano agresivnost, frustracije in neustrezne oblike socialnega vedenja. Preventiva pomeni odlaganje zgodnjega

vključevanja v kontaktne športe ter vzgojno-izobraževalne pristope, kjer trenerji ne spodbujajo »totalnega presinga« in tekmovalnosti za vsako ceno, temveč varno tehnično učenje. Dispenza (2019) pa ponuja možnost kurativne poti: prek pozitivnih miselnih in vedenjskih vaj je mogoče negativne nevronske povezave zamenjati z novimi, zdravimi. Čeprav so takšne metode dragocene, je bistveno vprašanje preventivno – zakaj zdraviti, če lahko preprečimo? Za otroke to pomeni omogočiti razvoj športa kot igre in gibanja, ne pa kot zgodnjo specializacijo v agresivni tekmovalni model.

Ključne besede: možgani, nevronske povezave, um otrok, motorično učenje, kontakti, izkušnje

LITERATURA:

Dispenza, J. (2019). Odvadite se biti to, kar ste. UMco.

Amen, D. G. v Dispenza, J. (2019). Odvadite se biti to, kar ste. UMco.

Gopnik, A., Meltzoff, A., Kuhl, P. (2003). Genij v zibelki: Zgodnje učenje in človeški um. UMco.

Dryden, G., Vos, J. (2001). Revolucija učenja. Educy.

Zadel, A. (2024). Edina, ki globoko osmišlja bivanje človeka, je ravno bolečina. Večer, 6. januar 2024.

RAZVIJANJE GIBALNIH NAVAD V PREDŠOLSKEM OBDOBJU Z NAMENOM RAZVOJA GIBALNE PISMENOSTI

THE DEVELOPMENT OF MOTOR HABITS IN THE PRESCHOOL PERIOD FOR THE PURPOSE
OF ENHANCING PHYSICAL LITERACY

Vanja ROGIČ¹

¹Vrtec Kurirček Logatec

Predavateljica: Vanja Rogič

IZHODIŠČA: Vzgojitelji v vrtcu opažamo, da iz leta v leto gibalne sposobnosti otrok upadajo, zato vedno znova iščemo nove in atraktivne načine, da bi otrokom privzgojili navado in potrebo po tem, da gibanje postane del njihovega vsakodnevnega življenja.

PROBLEM: Otroci znotraj posamezne skupine prihajajo iz različnih družinskih skupnosti z različnimi gibalnimi navadami. Na eni strani imamo otroke staršev, ki sami sebi in svojim otrokom dnevno namenjajo čas za različne skupne ali individualne športne aktivnosti, ki jih oplemenitijo z zdravim prehranjevanjem. Na drugi strani so otroci staršev, ki gibanju ne posvečajo pozornosti, svojim otrokom omogočajo preveliko količino časa preživetega pred IKT napravami, zdravi prehrani ne namenjajo pozornosti. Na nas vzgojiteljih je zahtevna naloga, da vse otroke z individualnim pristopom v gibanju združimo in poenotimo, razvijamo gibalno spretnejše, ter gibalno šibkejšim otrokom, ki jim že hoja in tek povzročata preglavice, vzbujaemo in krepimo interes za najrazličnejše vrste gibanja.

METODE: Glede na dnevno razpoloženje otrok in dinamiko skupine smo v preteklem šolskem letu organizirali skupinske igre kot so: igre z različnim naravnim gibanjem in pravili, sodelovalne igre, družabne igre, plesne igre in različne zvrsti plesa, igre zaupanja in timskega dela, sprostivne igre, štafetne igre... Organizirali smo pohode in gibalne naloge v sklopu Gibalno/športnega programa Mali sonček in daljše sprehode do gozdnih koticov, kjer smo plezali po drevju in skalah ter preizkušali naše ravnotežje in sodelovali v projektu 365 dni telovadimo vsi.

UGOTOVITVE: Z vsakodnevnim gibanjem v različnih vremenskih razmerah na različnih terenih v prostorih vrtca in na prostem, smo izboljševali gibalne sposobnosti otrok, razvijali temeljne gibalne vzorce, urili njegove spretnosti in krepili imunski sistem, ter vse to obogatili s spodbujanjem uživanja zdrave prehrane. Z načrtovanjem najrazličnejših gibalnih izzivov in skupinskih iger smo pri otrocih krepili ustvarjalnost pri reševanju gibalnih problemov, sodelovanje in dogovarjanje, prostorsko orientacijo, samostojnost, pomoč šibkejšim, učenje drug od drugega, izkustveno učenje skozi igro, zadovoljevali željo po pripadnosti in občutku povezanosti drug z drugim, skrbeli za varnost, urili slušno pozornost s podajanjem jasnih in spodbudnih navodil, opazovali lasten napredek, razvijali empatijo in čustveno regulacijo, predvsem pa širili navdušenje nad gibanjem. Gibanje, kjer je poudarek na zabavi, druženju in sprostitvi, kjer zmaga ni pomembna, kjer je šport priložnost za optimalni osebni in socialni razvoj otroka, prilagojen njegovim potrebam in značilnostim.

ZAKLJUČEK: Z gibanjem skozi igro z veliko motivacije, z menjavanjem dejavnosti, z uporabo različnih športnih pripomočkov in orodij, z menjavo vadbenih terenov in z razvijanjem

notranje motivacije, bomo lahko najverjetneje vplivali na otrokov kasnejši življenjski slog, ter ga opremili za obvladovanje preizkušenj in stresov, ki mu jih bo prinašalo življenje v šoli in odrasli dobi.

Ključne besede: predšolski otroci, gibanje, notranja motivacija

LITERATURA:

Plevnik, M., & Pišot, R. (2016). *Razvoj elementarnih gibalnih vzorcev v zgodnjem otroštvu*. Univerza na Primorskem, Univerzitetna založba Annales.

Škof, B., Šarabon, N., Bačanac, L., Kalan, G., CeciĆ Erpič, S., Žvan, B., Kolar, E., Struger, B., Štrumbelj, B., Škof, L., & Jakše, B. (2007). *Šport po meri otrok in mladostnikov* (str. 27–35, 57–105). Univerza v Ljubljani, Fakulteta za šport, Inštitut za šport.

Športna unija Slovenije. (n.d.). *Gibalna pismenost*. Pridobljeno 14. julija 2025, s <https://www.sportna-unija.si/programi/gibalna-pismenost/>

SPORTBRIDGE: SPODBUJANJE VKLJUČUJOČEGA ŠPORTNEGA OKOLJA ZA MANJŠINSKE SKUPNOSTI

SPORTBRIDGE: PROMOTING INCLUSIVE SPORT ENVIRONMENTS FOR MINORITY COMMUNITIES

Valentina SERDINŠEK¹, Maurizio TREMUL², in Marin CORVA²

¹Društvo BOR, Trst, Italija

²Italijanska Unija, Reka, Hrvaška

Predavateljica: Valentina Serdinšek

IZHODIŠČA: Dostop do kakovostnih športnih aktivnosti za otroke iz manjšinskih skupnosti je pogosto omejen, kljub njihovim priznanjem in pravicam znotraj držav gostiteljic. Projekt *SportBridge* naslavlja to vrzel in spodbuja fizično aktivnost ter socialno vključenost otrok in družin iz italijanske in slovenske manjšine v Sloveniji, na Hrvaškem in v Italiji. Šport se uporablja kot orodje za premagovanje jezikovnih, kulturnih in socialnih ovir.

PROBLEM/NAMEN: Glavni cilj projekta *SportBridge* je razvoj in implementacija kulturno občutljivega programa športne vadbe, ki vključuje otroke iz manjšinskih skupnosti in hkrati krepi kompetence lokalnih trenerjev ter učiteljev. Projekt obravnava pomanjkanje strokovnjakov, dostopnost programov in socialno integracijo otrok skozi šport. Na konferenci bodo predstavljeni preliminarne rezultati, ki vključujejo aktivnosti izvedene v prvem letu ter povratne informacije otrok, staršev in učiteljev iz skupnosti.

METODE: V prvem letu projekta so bile izvedene delavnice in dogodki na nacionalni in mednarodni ravni, vključno s tremi več deležniškimi dogodki v Sloveniji in na Hrvaškem. V dejavnosti je bilo vključenih več kot 130 otrok in 35 športnih delavcev iz manjšinskih skupnosti. Povratne informacije so bile zbrane prek strukturiranih vprašalnikov, anket in pogovorov z otroki, starši in pedagogi. Uporabljeni so bili tudi mentorski pristopi ter priprava video vsebin v treh jezikih (italijanščini, slovenščini in hrvaščini).

UGOTOVITVE: Otroci, vključeni v program, so izrazili zadovoljstvo, boljšo motivacijo za gibanje ter izboljšano fizično počutje. Starši in učitelji so opazili večjo povezanost otrok s skupnostjo, krepitev samozavesti in boljšo socialno integracijo. Trenerji in športni pedagogi so poročali o večji ozaveščenosti o kulturnih posebnostih in večji usposobljenosti za delo v raznolikih okoljih. Rezultati nakazujejo, da lahko kakovostni športni programi prispevajo k zmanjševanju socialnih razlik v dostopu do gibanja.

ZAKLJUČEK: *SportBridge* dokazuje, da je šport učinkovito orodje za spodbujanje zdravja, socialne vključenosti in kulturnega razumevanja. Z razvojem programov, ki upoštevajo specifične potrebe manjšin, lahko bistveno prispevamo k enakim možnostim otrok v športu. Projekt je dobra praksa vključevanja manjšin v športne aktivnosti in predstavlja osnovo za širitev v druge evropske regije.

Ključne besede: vključevanje manjšin, športna vzgoja, kulturna raznolikost, socialna integracija, otroci in šport

LITERATURA:

Long, J., & Hylton, K. (2014). Reviewing research evidence and the case of participation in sport and physical recreation by black and minority ethnic communities. *Leisure Studies*, 33(4), 379-399.

Schinke, R. J., Middleton, T., Petersen, B., Kao, S., Lefebvre, D., & Habra, B. (2019). Social justice in sport and exercise psychology: A position statement. *Quest*.

Vermeulen, J., & Verweel, P. (2019). Participation in sport: Bonding and bridging as identity work. In *The social impact of sport* (pp. 98-111). Routledge.

VKLJUČEVANJE GIBALNIH DEJAVNOSTI V VSAKODNEVNI POUK

INTEGRATING PHYSICAL ACTIVITY INTO EVERYDAY TEACHING

Teja SVETELŠEK¹

¹Osnovna šola Mirana Jarca Črnomelj

Predavateljica: Teja Svetelšek

IZHODIŠČA: Potreba po gibanju je otrokova osnovna biološka potreba, a kljub temu številni otroci danes ne dosegajo priporočenih ravni dnevne telesne dejavnosti. Po smernicah Svetovne zdravstvene organizacije (WHO) naj bi bili otroci in mladostniki, stari od 5 do 17 let, vsak dan telesno dejavni vsaj 60 minut, predvsem zmerno do intenzivno aerobno vadbo. Vendar raziskave kažejo, da številni otroci teh priporočil ne izpolnjujejo. Ker otroci veliko časa preživijo v šoli, ta predstavlja idealno okolje za vključevanje gibanja v vsakodnevni učni proces.

PROBLEM/NAMEN: Namen spodbujanja gibanja je bil poiskati čim več različnih načinov, kako v vsakodnevni pouk vključiti več gibanja. S tem zmanjšati čas sedenja, povečati telesno aktivnost učencev ter hkrati prispevati k bolj dinamičnemu, zanimivemu in učinkovitemu učnemu procesu.

METODE: Ob že obstoječih oblikah, kot so učne ure športa, minuta za zdravje, dnevi dejavnosti in šola v naravi, smo želeli dodatno spodbuditi vsakodnevno vključevanje gibanja v redni učni proces. Osredotočili smo se na gibanje znotraj različnih oblik dela ter na gibanje med samim učnim procesom.

UGOTOVITVE: Vključevanje gibanja v učni proces pozitivno vpliva na motivacijo učencev in spodbuja njihovo naravno radovednost. Učenci se takšnega pouka veselijo, saj je dinamičen, zabaven in razgiban. Ustvarjeno je sproščeno in spodbudno učno okolje. Koncentracija učencev je večja, manj je nemirnosti. Zmanjšuje pa se tudi čas sedenja, kar pozitivno vpliva na telesno zdravje. Dejavnosti, ki so potekale v skupinah, so krepile socialne veščine. Učenci so ob teh sodelovali, se učili upoštevati pravila in skupaj reševati probleme. Med uporabljnimi pristopi so se kot zelo dobre so se izkazale različne gibalne naloge, menjevanje učnih položajev, učno delo po postajah ter različni gibalni prehodi.

ZAKLJUČEK: Z vnosom gibalnih dejavnosti v vsakodnevni pouk vplivamo na povečanje gibanja otrok. Poleg tega pouk popestrimo in razvijamo socialne veščine, gibalne spretnosti ter omogočimo izkustveno učenje. Učenci povezujejo različna znanja in se izražajo na različne načine, kar pripomore k trajnejšemu znanju ter celostnem učenju.

Ključne besede: gibanje, gibalne dejavnosti, učni proces, aktivno učenje, motivacija

LITERATURA:

Rajovič, R. (2021). Kako z igro spodbujati miselni razvoj otroka. Ljubljana: Mladinska Knjiga.

Pistotnik, B., Pinter, S., Dolenc, M. (2002). Gibalna abeceda. Ljubljana: Fakulteta za Šport.

Kovač, M. et. al. (2011). Učni načrt. Program osnovna šola. Športna vzgoja. Ljubljana. Ministrstvo za šolstvo in šport: Zavod RS za šolstvo.

Nacionalni inštitut za javno zdravje. (2022). Smernice za telesno dejavnost in sedeče vedenje (kratek pregled) [Prevod dela Guidelines on physical activity and sedentary behaviour: at a glance]. <https://www.nijz.si/sl>

AKTIVNO UČENJE MATEMATIKE SKOZI GIBANJE IN MEDGENERACIJSKO SODELOVANJE MED UČENCI 1. IN 8. RAZREDA

ACTIVE LEARNING OF MATHEMATICS THROUGH MOVEMENT AND INTERGENERATIONAL COLLABORATION BETWEEN 1ST AND 8TH GRADE STUDENTS

Sandra STARC¹

¹Osnovna šola Dragomirja Benčiča – Brkina Hrpelje

Predavateljica: Sandra Starc

IZHODIŠČA: Na podlagi pretekle izkušnje medgeneracijskega sodelovanja med učenci prvega in devetega razreda smo opazili izjemno pedagoško vrednost tovrstnega povezovanja. Navdušenje devetošolcev ob vodenju ter prenosu znanja in iskrivo zanimanje prvošolcev ob njihovem sprejemanju sta nas spodbudili, da preizkusimo podobno dejavnost tudi med prvošolci in osmošolci – tokrat s poudarkom na matematiki in gibanju.

PROBLEM/NAMEN: Teoretično izhodišče temelji na piramidi učenja, ki poudarja, da učenci največ znanja pridobijo, ko učno snov najprej izkusijo sami in nato svoje razumevanje posredujejo drugim. Takšna izmenjava spodbuja ne le kognitivno, temveč tudi čustveno in socialno rast. Z gibanjem učenci dodatno razvijajo psihomotorične sposobnosti, krepijo pozornost in pridobivajo na socialni samozavesti.

METODE: Na podlagi primerjave učnih načrtov 1. in 8. razreda smo oblikovali sedem gibalno-matematičnih postaj, na katerih so sodelovali učenci v parih ali trojkah. Vsaka postaja je trajala tri minute in združevala matematične vsebine z gibanjem – od razvrščanja števil s tekom, koordinacijskih izzivov, natančnega ciljanja, iskanja geometrijskih oblik v gibanju ipd. Vključene so bile vsebine prvega razreda (seštevanje in odštevanje, geometrijske oblike, razvrščanje ipd.), povezane z vsebinami osmega razreda (kvadriranje, korenjenje ipd.). Takšna metoda prispeva k razvoju matematične pismenosti, socialnih veščin in gibalne dejavnosti ter spodbuja inovativne oblike medgeneracijskega in celostnega poučevanja v osnovni šoli.

UGOTOVITVE: Opazovanja med izvajanjem sedmih gibalno-matematičnih dejavnosti so pokazala, da so bili učenci iz obeh starostnih skupin visoko motivirani, aktivni in osredotočeni v takšnem spodbudnem učnem okolju. Prvošolci so z veseljem sprejemali pomoč starejših, osmošolci pa so s ponosom prevzeli vlogo tutorjev. Gibalne dejavnosti so omogočile, da so vsi učenci sodelovali glede na svoje sposobnosti in izkusili uspeh – tako na področju matematike kot v gibanju. Povezava med gibanjem in učenjem se je izkazala kot izjemno učinkovita. Učenci so z večjo samozavestjo pristopali k reševanju nalog, hitreje usvajali nove pojme in razvijali pozitivno samopodobo. Gibanje je prispevalo k boljši pozornosti, večji radovednosti ter občutku pripadnosti.

ZAKLJUČEK: Na podlagi teorije in izvedene prakse smo ugotovili, da medgeneracijsko sodelovanje, podprto z gibanjem, pomembno prispeva k razvoju matematičnih, socialnih in gibalnih veščin. Tak pristop spodbuja višje miselne procese, čustveno zrelost in domišljijo, hkrati pa omogoča otrokom, da znanje pridobivajo z vsemi čutili.

Ključne besede: Medgeneracijsko sodelovanje, gibalno-matematične dejavnosti, učenje skozi gibanje, učenje po postajah, spodbudno učno okolje

LITERATURA:

Zavod RS za šolstvo. (2011). Digitalni učni načrt. Program osnovna šola. Matematika. <https://dun.zrss.augmentech.si/#/>

Kavčič, R. A. (2005). Učenje z gibanjem pri matematiki. Društvo Bravo.

Videmšek, M. (2018). Prvi koraki v svet športa. Fakulteta za šport, Inštitut za šport.

MEDGENERACIJSKA VADBA: REZULTATI PROJEKTA NEUROPLAY

INTERGENERATIONAL ACTIVITY PROGRAMS: OUTCOMES OF THE NEUROPLAY PROJECT

Luka ŠLOSAR¹, Saša PIŠOT¹, Uros MARUSIC¹, Rado PIŠOT¹

¹Inštitut za kineziološke raziskave, Znanstveno-raziskovalno središče Koper, Koper, Slovenia

Predavatelj: Luka Šlosar

IZHODIŠČA: V sodobni družbi, ki se izrazito stara, postajajo medgeneracijske aktivnosti vse pomembnejše za spodbujanje zdravja ter krepitev povezanosti med generacijami. Tako starejši odrasli kot otroci potrebujejo gibalne in kognitivne spodbude, ki ugodno vplivajo na njihovo zdravje in razvoj. Projekt NEUROPLAY je to potrebo naslovil z razvojem inovativnih gibalno-kognitivnih aktivnosti, zasnovanih za sočasno udeležbo otrok in njihovih starih staršev. V središče koncepta je postavljena nevroplastičnost kot osnova za skupno učenje, gibanje in kakovostno medgeneracijsko sodelovanje.

PROBLEM/NAMEN: Čeprav so koristi gibalne aktivnosti pri otrocih in starejših dobro raziskane, so programi, ki bi istočasno vključevali obe starostni skupini, še vedno redkost. Glavni cilj projekta NEUROPLAY je oblikovati, preizkusiti in razširiti dostopen program medgeneracijskih aktivnosti, ki spodbuja gibalni razvoj otrok, izboljšuje psihofizično počutje starejših in hkrati krepi socialno povezanost med generacijami.

METODE: V okviru projekta smo v Sloveniji, Bolgariji in Italiji organizirali več športnih dogodkov in delavnic, ki se jih je udeležilo več kot 120 otrok in njihovih starih staršev. Vadbeni program je vključeval gibalno-kognitivne naloge, prilagojene starostni skupini in zmožnostim udeležencev. Povratne informacije udeležencev smo zbrali z anketnim vprašalnikom, ki je omogočil vpogled v njihovo izkušnjo, zadovoljstvo in zaznane koristi.

UGOTOVITVE: Projekt je uspešno vključil veliko število starih staršev, ki so se z veseljem vključili v skupne aktivnosti z vnuki. Udeleženci so poročali o izboljšanem telesnem počutju, večji motivaciji za gibanje ter okrepljenih medgeneracijskih odnosih. Starši in stari starši so poudarili tudi pozitiven vpliv na razvoj otrok, tako z vidika gibanja kot socialnih veščin.

ZAKLJUČEK: NEUROPLAY je pokazal, da je mogoče z relativno enostavnimi in zabavnimi pristopi uspešno združiti dve generaciji v smiselno in zdravju koristno skupno aktivnost. Projekt predstavlja odličen primer dobre prakse na področju promocije aktivnega staranja, celostnega razvoja otrok in medgeneracijskega sodelovanja. Rezultati projekta ponujajo trdno osnovo za širšo uvedbo programa v vzgojno-izobraževalne in športne sisteme po vsej Evropi.

Ključne besede: Medgeneracijska vadba, gibalne sposobnosti, kognitivne sposobnosti, razvoj.

LITERATURA:

Schroeder, K., Ratcliffe, S. J., Perez, A., Earley, D., Bowman, C., & Lipman, T. H. (2017). Dance for Health: An Intergenerational Program to Increase Access to Physical Activity. *Journal of pediatric nursing*, 37, 29–34. <https://doi.org/10.1016/j.pedn.2017.07.004>

Zhou, F., Zhang, H., Wang, H. Y., Liu, L. F., & Zhang, X. G. (2024). Barriers and facilitators to older adult participation in intergenerational physical activity program: a systematic review. *Aging clinical and experimental research*, 36(1), 39. <https://doi.org/10.1007/s40520-023-02652-z>

POMEN GIBANJA PRI RAZVIJANJU SOCIALNIH IN JEZIKOVNIH VEŠČIN V RAZREDU

THE IMPORTANCE OF MOVEMENT IN DEVELOPING SOCIAL AND LANGUAGE SKILLS IN THE CLASSROOM

Petra ŠTRANCAR¹

¹Osnovna šola Antona Aškercia Velenje

Predavateljica: Petra Štrancar

IZHODIŠČA: Raziskave s področja razvojne psihologije in pedagogike kažejo, da telesna dejavnost ni zgolj ključna za razvoj motoričnih spretnosti, temveč pomembno vpliva tudi na kognitivne funkcije, emocionalno stabilnost ter socialne veščine otrok. Ugotovljeno je bilo, da vključevanje gibanja v učni proces izboljšuje zbranost, spodbuja ustvarjalnost in krepi motivacijo za učenje. Še posebej pri učenju tujega jezika telesna aktivnost omogoča večjo sproščenost, zmanjšuje strah pred napakami in spodbuja spontano rabo jezika, saj gibanje aktivira različne dele možganov, ki sodelujejo pri procesiranju in pomnjenju informacij. Teoretična izhodišča tako potrjujejo, da učenje, ki vključuje gibanje, ni zgolj prijetnejše, temveč tudi učinkovitejše.

PROBLEM/NAMEN: Gibanje se je načrtno vključilo v pouk nemščine in razredne ure tako, da je podprto učenje besedišča, komunikacije ter, da se hkrati krepijo socialne veščine in povezanost v razredu. Namen je bil razviti pristope, s katerimi skozi gibanje dosežemo tako jezikovne cilje kot tudi cilje osebnostnega razvoja otrok. Težko je najti dejavnosti, ki ustrezajo različnim učencem – tako tistim, ki so zelo telesno aktivni, kot tistim, ki so bolj sramežljivi in potrebujejo spodbudo za sodelovanje.

METODE: Pri pouku nemščine se uporablja različne gibalne igre in aktivnosti povezane z glasbo in plesom. Igrajo se igre, kjer učenci sledijo nemškemu ukazom in pri tem vadijo razumevanje. Ob učenju živali se izvaja pantomimo, kjer učenci posnemajo živali, ostali pa ugibajo katera žival je. Pri predlogih se ustvarijo s telesi in stoli različne pozicije, kar jim pomaga konkretizirati pomen. Na razrednih urah se izvajajo štafetne igre, kjer morajo otroci v paru prenesti listek s pozitivnim sporočilom za sošolca ali ga glasno prebrati. Pogosto se uporabi tudi igra zaupanja, kjer eden izmed para vodi sošolca z zaprtimi očmi med ovirami, kar gradi zaupanje in povezanost.

UGOTOVITVE: Izkušnje potrjujejo, da gibanje pomembno prispeva k učenju tujega jezika. Otroci si besede in fraze hitreje zapomnijo, saj jih povezujejo s telesnimi izkušnjami. Postanejo pogumnejši pri uporabi jezika, saj so zaposleni z gibanjem in manj obremenjeni z napakami. Pri razrednih urah se opaža, da gibalne dejavnosti krepijo medsebojne odnose, spodbujajo spoštovanje, empatijo ter ustvarjajo prijetno klimo, kjer se otroci počutijo varne in sprejete. Pri teh dejavnostih radi sodelujejo tudi sicer tišji učenci.

ZAKLJUČEK: Na podlagi lastnih opažanj lahko zaključimo, da je gibanje pri pouku nemščine in na razrednih urah izjemno koristno sredstvo tako za učenje jezika kot za socialni razvoj. V učne ure se velikokrat vključi gibalne igre in se tako naredi pouk bolj zanimiv, učinkovit in otrokom prijazen. V prihodnosti želimo še naprej iskati nove možnosti za vključevanje

gibanja v pouk, saj je opazno, da ima to dolgoročne pozitivne učinke na znanje, samozavest in odnose v razredu.

Ključne besede: gibanje, nemščina, razredne ure, sodelovanje, sproščeno učenje

LITERATURA:

Macedonia, M. & von Kriegstein, K. (2012). Gestures Enhance Foreign Language Learning. *Biolinguistics*, 6(3-4), 393–416.

Brain Sci. (2024) – The Influence of Separate and Combined Exercise and Foreign Language Acquisition on Learning and Cognition

Fonda Karmen, Kuštrin Vika, Požar Sonja, Prunk Vesna (2010). Minuta za gibanje v razredu

ŠTUDIJA PRIMERA: GIBALNI RAZVOJ UČENCA Z ZMERNIMI MOTNJAMI V DUŠEVNEM RAZVOJU OD VSTOPA V ŠOLO DO ADOLESCENCE

CASE STUDY: MOTOR DEVELOPMENT OF A STUDENT WITH MODERATE INTELLECTUAL DISABILITIES FROM SCHOOL ENTRY TO ADOLESCENCE

Nika ŠUC¹

¹Center Janeza Levca Ljubljana

Predavateljica: Nika Šuc

IZHODIŠČA: Gibalni razvoj otrok je tesno povezan z njihovim nevrološkim in kognitivnim zorenjem ter vplivi okolja. V splošni populaciji otroci dosegajo ključne mejnike v gibalnem razvoju znotraj razvojno pričakovanih okvirov – običajno do 7. ali 8. leta dosežejo temeljne gibalne spretnosti. Do adolescence dosežejo visoko stopnjo gibalne avtomatizacije in sposobnosti učenja novih, kompleksnih gibalnih nalog. V nasprotju s tem poteka gibalni razvoj pri otrocih z zmerno motnjo v duševnem razvoju (ZMDR) bistveno počasneje, pogosto nesinhrono in z večjimi individualnimi razlikami. V povprečju dosegajo gibalne mejnike z večletnim zamikom in pogosto ne dosežejo popolne avtomatizacije osnovnih spretnosti. Njihove sposobnosti grobe in fine motorike so pogosto nerazvite, okorne in manj usklajene. Pogoste so težave pri prostorski orientaciji, načrtovanju gibanja ter vzdrževanju ravnotežja.

PROBLEM/NAMEN: Medtem ko otroci iz splošne populacije v adolescenci praviloma še napredujejo v specifičnih športnih in funkcionalnih spretnosti, mladostniki z ZMDR pogosto dosežejo plato gibalnega razvoja med 12. in 15. letom. Namen študije primera je prikazati potek gibalnega razvoja učenca z ZMDR od vstopa v osnovno šolo do 16. leta, s poudarkom na prepoznavi gibalnega platoja in potrebi po dolgoročnem vzdrževanju funkcionalne samostojnosti.

METODE: Od vstopa v šolo do 18. leta smo spremljali učenčev gibalni razvoj in napredek. Ob vstopu smo preverili ali so usvojena gibanja: hoja po gredi, po prstih, po črti, vzvratno, po stopnicah, tek, met/lovljenje žoge, plazenje, lazenje, plezanje, sonožni poskok, poskoki po eni nogi ter preskok nizke ovire. Poleg temeljnih gibanj smo merili tek na 50/100m, skok v daljino z mesta, met žogice in vzdržljivostni tek – 400/600m. Učenec je vključen v posebni program vzgoje in izobraževanja.

UGOTOVITVE: Učenec je ob vstopu v šolo imel slabše ravnotežje (stoja na eni nogi, poskoki na eni nogi, hoja po stopnicah navzdol s prestopanjem), prav tako ni zmozel sonožnega poskoka. Izhaja iz podpornega družinskega okolja, kjer tudi starši vložijo veliko časa in truda v njegov (gibalni) napredek. Tako je do 12. leta je usvojil vožnjo s triciklom, plavanje, vodenje žoge in met na koš, osnove namiznega tenisa, osnovne plesne koreografije. Merjeni rezultati teka, skoka v daljino in meta žogice pa so bili vsako leto boljši za 1% letno pri vseh merjenih disciplinah. Okoli 13. leta se je njegov napredek upočasnili, zahtevnejših nalog (npr. športne igre z žogo) ni uspel usvojiti. Po 15. letu je bil opažen plato gibalnega razvoja, ni več napredoval, vendar je z redno vadbo ohranjal osvojene sposobnosti. Ob daljši neaktivnosti se je hitro pokazal upad splošne aerobne vzdržljivosti. Glavni poudarek so postale rekreativne dejavnosti, ki ohranjajo funkcionalno samostojnost.

ZAKLJUČEK: Čeprav je predstavljen le en primer, vidimo podoben trend pri večini raziskovane populacije. Primer poudarja pomen zgodnje intervencije, dolgoročne podpore in prilagojenih gibalnih programov. Le z ustrezno okoljsko in strokovno podporo je mogoče učencem z ZMDR zagotoviti pogoje za kakovostno življenje in večjo samostojnost v odrasli dobi.

Ključne besede: zmerne motnje v duševnem razvoju, gibalni razvoj, plato razvoja

LITERATURA:

Blank, R., Smits-Engelsman, B., Polatajko, H., & Wilson, P. (2019). European Academy for Childhood Disability (EACD) recommendations on developmental coordination disorder: Part 1. *Developmental Medicine & Child Neurology*, 61(3), 242–285.

Kirk, S. A., Gallagher, J. J., Coleman, M. R., & Anastasiow, N. J. (2015). *Educating Exceptional Children* (14th ed.). Cengage Learning.

Rimmer, J. H., & Rowland, J. L. (2008). Physical activity for youth with disabilities: A critical need in an underserved population. *Developmental Neurorehabilitation*, 11(2), 141–148.

Dejanović, S. (2017). Vključevanje otrok s posebnimi potrebami v šport. *Šport*, 65(3-4), 34–39.

KJER SE GIBANJE, IGRA IN ZNANJE SREČAJO

WHERE MOVEMENT, GAME AND KNOWLEDGE MEET

Barbara UŠAJ¹

¹Osnovna šola Naklo

Predavateljica: Barbara Ušaj

IZHODIŠČA: Pri mlajših otrocih je gibanje ključnega pomena za celosten in zdrav razvoj ter za uspešnost v učnem procesu. V prvem razredu otroci znanje in spretnosti najlažje usvajajo z gibanjem in igro. Ker z gibanjem razvijajo tudi osnovne motorične sposobnosti je pomembno, da ga pogosto vključujemo v učni proces. Sodoben pripomoček Stapelstein (barvni kamni) spodbuja aktivno in celostno učenje. Barvne kamne lahko uporabljamo za skakanje, hojo, zlaganje... Omogočajo nam, da se učenci gibajo, igrajo in se učijo.

PROBLEM/NAMEN: Prvošolci težko sledijo učnemu procesu, če so dlje časa v sedečem položaju, saj to zmanjšuje njihovo pozornost, motivacijo in razumevanje učne snovi. Namen uvažanja barvnih kamnov v učni proces je bil, da z gibalnimi dejavnostmi povečamo pri učencih motivacijo za učenje, izboljšamo razumevanje učnih vsebin in hkrati spodbudimo povezovanje ter sodelovanje med njimi. Zanimalo nas je tudi ali gibanje med učenjem pomeni za učence motnjo ali pomoč.

METODE: Poudarek je na metodi aktivnega učenja. Učenci izvajajo različne gibalne dejavnosti, preko katerih usvajajo različne učne vsebine pri matematiki (npr. ugotavljanje števil, štetje, računanje...) in slovenščini (npr. iskanje in prepoznavanje glasov/črk, zlogov, besed...). Po izvedenih dejavnostih učitelj preko opazovanja in pogovora pri učencih preveri napredek usvojene učne snovi, preveri njihovo počutje ter jih povpraša po njihovih vtisih.

UGOTOVITVE: Uporaba barvnih kamnov učencem predstavlja spodbudno učno okolje, saj so pri tem aktivni vsi učenci. Učenci preko gibalnih dejavnosti pokažejo večjo motivacijo za učenje. Dejavnosti z barvnimi kamni pozitivno vplivajo na razumevanje učnih vsebin pri matematiki in slovenščini ter pripomorejo k izboljšanju povezovanja in sodelovanja. Gibanje med učenjem učencem vsekakor predstavlja pomoč.

ZAKLJUČEK: Učenci s pomočjo gibanja lažje sledijo učni snovi in usvajajo nova znanja, učitelj pa ob vpeljevanju gibanja lažje vodi pouk. Gibalne dejavnosti prispevajo k večji samozavesti in pozitivni samopodobi. Sodoben pripomoček Stapelstein je zelo učinkovit, saj otrokom v prvem letu šolanja omogoča usvajanje znanja na prijetnejši način.

Ključne besede: barvni kamni, aktivno učenje, gibanje, motivacija, sodelovanje

LITERATURA:

Kirn, J. (2019). Prepričanja razrednih učiteljev o pomenu gibanja in njegovem vključevanju v pouk (magistrsko delo). Pedagoška fakulteta Univerza v Ljubljani.

Zurc, J. (2008). Biti najboljši: Pomen gibalne aktivnosti za otrokov razvoj in šolsko uspešnost. Založba Didakta.

Vrlinič, D. (2019). Z gibanjem do matematičnega znanja v 1. razredu. Razredni pouk (št. 2). <https://www.zrss.si/strokovne-revije/razredni-pouk/>

UČENKA POSTANE UČITELJICA

THE STUDENT BECOMES THE TEACHER

Petra VERŠNJAK¹

¹Osnovna šola Škofljica

Predavateljica: Petra Veršnjak

IZHODIŠČA: Najstništvo je zahtevno obdobje za učence in velik izziv za učitelje, ker vključuje burne telesne, hormonske, čustvene, miselne in socialne spremembe. V šolskem okolju to pogosto povzroča napetost, porušeno samopodobo, nerazumevanje ali konflikte. Prav zaradi tega je potrebnega dovolj medsebojnega razumevanja.

PROBLEM/NAMEN: Ugotavljamo, da v devetem razredu prihaja do zmanjšane motivacije za sodelovanje pri pouku športa. Vzroke za to lahko najdemo v bioloških, psiholoških, socialnih in kulturnih dejavnikih. Da bi dekleta spodbudili za delo pri pouku, smo jim pripravili prav posebno nalogo.

METODE: Po razmisleku in daljšem pogovoru med učiteljico razrednega pouka in učiteljico športa je slednja naredila načrt. Svoje devetošolke je vprašala ali bi se želele preizkusiti v vlogi učiteljice. Ker so bili odzivi zelo pozitivni, je nekaj ur športa posvetila natančnemu preučevanju prevala naprej in prevala nazaj. Učenke so se med sabo popravljale, imitirale napake, preizkušale različne možnosti v primerih, ko je potrebno otroka motivirati, da ne obupa. Izobraževale so se tako na gibalnem, emocionalnem, pedagoškem kakor tudi psihološkem področju. Ko je napočil dan učenja, so bile devetošolke suverene pri svojem delu. Drugošolke so dobro ogrele z igro in nato z razteznimi gimnastičnimi vajami, z njimi izvedle vaje za moč, nato pa se preko pripravljanih vaj lotile tudi končne izvedbe. Športna pedagoginja je bila ves čas kot povezovalka ure in med izvajanjem vaj v pripravljenosti za pomoč kateremukoli od učencev.

UGOTOVITVE: Tako kot so učenke navdušeno sprejele izziv preizkusiti se v vlogi učiteljice, tako so motivirano tudi vadile, se pripravljale na uro vodenja športne vzgoje in jo izvrstno izvedle. Projekt nam ni dal le učinkov na gibalni razvoj drugošolcev, temveč je pozitivno vplival na psiho-fizična, emocionalna in socialna področja najstnic.

ZAKLJUČEK: Medgeneracijsko sodelovanje je uspelo. Ne bi bilo dovolj, da bi učenke na licu mesta le sledile navodilom športne pedagoginje. Upoštevanje širše slike, kot je dejanska postavitev v vlogo razmišljujočega učitelja, ki je motivator, varuh in mentor, je bila dodana vrednost, ki se je obrestovala. Učenke so bile presenečene nad svojimi občutki. Ponosne so bile na svoje delo, ko so videle, da so zaradi njihove pomoči učenci začeli pravilno izvajati gimnastična elementa.

Gljučne besede: učitelj razrednega pouka, športni pedagog, medgeneracijsko sodelovanje

LITERATURA:

Siegel D. J. (2014). *Vihar v glavi: moč najstniških možganov*. Ljubljana: UMco.

Jensen, F. E. (2015). Adolescent brain development and the regulation of behavior. *Developmental Neuroscience*, 37(3), 1–8.

Blakemore, S.-J. & Choudhury, S. (2006). Development of the adolescent brain: implications for executive function and social cognition. *Journal of Child Psychology and Psychiatry*, 47(3-4), 296–312.

TRIM STEZA V VRTCU

KINDERGARTEN JOGGING TRACK

Katja VIDMAR¹

¹Vrtec Mladi rod

Predavateljica: Katja Vidmar

IZHODIŠČA: Postali smo družba, ki je odvisna od tehnologije. Ta je zelo privlačna, ne zahteva nobenega napora, vendar pa jemlje otrokom priložnost in možnost, da bi več časa preživeli pri igri na prostem.

PROBLEM/NAMEN: Številne študije kažejo, da sta prav preživljanje časa v naravi in gibanje na prostem izjemno koristna za otrokov razvoj. Otroci, ki so veliko v naravi ali so vključeni v kakršnokoli gibalno dejavnost, se namreč lažje spopadajo s stresom, imajo redkeje težave s pozornostjo in depresijo, so bolj kreativni, bolj telesno dejavni in imajo zato redkeje težave z debelostjo, hkrati pa s preživljanjem časa v naravi razvijejo večje spoštovanje in odgovornost do varovanja okolja. Želim si, da bi otrokom v času bivanja v vrtcu nudili čim več različnih gibalnih dejavnosti in starše preko dodatnih dejavnosti spodbudili, da se tudi sami več gibajo na prostem.

METODE: Dejavnost je potekala v sklopu Dneva Zemlje v mesecu aprilu. Projekt smo načrtovali tako, da smo v vsaki od petih enot vrtca na drevesa obesili oznake. Vsaka od oznak je vsebovala risbo drevesa in njegovo ime, ter vajo za izvajanje vaj po principu »Trim steze« kot na hribih. Naloga staršev je bila, da ob prihodu po otroka v vrtec, skupaj z njim opravijo vse naloge. Otroci so skupaj s starši telovadili in spoznavali drevesa. V izhodišču sem izpostavila problematiko odvisnosti od tehnologije. Pa, vendar ker je tehnologija vseeno med nami, smo tudi v to dejavnost vključili malo tehnologije. Vsaka oznaka je imela poleg vaje in risbe drevesa še kodo qr, preko katere so lahko izvedeli »nekaj več« o samem drevesu. Odziv nad dogodkom je bil zelo pozitiven in nam je dal zagon, da v prihodnje ponovno pripravimo podobne dejavnosti.

UGOTOVITVE: Veseli me, da so družine poleg same dejavnosti izkoristile čas za medsebojno druženje. Tega je namreč manj opaziti. Vsak namreč pride po otroka ob svoji uri in se nekateri ne srečujejo med seboj drugače kot na dogodkih in zaključkih skupin.

ZAKLJUČEK: Projekt se je zaključil z udeležbo velikega števila družin in resnično lepo jih je bilo opazovati, ko so preživljale eno popoldne v gibanju in v naravi. S tem, da so se posvetili en drugemu in tv ekrane zamenjali za druženje na prostem, je bil cilj dosežen.

Ključne besede: gibanje, trim steza, narava, druženje, prosti čas

LITERATURA

Željeznov Seničar Maruška (2023). Promocija psihofizičnega zdravja otrok in mladostnikov, Ljubljana, On-line, pdf.

Zakaj je pomembno, da z otroki preživimo čimveč skupnega časa v naravi (2024), Psihološki raziskovalni inštitut - <https://prinstitut.com/narava-otrok-razvoj-pocutje/> (15.7.2025);

VIKEND POHODNIŠKA ŠPORTNA ŠOLA V OSNOVNI ŠOLI

WEEKEND HIKING SPORTS SCHOOL IN PRIMARY SCHOOL

Jasmina VRH¹¹OŠ Tabor I Maribor

Predavateljica: Jasmina Vrh

IZHODIŠČA: Na naši šoli že 43 let vzporedno z rednim programom izvajamo tudi dodatni športni program. Dodatni športni program je nadstandardni program, ki ga ponujamo. Z njim želimo spodbujati in razvijati zdrav način življenja, nadgraditi znanja in spretnosti s področja različnih športov ter ozaveščati pomen gibanja v naravi. Vključuje redne vsebine, ki se izvajajo v šoli (telovadnica, zunanja igrišča) enkrat na teden, tečajne oblike smučanja, drsanja in plavanje, pohode in dodatne športne šole od 1. do 9. razreda. V tem prispevku bom predstavila pohodniško vikend športno šolo, ki jo ponujamo učencem v 6. razredom in jo izvajamo v Bohinju.

NAMEN: Namen prispevka je podrobneje predstaviti eno izmed dodatnih ponujenih športnih šol, ki jo ponuja naša šola.

METODE: Predstavitev pohodniške športne šole s primeri dobre prakse in mnenjem učencev. Dodatni športni program poleg rednih ur športa, ki jih izvajamo v telovadnici, vključuje tudi tečajne oblike smučanja, drsanja in plavanja, pohode ter športne šole, ki jih izvajamo med vikendom. V šestem razredu osnovne šole že vrsto let ponujamo pohodniško športno šolo v Bohinju. Pred časom korone smo v tej športni šoli taborili, sedaj pa zaradi slabe opreme in nepredvidljivih vremenskih razmer spimo v ČŠOD Bohinj, izvedba pa je popolnoma v naših rokah. To športno šolo smo poimenovali pohodniška šola, saj veliko hodimo. Naš glavni cilj je, da se v soboto ali nedeljo, odvisno od vremena, povzpne in osvojimo Šijo. Ta pohod uvrščamo tudi med osvojene vrhove, ki jih skozi vsa leta dodatnega športnega programa osvajajo naši učenci. Vsebine v tej športni šoli so zraven pohodništva tudi plezanje po naravni steni, supanje, vožnja s kajakom, orientacijski tek in športne ter družabne igre. Velik poudarek pa damo tudi na medosebne odnose, strpnost, druženje brez mobilnih naprav, medosebno pomoč in vzpodbujanje drug drugega, da dosežemo zastavljene cilje. Pogovori pa se začnejo še preden gremo na pot, saj je otrokom in staršem potrebno predstaviti pomen primerne športne opreme (obutev, oblačila, nahrbtnik). Po koncu športne šole se z vsemi pogovorimo o njihovih občutkih, o tem kaj jim je bilo v redu in kaj bi spremenili. Učenci izpolnijo tudi kratek vprašalnik.

UGOTOVITVE: Športne šole pozitivno vplivajo na otrokovo samopodobo in samozavest. Učenci imajo radi tako imenovani odklop v naravi brez mobilnih telefonov, čeprav s prva niso navdušeni nad tem, da morejo vse te stvari pustiti doma. Učencem hoja iz leta v leto predstavlja večji napor, vendar pa je vse veliko lažje v skupini sovrstnikov. Pri generaciji otrok po koroni, imata motivacija in vzpodbuda veliko večji pomen, saj otroci ne bi več hodili kar tako. Potreben je jasen cilj in razlaga, zakaj je hoja tako zelo pomembna za nas. Pomembna pa je tudi odgovornost do sebe in drugih. Da nismo sami, ampak smo skupina.

ZAKLJUČEK: Ta prispevek lahko veliko prinese k športni stroki, saj je dobra ideja za izpeljavo dodatne ponudbe tudi na ostalih šolah.

Ključne besede: hoja, druženje, sprostitev v naravi, motivacija, odklop

LITERATURA:

Pajenk, A. (2010). Analiza gibalnih sposobnosti štiri do šest letnih dečkov iz športnega društva svizec. Diplomsko delo, Ljubljana: Univerza v Ljubljani, Fakulteta za šport.

Videmšek, M. in Pišot, R. (2007). Šport za najmlajše. Ljubljana: Fakulteta za šport, Inštitut za šport.

Rajšp, M., Kolar, R., Vrh, J., Novak, H. in Cox, N. (2020). Dodatni športni program, pravila delovanja. Maribor: OŠ Tabor I Maribor.

Stritar, A. in Stritar, U. (2019). Z otroki v gore: družinski izleti. Ljubljana: založba Sidarta.

Šimunič, B. (2008). Otrok med vplivi sodobnega življenjskega sloga – gibalne sposobnosti, telesne značilnosti in zdravstveni status slovenskih otrok. Koper: Znanstveno-raziskovalno središče Koper, Inštitut za kineziološke raziskave.

DODATNI POHODI V OSNOVNI ŠOLI

ADDITIONAL HIKES IN PRIMARY SCHOOL

Jasmina VRH¹

¹OŠ Tabor I Maribor

Predavateljica: Jasmina Vrh

IZHODIŠČA: Pohodništvo, izletništvo, gornišstvo res niso dejavnosti, ki bi množično pritegnile otroke in mlade ljudi. Mladina potrebuje določeno mero atraktivnosti, dinamike, novosti, da je zanje dejavnost privlačna. Za mnoge učence so šolski športni dnevi z vsebino pohodništva duhomorni, nekatere šole jih celo opuščajo, češ da pri mladini ni zanimanja zanje. Ker za otroke in mladino pohodniška dejavnost večinoma ni zelo privlačna dejavnost, jo je potrebno otrokom privzgajati. Prvi pogoj je, da jo prilagodimo otrokovi naravi. Na naši šoli se trudimo pohodništvo približat otrokom z interesno dejavnostjo Mladi planinci in v okviru dodatnega športnega programa, ki poteka na naši šoli. V okviru le tega, v vsakem razredu enkrat letno ponudimo pohod prilagojen starosti otrok. Iz leta v leto nadgrajujemo težavnost. Naš cilj je, da se učenci v devetem razredu povzpnejo na Triglav.

NAMEN: Namen prispevka je podrobneje predstaviti eno izmed dodatnih ponujenih športnih aktivnosti, ki jo ponuja naša šola.

METODE: Predstavitev pohodništva s primeri dobre prakse in mnenjem učencev. Dodatni športni program poleg rednih ur športa, ki jih izvajamo v telovadnici, vključuje tudi tečajne oblike smučanja, drsanja in plavanja, pohode ter športne šole, ki jih izvajamo med vikendom. Ker so aktivnosti povezane z dodatnim športnim programom plačljive s strani staršev, je udeležba odvisna od prijav staršev, ni pa obvezna. V tem prispevku bom podrobneje predstavila pohode v okviru dodatnega športnega programa. Pohode izvajamo v jesenskih in spomladanskih mesecih, saj so pogoji za hojo v hribe, gore in visokogorja takrat najbolj optimalni. Za vsak razred organiziramo en pohod letno v okviru dodatnega športnega programa. Seveda pa se pohodi, ne tako zahtevni, organizirajo za posamezne razrede tudi v okviru interesne dejavnosti. V prvem in šestem razredu izpeljemo pohod v okviru vikend športne šole. Učenci se lahko udeležijo pohoda, če jih starši oziroma skrbniki na pohod prijavijo in seveda izkažejo interes. Ker pa se težavnost stopnjuje iz leta v leto, smo športni pedagogi in razredniki pozorni na prijave in se v nekaterih primerih posvetujemo tudi s starši posameznega otroka. Naš končni cilj je, da se v devetem razredu učenci povzpnejo na naš najvišji vrh Triglav. Vsako leto je na pohode prijavljenih manj učencev, ampak to pripisujemo težavnosti in tudi temu, da otrokom v hribe več ni za hoditi. Vsako leto se trudimo, da bi jih navdušili za pohode. Z učenci se pogovarjamo o pozitivnih vplivih hoje na telo, pokažemo jim slike iz preteklih pohodov in športnih šol, jih motiviramo s tem, da je v dobri družbi vse mogoče. So pa učenci v času pohodov odklopljeni od vseh elektronskih naprav, ter se pogovarjajo s sovrstniki. Velik poudarek pa damo tudi na medosebne odnose, strpnost, druženje brez mobilnih naprav, medosebno pomoč in vzpodbujanje drug drugega, da dosežemo zastavljen cilj. Pogovori pa se začnejo še preden gremo na pot, saj je otrokom in staršem potrebno predstaviti pomen primerne športne opreme (obutev, oblačila, nahrbtnik). Po koncu pohoda se z vsemi pogovorimo o njihovih občutkih, o tem kaj jim je bilo v redu in kaj bi spremenili.

UGOTOVITVE: Pohodi pozitivno vplivajo na otrokovo samopodobo in samozavest. Učenci imajo radi tako imenovani odklop v naravi brez mobilnih telefonov. Učencem hoja iz leta v leto predstavlja večji napor, vendar pa je vse veliko lažje v skupini sovrstnikov. Pri generaciji otrok po koroni, imata motivacija in vzpodbuda veliko večji pomen, saj otroci ne bi več hodili kar tako. Potreben je jasen cilj in razlaga, zakaj je hoja tako zelo pomembna za nas. Pomembna pa je tudi odgovornost do sebe in drugih. Da nismo sami, ampak smo skupina.

ZAKLJUČEK: Ta prispevek lahko veliko prinese k športni stroki, saj je dobra ideja za izpeljavo dodatne ponudbe tudi na ostalih šolah.

Ključne besede: nadgradnja športnih ur, druženje, motivacija, narava, nova izkušnja

LITERATURA:

Joseph, C. (1994). Približajmo naravo otroku. Celje: Mohorjeva družba.

Pajenk, A. (2010). Analiza gibalnih sposobnosti štiri do šest letnih dečkov iz športnega društva svizec. Diplomsko delo, Ljubljana: Univerza v Ljubljani, Fakulteta za šport.

Videmšek, M. in Pišot, R. (2007). Šport za najmlajše. Ljubljana: Fakulteta za šport, Inštitut za šport.

Rajšp, M., Kolar, R., Vrh, J., Novak, H. in Cox, N. (2020). Dodatni športni program, pravila delovanja. Maribor: OŠ Tabor I Maribor.

Stritar, A. in Stritar, U. (2019). Z otroki v gore: družinski izleti. Ljubljana: založba Sidarta.

Šimunič, B. (2008). Otrok med vplivi sodobnega življenjskega sloga – gibalne sposobnosti, telesne značilnosti in zdravstveni status slovenskih otrok. Koper: Znanstveno-raziskovalno središče Koper, Inštitut za kineziološke raziskave.

GIBALNA POPESTRITEV POUČEVANJA TUJEGA JEZIKA PRI SREDNJEŠOLCIH

ENHANCING FOREIGN LANGUAGE TEACHING FOR SECONDARY SCHOOL STUDENTS

Mojca ŽVOKELJ¹

¹Srednja ekonomsko-poslovna šola Koper

Predavateljica: Mojca Žvokelj

IZHODIŠČE: Gibanje med učenjem spodbuja boljše delovanje možganov in povečuje sposobnost pomnjenja. Kratki aktivni odmori med poukom pripomorejo k boljši koncentraciji in zmanjšujejo utrujenost. Telesna dejavnost zmanjšuje stres, kar pozitivno vpliva na počutje in motivacijo dijakov za učenje. S prepletanjem gibanja in učnih vsebin se izboljšata učna uspešnost in razumevanje snovi. Srednješolci, ki so redno telesno dejavni, razvijajo boljše učne in delovne navade ter večjo samodisciplino.

PROBLEM/NAMEN: Poučevanju tujega jezika srednješolcem, poleg prvega tujega jezika angleščine in jezika okolja italijanščine, predstavlja predvsem dodatno breme in podaljšan **čas v šoli**. Za učitelja je velik izziv, da naredi pouk dijakom zanimiv, da so pripravljeni na sodelovanje in da pri vseh urah naučijo nekaj trajnega in uporabnega znanja nemščine. Zaradi različnih učnih tipov je potrebno upoštevati tudi tiste dijake, ki si zapomnijo največ s pomočjo gibanja oz. med gibanjem. Ker se skoraj polovica dijakov, ki jih poučujemo, v svojem prostem **času** redno ukvarja z različnimi oblikami **športa** in so **že** sedaj navajeni, da vsak popoldan preživijo na **športnem** igrišču, smo poiskali različne načine, kako tudi pri pouku nadaljevati z gibalno dejavnostjo, ki dvigujejo motiviranost in učinkovitost poučevanja tujega jezika.

METODE: Pri reševanju svojega problema oz. zastavljenega cilja sem si pomagala z različnimi knjižnimi gradivi in didaktičnimi pristopi ter idejami z različnih izobraževanj, kot so FIT pedagogika, Zdrav **življenjski** slog in pa **čisto** s svojimi načini dela. Pri vsaki učni temi sem uvedla najprej teoretični del, ki je osnova za nadaljnje delo. Učenje z gibanjem sem uporabila predvsem pri utrjevanju in ponavljanju snovi oz. kot popestritev učne ure. Uporabljene so bile tudi krajše gibalne dejavnosti na začetku ure, ob koncu različnih bolj tradicionalnih frontalnih oz. pisnih dejavnosti kot neke vrste odmora, ali pa na koncu ure, ko je koncentracija dijakov, ki so gibalno zelo aktivni najnižja.

UGOTOVITVE: Ne glede na dolžino gibalnih dejavnosti je pouk za vse dijake zanimivejši in uspešnejši. Poveča se motiviranost, koncentracija, pomnjenje in ne nazadnje tudi priljubljenost tujega jezika. Dijaki na tak način snov lažje in hitreje usvojijo. Ne smemo pa pozabiti, da tak način dela v razredu razvije glasnejšo komunikacijo med dijaki, večjo količino hrupa. Take dejavnosti je treba zelo dobro načrtovati, da se učna ura ne izjalovi in se ne konča s stresom in neuspehom.

ZAKLJUČEK: Iskanje novih učnih metod za generacije otok, ki prihajajo je ključno. Vztrajanje na klasičnih metodah, frontalnemu pouku, prepisovanju s prosojnic otrokom, ki so obdani z interaktivnimi aplikacijami, telefoni, spletom, kjer se slike in glasovi gibajo izjemno hitro, je glede na izkušnje v razredu zagotovo neuspešno.

Ključne besede: tuj jezik, poučevanje z gibanjem, aktiven otrok, motivacija, gibalni odmor

LITERATURA:

Zurc, Joca. (2008). Biti najboljši: Pomen gibalne aktivnosti za otrokov razvoj in šolsko uspešnost. Radovljica: Didakta d. o. o.

Gavin, Mary L. (2007). Otrok v formi. Praktični vodnik za vzgojo zdravih otrok – od rojstva do najstniških let. Ljubljana: Založba Mladinska knjiga.

Otroci v gibanju. (2004). Ljubljana: Ministrstvo za okolje, prostor in energijo.

