



## PhysAgeNet & EGRAPA Conference 2024

*“Evidence Based Physical Activity in Old Age”*

# BOOK OF ABSTRACTS

18<sup>th</sup> – 19<sup>th</sup> of April, 2024

### Welcome Greetings:

The European Group for Research on Aging and Physical Activity (EGRAPA) is delighted to welcome all of you to the PhysAgeNet & EGRAPA Conference 2024, themed "Evidence-Based Physical Activity in Old Age." Advances in technology now allow for unprecedented exploration of the body and mind, shifting our focus towards understanding the intricate neurochemical, cellular, and molecular processes influenced by various exercise regimes, including type, intensity, duration, and frequency. Our challenge in this conference is to enhance our understanding of "how it works" and to unravel the mechanisms behind the benefits of physical activity, as well as exercise behaviour in old age. Our scientific program includes three eminent scholars who will deliver central keynote speeches, along with symposiums, oral sessions, and poster presentations. We wish you all a pleasant and fruitful conference.

### Organising Committee:

- Prof. Dr. Nerijus Masiulis – *Lithuanian Sports University, Lithuania*
- Dr. Margarita Drozdova-Statkevičienė – *Lithuanian Sports University, Lithuania*
- Assoc. Prof. Vida Janina Česnaitienė – *Lithuanian Sports University, Lithuania*
- Kristina Visagurskienė – *Lithuanian Sports University, Lithuania*
- Agnė Bridaitytė – *Lithuanian Sports University, Lithuania*
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- Tomas Kukenys – *Lithuanian Sports University, Lithuania*
- Soneta Ivanovė – *Lithuanian Sports University, Lithuania*
- Ellen Bentlage – *Institute of Sport and Exercise Sciences, University of Muenster, Germany*
- Vanessa Hübert – *Institute of Sport and Exercise Sciences, University of Muenster, Germany*

### Scientific Committee:

Head: Prof. Dr. Yael Netz – *President of EGRAPA, Levinsky-Wingate Academic Center, Israel and Lithuanian Sports University, Lithuania*

#### Members:

- Prof. Dr. Nerijus Masiulis – *Lithuanian Sports University, Lithuania*
- Prof. Dr. Diana Rėklaitienė – *Lithuanian Sports University, Lithuania*
- Prof. Dr. Oron Levin – *Lithuanian Sports University, Lithuania*
- Assoc. Prof. Vida Janina Česnaitienė – *Lithuanian Sports University, Lithuania*
- Prof. Dr. Hans Degens – *Lithuanian Sports University, Lithuania*
- Dr. Margarita Drozdova-Statkevičienė – *Lithuanian Sports University, Lithuania*
- MD Wouter Vints – *Lithuanian Sports University, Lithuania*
- Assoc. Prof. Gediminas Mamkus – *Lithuanian Sports University, Lithuania*
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- Dr. Dovilė Kielė – *Lithuanian Sports University, Lithuania*
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- Assoc. Prof. Arzu Erden – *Karadeniz Technical University, Trabzon, Turkey*
- Asst. Prof. Veysel Alcan – *Tarsus University, Turkey*
- Prof. Uğur Cavlak – *Biruni University, Istanbul, Turkey*
- Prof. Dr. Ivan Bautmans – *Vrije University, Brussel, Belgium*

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Editors: Ellen Bentlage, Michael Brach, Yael Netz, Nerijus Masiulis

**The Conference is jointly organised by:**

The European Group for Research on Aging and Physical Activity (EGRAPA)  
COST Action Evidence-based Physical Activity in Old Age (PhysAgeNet)  
Lithuanian Sports University, Kaunas  
University of Münster, Germany



The European Group for Research on Aging and Physical Activity aims to promote physical activity and health in older adults through the carrying out and promotion of research and the collection and diffusion of information related to this field of interest. [EGRAPA Website](#)



The COST Action 20104 PhysAgeNet aims to establish a sustainable network that will foster evidence-based research and practice of physical activity in older adults and will enhance integration of innovative ICT solutions based on open data consolidated research information, in order to promote health and reduce the burden of inactivity in ageing populations. [PhysAgeNet Website](#)



The Lithuanian Sports University (LSU) is the only University in Lithuania that carries out research in all main areas of sports and health sciences, delivers study programmes in these areas and trains high-level professionals in the fields of sport, physical education, public health, physiotherapy, and sport and leisure management. Founded in 1934, the University, as an important centre of sports science, a promoter of physical education, physical activity and sports values and traditions, has been serving the community of Lithuania. The LSU offers 19 degree programmes, primarily in sports science-related disciplines, with a total enrolment of nearly 1.600 students at all three study cycles. <https://www.lsu.lt/en>



The University of Münster (WWU) is one of Germany's largest institutions of higher education (~46,000 students, 600 professors and 4500 research staff). The Institute of Sport and Exercise Sciences includes six departments from natural science, social science and humanities. Research and teaching addresses target groups from preschool children to the oldest old, and includes physical education as well as high performance sport, preventive exercise as well as everyday activity. [University of Münster Website](#) + [Movement Science Website](#)

## Final Programme: Day 1, Thursday April 18

Time EET= Local time	Programme <b>Conference Zoom Link for online participants:</b> <a href="https://liedm.zoom.us/j/85480823111">https://liedm.zoom.us/j/85480823111</a>		
08:30-09:45 EET 07:30-08:45 CET	<b>Conference hall</b>		
	<b>Symposium:</b> <b>Technology-based cognitive-motor training in home settings of older adults</b> <b>Chair: Eleftheria Giannouli</b>		
	<p><b>(1) Anabela Silva (online):</b> A mixed-methods randomized and controlled pilot study on the impact of a web-based dance solution</p> <p><b>(2) Rogerio Pessoto Hirata:</b> Benefits of a 12-week online dance training intervention on static and dynamic postural stability and gait speed in older adults</p> <p><b>(3) Eling de Bruin:</b> Targeting the brain using Information Technology for secondary prevention of mild neurocognitive disorder</p> <p><b>(4) Eleftheria Giannouli:</b> Feasibility and Effectiveness of a Personalized Home-Based Motor-Cognitive Training Program in Community-Dwelling Older Adults</p>		
09:45-10:15 EET 08:45-09:15 CET	<b>Ground floor of the Conference hall</b> Coffee break		
10:15-11:00 EET 09:15-10:00 CET	<b>Conference hall</b>		
	<b>Opening</b>		
	Diana Rėklaitienė: LSU-Rector Yael Netz: EGRAPA-President Michael Brach: COST Action PhysAgeNet Chair Nerijus Masiulis: Local Organizer		
11:00-12:00 EET 10:00-11:00 CET	<b>Conference hall</b>		
	<b>Keynote: Prof. Dr. Kirk Erickson</b> <b>Title: Exercise and Brain Health in Late Adulthood</b> <b>Moderator: Wouter Vints</b>		
12:00-13:30 EET 11:00-12:30 CET	<b>Central Building (Basketball gym)</b>		
	<b>Poster Session + Lunch</b> <b>Moderators: Dovelė Kielė and Mati Paasuke</b>		
13:30-14:45 EET 12:30-13:45 CET	<b>Central Building (232 room)</b>	<b>Central Building (215 room)</b>	<b>Central Building (309 room)</b>
	<b>Oral Presentations: Exercise, Cognition, and Neuroplasticity 1</b>	<b>Oral Presentations: Aspects of Training in Advanced Age</b>	<b>Oral Presentations: Exercise and Psychological Functioning 1</b>

	<p style="text-align: center;"><b>Moderators: Tiia Kekäläinen &amp; Ugur Cavlak</b></p> <p><b>#6 Clelia Carrubba:</b> Improving Cognitive Functions in Healthy Older Adults: A Comparison of Three Combined Training Programs</p> <p><b>#7 Ugur Cavlak:</b> The Effects of Vestibular-Based Exercises and Calisthenic Exercises on Cognitive Functions in Older Individuals: A Randomized Controlled Trial.</p> <p><b>#29 Cécile Marcourt:</b> Effect of High-Intensity Interval and Moderate-Intensity Continuous training on neuroplasticity, cognition and sensorimotor performance in aged rats</p> <p><b>#54 Natalia Gawron:</b> Activity and cognitive function in middle-aged and older adults - preliminary study result</p> <p><b>#95 Anna Wunderlich:</b> The impact of age-related hearing-impairment on cognitive and motor dual-task costs</p>	<p style="text-align: center;"><b>Moderators: Hans Degens &amp; Veysel Alcan</b></p> <p><b>#5 Marta Maria Torre:</b> Concept-framed reviews of combined training studies in older adults: conventional intervention and exergames</p> <p><b>#18 Mona Herden:</b> Defining and reporting exercise intensity in interventions for older adults: Results of a modified Delphi process</p> <p><b>#21 Miloš Bednář:</b> Sport in Old Age: An Example of Long-distance Running and Nordic Walking</p> <p><b>#26 Aija Klavina:</b> Personalized Physical Activity Programs for Seniors: Why it is Important?</p> <p><b>#73 Lukas Mikalauskas:</b> The effect of a selective balance enhancing physical exercise program on balance, gait, quality of life performance and risk of falls in old age elderly</p>	<p style="text-align: center;"><b>Moderators: Vida Cesnaitiene + Nadja Schott</b></p> <p><b>#12 Fatma Ben Waer (online):</b> Effects of Pilates vs Zumba dancing on Functional performances, mood, and QoL in postmenopausal women</p> <p><b>#25 Soledad Ballesteros:</b> The effectiveness of physical activity on psychological and physical well-being in older breast cancer patients: A systematic review and meta-analysis</p> <p><b>#32 Melanie Mack:</b> Meta-analysis on the chronic effects of exercise on depression in older adults: Protocol and main results</p> <p><b>#36 Laimute Samsoniene:</b> The effects of art therapy on cognitive function and self-esteem in older people</p> <p><b>#39 Nadja Schott:</b> Role of functional and clinical parameters in predicting aging perception in older adults</p>
<p>15:00-16:15 EET 14:00-15:15 CET</p>	<p style="text-align: center;"><b>Central Building (232 room)</b></p> <p style="text-align: center;"><b>Symposium</b>  <b>Different movement-based programs for the older adults, the same goal: holistic health</b>  <b>Chair: Ana Isabel Morais</b></p> <p><b>(1)</b> Psychomotor intervention on water for people with dementia</p> <p><b>(2)</b> Aquafast: potential of aquatic high-intensity training for older people</p>	<p style="text-align: center;"><b>Central Building (215 room)</b></p> <p style="text-align: center;"><b>Symposium</b>  <b>Challenges in physical activity promotion for older adults and nursing home residents</b>  <b>Chair: Bettina Wollesen &amp; Claudia Voelcker-Rehage,</b></p> <p><b>(1) Michael Brach:</b> Promoting Physical Activity in Older Adults through Information and Communication Technologies -</p>	

	<p><b>(3) Aging well: Comprehensive Exercise and Rehabilitation Interventions for Optimal Physical and Cognitive Health</b></p> <p><b>(4) Balance training in older individuals living in institutions reduces falls and fear of falling</b></p>	<p>The relationship between user needs and technology requirements</p> <p><b>(2) Nadja Schott:</b>                  Influence of cognitive and emotional factors on dual-task performance in nursing home residents - The mediating and moderating roles of cognition, fear of falling, well-being and depression</p> <p><b>(3) Vera Belkin:</b>                  Promotion of physical activity and life space mobility in nursing home residents: Introduction to the PROGRESS study protocol</p> <p><b>(4) Bettina Wollesen:</b>                  Benefits of exercise for nursing home residents - does the dose matter?</p>
<p><b>16:15-16:45</b>                  EET                  15:15-15:45                  CET</p>	<p><b>Central Building (Basketball gym)</b></p> <p><b>Coffee Break</b></p>	
<p><b>16:45-17:45</b>                  EET                  15:45-16:45                  CET</p>	<p><b>Conference hall</b></p> <p><b>Keynote: Prof. Dr. Mikaela von Bonsdorff</b>                  Life course epidemiology of healthy ageing and physical activity                  Moderator: Timo Hinrichs</p>	
<p><b>19:00-21:00</b>                  EET                  18:00-20:00                  CET</p>	<p><b>Dinner Options</b></p> <p><b>City tour</b></p>	



**Final Programme: Day 2, Friday April 19**

Time EET= Local time	<b>Programme</b> <b>Conference Zoom Link for online participants:</b> <a href="https://liedm.zoom.us/j/85480823111">https://liedm.zoom.us/j/85480823111</a>		
08:30-09:45 EET 07:30-08:45 CET	<p style="text-align: center;"><b>Central Building (215 room)</b></p> <p style="text-align: center;"><b>Symposium: Future directions in the research of muscle-brain crosstalk in healthy aging: perspectives into models, hypotheses, and methods</b></p> <p style="text-align: center;"><b>Chairs: Ivan Bautmans &amp; Nerijus Masiulis</b></p> <p><b>(1) Wouter Vints:</b> Unraveling exerkinases' molecular pathways to enhance cognitive function</p> <p><b>(2) Ivan Bautmans:</b> Exercise to combat chronic low-grade inflammation</p> <p><b>(3) Nerijus Masiulis:</b> What type of physical exercise would be optimal for cognitive and functional gains in older age?</p> <p><b>(4) Oron Levin:</b> Magnetic resonance spectroscopy as non-invasive tool for assessing brain adaptation to physical exercise in older age</p> <p><b>(5) Hans Degens:</b> Age-related muscle remodelling in normal people and master athletes; no evidence for motor unit remodelling</p>	<p style="text-align: center;"><b>Central Building (232 room)</b></p> <p style="text-align: center;"><b>Oral Presentations: Behavioral Change and Exercise Promotion</b></p> <p style="text-align: center;"><b>Moderators: Michael Brach &amp; Ellen Bintlage</b></p> <p><b>#48 Emilia Beblavá:</b> The Role of Pre-Intervention Motivation in Health Behavioral Change: Insights from Experiment</p> <p><b>#53 Günay Yıldız:</b> The Impact of Education and Gender on Perceived Physical Activity Constraints among Community Dwelling Older Adults</p> <p><b>#56 Ketevan Inasaridze:</b> The physical activity, cognitive functioning and motivation in elderly</p> <p><b>#72 Nanna Notthoff:</b> <del>Promoting Walking in Older Adults with Motivational Messages: The Role of Memory for the Information</del></p> <p><b>#81 Stefanie Dahl:</b> Evaluation of an e-learning platform promoting physical activity for older adults and their carers</p>	
10:00-11:30 EET 09:00-10:30 CET	<p style="text-align: center;"><b>Central Building (215 room)</b></p> <p style="text-align: center;"><b>Oral Presentations: Assessing Aspects of Physical Fitness</b></p> <p style="text-align: center;"><b>Moderators: Mati Pääsuke &amp; Nerijus Masiulis</b></p> <p><b>#11 Shaea Alkahtani:</b> Association between relative handgrip strength and Metabolic Syndrome in Saudi men and women</p>	<p style="text-align: center;"><b>Central Building (309 room)</b></p> <p style="text-align: center;"><b>Oral Presentations: Health Aspects of Physical Activity</b></p> <p style="text-align: center;"><b>Moderator: Arzu Erden &amp; Jana Pelclova</b></p> <p><b>#68 Guoping Qian (online):</b> Effects of body mass index on plantar pressure distribution in Polish postmenopausal women</p>	<p style="text-align: center;"><b>Central Building (232 room)</b></p> <p style="text-align: center;"><b>Oral Presentations: Exercise, Cognition, and Neuroplasticity 2</b></p> <p style="text-align: center;"><b>Moderators: Orgesa Qipo &amp; Michel Audiffren</b></p> <p><b>#8 Ugur Cavlak:</b> Are static and dynamic balance tests a criterion showing deterioration of cognitive functions in older adults? Preliminary results</p>



	<p><b>#30 Hans Degens:</b> No changes in muscle morphology over 10 years in sprint-trained masters runners</p> <p><b>#38 Nadja Schott:</b> Development and initial validation of the Geriatric Balance Self-Efficacy (GBSE) Scale: a new scale for nursing home residents</p> <p><b>#49 Martin Krssak:</b> Multinuclear MR based detection of training induced changes in the skeletal muscle of elderly</p> <p><b>#92 Irmantas Toleikis:</b> Accentuated eccentric loading and blood flow restriction training: both increase lactate level and causes muscle damage in older men</p>	<p><b>#74 Jing Li:</b> BMI and biomechanical parameters of gait in postmenopausal women</p> <p><b>#75 Steinunn Olafsdottir:</b> Older community-dwelling stroke survivors and ActivABLES for balance exercise</p> <p><b>#84 Jana Pelclová:</b> The Association Between Time Reallocation Among Posture-Specific 24-Hour Movement Behaviours and Obesity Risk in Older Adults: A Compositional and Isotemporal Substitution Analysis</p> <p><b>#42 Yintao Niu:</b> Meta-analysis of the effect of exercise on cardiovascular function in the elderly</p>	<p><b>#83 Tiia Kekäläinen:</b> Older adults’ physical activity and cognitive performance in daily life context: a pilot study combining accelerometer-based physical activity and smartphone-based cognitive assessments</p> <p><b>#86 Erika Krasinské:</b> Effects of 12 weeks resistance training on brain structure in healthy older adults and older adults with mild cognitive impairment</p> <p><b>#98 Orgesa Qipo:</b> Dose-response relationship of resistance training and the effects on circulating biomarkers of inflammation or neuroplasticity in older adults: A Systematic Review and Meta-Analysis</p> <p><b>#103 Anita Hoekelmann:</b> Sport, Gymnastic Movement and Dance Reduce the Decline of Critical Cognitive and Physical Functions in Elderly with Mild Cognitive Impairment</p>
<p>11:30-12:00 EET 10:30-11:00 CET</p>	<p><b>Central Building (Basketball gym)</b> Coffee Break</p>		
<p>12:00-13:15 EET 11:00-12:15 CET</p>	<p style="text-align: center;"><b>Central Building (215 room)</b></p> <p style="text-align: center;"><b>Oral Presentations Technology-assisted Physical Activity</b></p> <p style="text-align: center;"><b>Moderators: Rosemary Dubbeldam &amp; Patrick Esser</b></p> <p><b>#10 Jonathan Gomez-Raja:</b> The ESSENCE project: Empathic platform to personally monitor,</p>	<p style="text-align: center;"><b>Central Building (232 room)</b></p> <p style="text-align: center;"><b>Oral Presentations Exercise and Psychological Functioning 2</b></p> <p style="text-align: center;"><b>Moderators: Vaiva Balčiūnienė &amp; Melanie Mack</b></p> <p><b>#47 Emilia Beblavá:</b> Efficacy of Community-Based and Online Behavioral Interventions:</p>	

	<p>stimulate, enrich, and assist elders in their environment</p> <p><b>#19 Eleftheria Giannouli:</b> Usability and Psychometric Properties of the MOBITEC-GP App for Real-Life Mobility Assessment</p> <p><b>#31 Veysel Alcan:</b> Quantitative Evaluation of Physical Activity Impact on Myoelectric Activities in Leg and Foot Muscles During Dynamic Balance Tests in the Elderly</p> <p><b>#59 Rosemary Dubbeldam:</b> Technology-assisted physical activity interventions for older people in their home-based environment –a scoping review</p>	<p>Preliminary Insights on Health Outcomes</p> <p><b>#55 Alessandro Cudicio:</b> Impact Physical Activity Enjoyment on Self-Efficacy in Daily Activities Among Elderly</p> <p><b>#91 Andrea Rizzardi:</b> Motor reserve impact on motor severity and quality of life in Parkinson’s Disease patients</p>
<p>13:15-14:30 EET 12:15-13:30 CET</p>	<p><b>Poster Session + Lunch</b></p> <p>Moderators: Vaiva Balčiūnienė and Margarita Drozdova-Statkevičienė.</p>	
<p>14:30-15:45 EET 13:30-14:45 CET</p>	<p style="text-align: center;"><b>Central Building (232 room)</b></p> <p style="text-align: center;"><b>Symposium</b> Gamification approaches for assessment and training of cognitive and motor functioning in rehabilitation settings</p> <p style="text-align: center;"><b>Chair: Eleftheria Giannouli</b></p> <p><b>(1) Luka Slosar:</b> Balance Assessment Utilizing the Oculus Quest VR Headset During Bedrest</p> <p><b>(2) David Beckwee:</b> Enhancing Strength in Bedridden Older people with a Dynamic Fusion of Blood Flow Restriction Isometrics and an Innovative Wireless EMG-Sensor Game</p> <p><b>(3) Antoine Langeard:</b> Acceptability and concepts supporting the participatory development of a device for combined 'cognitive' - 'electrical neuromuscular stimulation' training to prevent falls in older adults</p> <p><b>(4) Eleftheria Giannouli:</b> Feasibility and effects of exergame-based cognitive-motor training in the scope of inpatient rehabilitation</p>	<p style="text-align: center;"><b>Central Building (215 room)</b></p> <p style="text-align: center;"><b>Symposium</b> Systemic and intra-articular effects of exercise in health and disease</p> <p style="text-align: center;"><b>Chair: Ivan Bautmans</b></p> <p><b>(1) Ivan Bautmans:</b> Both high and moderate intensity of resistance exercise improves the stress response of peripheral mononuclear blood cells after lipopolysaccharide challenge.</p> <p><b>(2) Emelyn Mathot:</b> Can muscle stretching be used as a control group for exercise immunology interventions? A systematic review</p> <p><b>(3) Ivan Bautmans:</b> Exercise-induced effects on inflammatory markers and brain-derived neurotrophic factor in patients with knee osteoarthritis. A systematic review with meta-analysis</p> <p><b>(4) Rose Njemini:</b> Can intra-articular biomarkers predict pain sensitization in knee osteoarthritis patients?</p>

15:45-16:15 EET 14:45-15:15 CET	<b>Central Building (Basketball gym)</b> <b>Coffee Break</b>
16:15-17:15 EET 15:15-16:15 CET	<b>Keynote: Prof. Dr. Ivan Bautmans</b> <b>Vitality capacity, why is it relevant and how to assess?</b> <i>Moderator: Yael Netz</i>
17:15-17:30 EET 16:15-16:30 CET	<b>Closing – Folk Dance</b>

## KEYNOTE LECTURES

**Prof. Dr. Kirk Erickson**  
*(University of Pittsburgh, Pennsylvania)*



**Prof. Dr. Kirk Erickson**, is Director of Translational Neuroscience and Mardian J. Blair Endowed Chair of Neuroscience at the AdventHealth Research Institute. Dr. Erickson received his Ph.D. at the University of Illinois at Urbana-Champaign and was a post-doctoral scholar at the Beckman Institute for Advanced Science and Technology. He was also a Professor of Psychology and Neuroscience at the University of Pittsburgh and the Principal Investigator of the Brain, Aging, and Cognitive Health Laboratory

before starting at AdventHealth. Dr. Erickson’s vast research program focuses on the effects of physical activity on brain health across the lifespan. This research has resulted in > 300 published articles and 15 book chapters. With currently over 52000 citations for his work since 2003 he has been identified by the AD Scientific Index as one of the world’s top 1% most productive scientists. In the last 10 years, Dr. Erickson’s research has received >\$55 million dollars in support including numerous grants from the NIH, the Alzheimer’s Association, and other organizations. He is the Principal Investigator of a Phase III randomized clinical trial examining the impact of exercise on neurocognitive function in late adulthood and an \$11 million follow-up study of this sample. His research resulted in the prestigious Chancellor’s Distinguished Research Award from the University of Pittsburgh. He was named a Fellow of the Academy of Behavioral Medicine Research in 2016 and received a Distinguished Scientist Award by Murdoch University in Australia in 2018. He was a reviewer for NIH and numerous journals for many years and has been a mentor for numerous early-stage scholars. Dr. Erickson was appointed by the U.S. Secretary of Health and Human Services to be an expert on the 2018 U.S. Physical Activity Guidelines Advisory Committee and chaired the Brain Health subcommittee. His research has been featured in a long list of print, radio, and electronic media including the New York Times, CNN, BBC News, NPR, Time, and the Wall Street Journal.

**Keynote lecture**

**“Exercise and Brain Health in Late Adulthood”**

Engaging in exercise improves brain health and reduces risk for Alzheimer’s disease in late adulthood. Yet, despite these assertive claims there is indisputable muddiness and heterogeneity in the scientific literature with a number of randomized trials failing to demonstrate improvements in cognitive performance. In this talk I will describe several reasons for this variability across the literature including methodological considerations for future large-scale randomized clinical trials. I will also focus on recent research findings on exercise and brain health in late adulthood and will discuss the evidence for several levels of mechanisms and moderators of these effects. Overall, engaging in regular exercise is an important modifiable lifestyle factor that carries significant consequences for learning, memory, and brain health in late adulthood, but methodological issues continue to limit the widespread adoption of exercise for enhancing brain health and our understanding of mechanisms and moderators of the effects.

**Prof. Dr. Mikaela von Bonsdorff**  
*(University of Jyväskylä, Finland)*



**Prof. Dr. Mikaela von Bonsdorff**, is a recently appointed Professor of Gerontology and Public Health at the Faculty of Sport and Health Sciences, University of Jyväskylä, Finland. She also leads a research group in the public health programme at Folkhälsan Research Center, Helsinki. She focuses on investigating healthy and active ageing from a life course perspective. Her multidisciplinary research particularly addresses the impact of various factors and events across the life course, lifestyle as well as social aspects of the development of health, functioning and frailty in older age. The research group she heads uses large international and national epidemiological cohort and registry data, but also more focused data in the effort to contribute towards understanding the complex network of individual and societal factors that affect the development of

health and functioning in the current longevity society. Prof. von Bonsdorff is involved in developing a population-level electronic frailty index in Finland funded by the Research Council of Finland. The index provides a comprehensive view of health and functioning in the adult population and can be used e.g. to identify individuals who are at risk of health decline who potentially can benefit from lifestyle interventions. Prof. von Bonsdorff has worked as a visiting fellow on a Fulbright scholarship at the National Institute of Aging in Bethesda, Maryland, and with a Research Council of Finland postdoctoral grant at the Medical Research Council, Unit of Lifelong Health and Aging, UCL in London. She is the Chair of the Public Health Panel of the Swedish Research Council for Health, Working life and welfare FORTE. She is responsible for organising the Nordic Congress of Gerontology in Jyväskylä in 2027.

**Keynote lecture**

**“Life course epidemiology of healthy ageing and physical activity”**

Healthy aging refers to the process of developing and maintaining functional ability that enables well-being in older age. Various individual and societal factors and events across the life course pave the way for heterogeneous trajectories of health and functioning in older age. Ageing starts from birth and is influenced by early exposures and circumstances and has been linked to a higher prevalence of chronic diseases, poorer physical performance and higher rates of disability. Differences in health and functioning at the population level become more evident from midlife onwards. At that time in life, the demands of the work career, taking care of children, and, more often also attending to ageing parents, coupled with health and poorer physical performance can result in a decrease in physical activity levels. This talk will highlight the importance of physical activity in mitigating declines in health, functioning and frailty within the life course epidemiology framework. Work ability, the balance between job demands and the individual’s resources, typically decreases at older ages. Our studies show that higher levels of vigorous physical activity can counteract the strain of heavy occupational physical activity in decreasing the risk of mobility limitations in older employees. We observed differences in frailty, measured using the frailty index indicating deficit accumulation across homeostatic systems, associated with lifestyle factors as early as in late midlife. Changes in specific domains of a healthy lifestyle, such as giving up regular exercise, are linked to an accelerated pace at which frailty increases from midlife to old age. Less than half of adults age healthy after 65 years in the current longevity society. Physical activity is a key modifiable factor contributing to healthy ageing, with evidence supporting its benefits across various dimensions of health and functioning. This makes the promotion of physical activity at all ages an urgent research area and a priority of public health strategies and policies.



**Prof. Dr. Ivan Bautmans**  
*(Head Gerontology & Frailty in Ageing research departments, Belgium)*



**Prof. Dr. Ivan Bautmans**, is MSc Physiotherapy & PhD Medical Sciences, and an expert in biogerontological research: physical training of older persons, sarcopenia and inflammation. His work on muscle fatigue in frailty was awarded by 6 scientific prizes among which the 3 most prestigious Belgian gerontology awards (2013 King Baudouin Foundation's PRIZE MARIE-THERÈSE DE LAVA; 2009 DE COOMAN PRIZE; 2010 BORGERHOFF PRIZE). He obtained funding from FWO, VUB, Willy Gepts Fund, EU (FP7, AAL), WCF (The Netherlands) and sponsored clinical trials. Ivan is full-time appointed as tenured full professor (Gewoon Hoogleraar) at the Vrije Universiteit Brussel (VUB) where he is head of the

Gerontology and Frailty in Ageing research (<https://fria.research.vub.be>) departments. He coordinates an Interdisciplinary Research Program @VUB on Active and Healthy Ageing, and a Strategic Growth Research Program @VUB on the anti-inflammatory effects of exercise in the aged. At the VUB he is coordinator of the Research Master of Gerontological Sciences ([www.vub.ac.be/en/study/research-master-gerontological-](http://www.vub.ac.be/en/study/research-master-gerontological-)<http://www.vub.ac.be/en/study/research-master-gerontological-> sciences) where he gives lectures on healthy ageing & research methodology. He is also board member (President elect in 2013-2015) of the Belgian Society for Gerontology & Geriatrics ([www.geriatrie.be](http://www.geriatrie.be)<http://www.geriatrie.be>) and founding board member of the Belgian Ageing Muscle Society ([www.ageingmuscle.be](http://www.ageingmuscle.be)<http://www.ageingmuscle.be>). At SOMT University of Physiotherapy (Amersfoort, The Netherlands) he is scientific advisor and PI of the Fatigue Resistance AMersfoort (FRAME) study and the AMersfoort COhort study on functional decline, Healthy ageing & Frailty (AMCOHF) study. @SOMT he gives lectures on geriatric rehabilitation and is responsible for the Master Thesis of the students in Geriatric Physiotherapy. He has extensive collaboration with WHO as leader of an expert group on Vitality Capacity within the WHO Healthy Ageing framework.

### Keynote lecture

#### “Vitality capacity, why is it relevant and how to assess?”

The World Health Organisation (WHO) defines Healthy Ageing as “the process of developing and maintaining the functional ability that enables wellbeing in older age”. Functional ability depends on intrinsic capacity, which is “the composite of all the physical and mental capacities that an individual can draw on”. When intrinsic capacity is too low to cope with the environmental challenges, functional loss occurs which threatens physical independency. Vitality capacity is considered as the underlying physiological determinant of intrinsic capacity reflecting the rate of biological ageing. While physical activity is a key element in its maintenance and improvement, vitality capacity is negatively impacted by chronic low-grade inflammation. Most ageing persons develop a chronic low-grade inflammatory profile (CLIP), which is a major pathophysiological driver for frailty and other ageing-related chronic diseases. Therefore, monitoring the trajectories of vitality capacity during ageing is of uttermost importance to provide timely (preventive) interventions. Fatigue and muscle endurance are two biomarkers of vitality capacity, which are easy to measure and allow to identify older persons with increasing CLIP and at risk for frailty. Since also CLIP can be countered by means of physical exercise, knowledge of these concepts and their assessment are highly relevant for the audience of the EGREPA -conference in their mission to promote healthy ageing.



## SYMPOSIA PRESENTATIONS

## Technology-based cognitive-motor training in home settings of older adults

Authors: Prof. Anabela Silva<sup>1</sup>, Prof. Rogerio Pessoto Hirata<sup>2</sup>, Prof. Eling Douwe de Bruin<sup>3</sup>, Dr. Eleftheria Giannouli<sup>4</sup>

<sup>1</sup> University of Aveiro

<sup>2</sup> Aalborg University

<sup>3</sup> Eastern Switzerland University of Applied Sciences

<sup>4</sup> ETH Zurich, Switzerland

Advancements in information and communication technologies (ICTs) are revolutionizing healthcare delivery, offering innovative solutions to address the escalating demands on health services. Particularly in the realm of active and healthy aging, ICTs play a pivotal role by supporting the health, well-being, and independence of older adults. This symposium presents recent studies leveraging ICTs to provide cognitive-motor training within the home environments of older adults.

Silva et al. and Hirata et al. explore the efficacy of online dance training in enhancing cognitive and motor functions. Additionally, De Bruin et al. and Giannouli et al. present findings on the feasibility and effects of utilizing a pressure-sensitive mat to administer cognitive-motor exergame training, targeting healthy older adults and those with mild cognitive impairment respectively.

The utilization of technology-enabled training within the home setting, coupled with remote management, has proven particularly vital amidst the challenges posed by the COVID-19 pandemic. As technological advancements persist and the ICT literacy among older adults continues to rise, the significance of such interventions is expected to increase further. Therefore, research in this domain is not only imperative but also timely, offering invaluable insights into fostering active and healthy aging.

- (1) Anabela Silva: A mixed-methods randomized and controlled pilot study on the impact of a web-based dance solution
- (2) Rogerio Pessoto Hirata: Benefits of a 12-week online dance training intervention on static and dynamic postural stability and gait speed in older adults
- (3) Eling de Bruin: Targeting the brain using Information Technology for secondary prevention of mild neurocognitive disorder
- (4) Eleftheria Giannouli: Feasibility and Effectiveness of a Personalized Home-Based Motor-Cognitive Training Program in Community-Dwelling Older Adults

## Different movement-based programs for the older adults, the same: holistic health!

Symposium Chair:  
Ana Isabel Morais<sup>1</sup>

<sup>1</sup>*University of Évora, Comprehensive Health Research Centre, Portugal*

In this symposium we intend to present four different non-pharmacological intervention programs, in the field of physical activity, aimed at the elderly population in different contexts, which are currently being led by different research teams from the University of Évora (Portugal) and the Comprehensive Health Research Center. The objective of these programs is common: to involve the different domains of the individual's health. Therefore, we will present:

Two programs carried out in the aquatic environment:

**Aquafast:** intends to study the potential of an aquatic program with increased speed and task specification on functional capacity, independence, and the risk of falls in older people.

**Aquamentia:** this is a psychomotor intervention program in an aquatic environment, aimed at elderly people with dementia, based on research into the effects of this disease on the individual's different skills, at a physical, emotional, cognitive, and social level.

Programs carried out on land: aims to present the beneficial effects of innovative exercise and rehabilitation interventions targeted at older adults across different age groups. We developed several studies testing exercise and rehabilitation targeting community-dwelling, nursing home, or home-care older adults (e.g. orienting, virtual reality, dance, psychomotor rehabilitation, multidisciplinary). Also, we will refer to a balance training in institutionalized older adults, that reduced the fear of falling, enhanced dynamic balance, and improved both isometric strengths.

Titles of the conferences:

- Psychomotor intervention on water for people with dementia: Matias, A.; Santos, G.; Morais, A.
- Aquafast: potential of aquatic high-intensity training for older people: Antas, D.; Bravo, J.; Gonçalves, B.; Figueira, B.; Batalha, N.;
- Aging well: Comprehensive Exercise and Rehabilitation Interventions for Optimal Physical and Cognitive Health: Pereira, C. Marmeleira, J.;
- Balance training in older individuals living in institutions reduces falls and fear of falling: Parraça, J.; Carmelo Adsuar, J.; Apolo, M.D.; Olivares, P.

**Acknowledgement:** this presentation was developed in the context of the Scoping workshop “Health and wellbeing of the Portuguese population” sponsored by Loughborough University and University of Évora 2024.

## Challenges in physical activity promotion for older adults and nursing home residents

Author: Prof. Bettina Wollesen<sup>1</sup>, Prof. Michael Brach<sup>2</sup>, Prof. Nadja Schott, Vera Belkin<sup>4</sup>

<sup>1</sup> Human Movement and Exercise Science, Department of Human Movement Science, University of Hamburg, Turmweg 2, 20146 Hamburg, Germany.

<sup>2</sup> Institute of Sport and Exercise Sciences, Department of Movement Science, University of Münster, Horstmarer Landweg 62b, 48149 Münster, Germany.

<sup>3</sup> Institute for Sport and Movement Science, Department of Psychology and Human Movement Science, University of Stuttgart, Allmandring 28, 70569 Stuttgart, Germany

<sup>4</sup> Affiliation: Institute of Sport and Exercise Sciences, Department of Neuromotor Behavior and Exercise, University of Münster, Wilhelm-Schickard-Straße 8, 48149 Münster, Germany.

Demographic and societal trends have far-reaching implications for clinical care, medical research, and health policy. Regular exercise or physical activity and an active lifestyle have been shown to influence the intercept, slope, and rate of age-related changes.

Three primary pathways can be distinguished for the beneficial effects of exercise interventions: (1) physical activity and tailored exercise improve various outcomes of cognitive and motor fitness, (2) social engagement with related psychosocial parameters and mental health, and (3) cognitive stimulation, which is also associated with physical and global functioning (e.g., ADL, IADLs), cognitive performance (especially memory and executive functions), and improved quality of life.

However, the translation of appropriate interventions into digital technologies, as well as the integration of specific requirements and needs of, e.g., multimorbid older adults, is still insufficient. This symposium will address these needs and provide ideas for transferring them into innovative intervention solutions.

Presentation 1: Promoting Physical Activity in Older Adults through Information and Communication Technologies: The relationship between user needs and technology requirements (Michael Brach), Authors: Michael Brach, Ellen Bentlage Mona Ahmed, Pilar Gangas, Alberto del Rio Ponce

Presentation 2: Influence of cognitive and emotional factors on dual-task performance in nursing home residents - The mediating and moderating roles of cognition, fear of falling, well-being and depression (Nadja Schott), Authors: Nadja Schott, Thomas Jürgen Klotzbier, Julian Rudisch, Oliver Vogel, Thomas Cordes, Claudia Voelcker-Rehage, Bettina Wollesen

Presentation 3: Promotion of Physical Activity and Life Space Mobility in Nursing Home Residents: Introduction to the PROGRESS study protocol (Vera Belkin), Authors: Vera Belkin, Tanja Janssen, Julian Rudisch, Bettina Wollesen & Claudia Voelcker-Rehage

Presentation 4: Benefits of exercise for nursing home residents - does the dose matter? (Bettina Wollesen), Authors: Bettina Wollesen, Madeleine Fricke, Anna Wunderlich & Klaus Gramann

## Future directions in the research of muscle-brain crosstalk in healthy aging: perspectives into models, hypotheses, and methods

Authors: Dr. Wouter Vints<sup>1,2</sup>, Prof. Ivan Bautmans<sup>3</sup>, Prof. Nerijus Masiulis<sup>1</sup>, Dr. Oron Levin<sup>1</sup>, Prof. Hans Degens<sup>1</sup>

<sup>1</sup> Lithuanian Sports University, Lithuania

<sup>2</sup> Maastricht University, Netherlands

<sup>3</sup> Vrije Universiteit Brussel, Belgium

The symposium aims to provide an overview into mechanisms underlying the beneficial effect of exercise on brain and muscle functioning and discuss possible hypotheses explaining these effects.

An increasingly popular explanation for the mechanism of cognitive and physical enhancement following physical exercise is the exerkin hypothesis. Exerkines are defined as peptides, metabolites, and nucleic acids that are released in response to acute and/or chronic exercise. They can play either neuroprotective or neurodegenerative roles by activating diverse signaling pathways. An overview on signaling pathways involved in exercise-induced neuroplasticity in the aging brain will be discussed by dr. Wouter Vints.

Title: Unraveling exerkin's molecular pathways to enhance cognitive function

Inflammation and oxidative stress have long been implicated as key factors contributing to the development of neurodegenerative and neuropsychiatric disorders in middle-age and late life. In the context of aging, ‘inflammaging’ refers to the gradual transition into a chronic pro-inflammatory stage that is reported when people get older. The beneficial effects of exercise on inflammation profiles of older adults and their underlying signaling pathways will be discussed by prof. Ivan Bautmans.

Title: Exercise to combat chronic low-grade inflammation

Exercise interventions have been acknowledged for having beneficial effects on cardiovascular health, muscle health and brain health. However, these beneficial effects vary as a function of the training protocol. An overview on recent methods of training paradigms of older adults and their potential impact on muscle structural and neurochemical properties in the aging population will be discussed by prof. Nerijus Masiulis.

Title: What type of physical exercise would be optimal for cognitive and functional gains in older age?

Proton MRS (1H-MRS) of the brain can be used in this respect for exploring neurometabolic alterations related to neuronal/axonal loss and neuroinflammation in normal aging and neurodegenerative conditions that cannot be acquired noninvasively by other methods. An overview into the use of 1H-MRS in research of healthy aging will be discussed by prof. Oron Levin.

Title: Magnetic resonance spectroscopy as non-invasive tool for assessing brain adaptation to physical exercise in older age

Finally, exercise interventions have been acknowledged for having beneficial effects on neuromuscular control. However, these effects may be modulated as function of age and/or level of physical activity. An overview on the differential effects of exercise on neuromuscular junction integrity as function across different target populations will be provided by prof. Hans Degens.

Title: Age-related muscle remodelling in normal people and master athletes; no evidence for motor unit remodelling?

## Gamification approaches for assessment and training of cognitive and motor functioning in rehabilitation settings

Symposium Chair:

Prof. Luka Slosar<sup>1</sup>, Prof. David Beckwee<sup>2</sup>, Prof. Antoine Langeard<sup>3</sup>, Eleftheria Giannouli<sup>4</sup>

<sup>1</sup> Science & Research Center Koper

<sup>2</sup> Vrije Universiteit Brussel, Belgium

<sup>3</sup> University of Caen Normandy, France

<sup>4</sup> ETH Zurich, Switzerland

In recent years, the development of health technology systems supporting both patients and healthcare professionals has increased significantly. Gamification, a concept rooted in applying "game design elements in a non-game context," has emerged as a powerful tool to increase engagement, demonstrating positive effects on training adherence across various patient populations. This symposium presents studies harnessing information and communication technologies (ICTs) to assess and improve cognitive and motor functioning in older adults within rehabilitation settings.

Slosar et al. will demonstrate the utilization of a virtual reality tool for balance assessment during a 10-day hospital bedrest. Meanwhile, Beckwee et al. will showcase the efficacy of a tablet-based game, driven by electromyography sensors, in enhancing strength among bedridden individuals within the hospital environment. Additionally, Langeard et al. will present the acceptability findings of a prototype device designed to deliver cognitive-electrical stimulation training for falls prevention. Finally, Giannouli et al. will present feasibility and effects of exergame-based cognitive-motor training within the scope of inpatient rehabilitation of geriatric, Parkinson's and stroke patients.

The integration of gamification into rehabilitation presents abundant opportunities for refining training methodologies and diagnostics. As gamification gains traction in both research and clinical practice, this symposium promises to offer invaluable insights into current strategies and their practical implications.

## Systemic and intra-articular effects of exercise in health and disease

Authors: Ivan Bautmans<sup>1</sup>, Frau Emelyn Mathot<sup>1</sup>, Prof. Rose Njemini<sup>1</sup>

<sup>1</sup> Vrije Universiteit Brussel, Belgium

Ageing is characterized by the progressive decline in muscle mass and especially muscle strength. This process can be accelerated by a chronic low-grade inflammation which develops in the absence of acute inflammation but is inherent to ageing, described as inflammaging. Several factors such as immune cell senescence and a higher concentration of pro-inflammatory cytokines are responsible for an elevation of the basal inflammatory milieu. With regards to other age-related pathologies such as knee osteoarthritis more evidence emerges of the biochemical origins of this pathology and especially the impact of inflammatory mediators on this process. Furthermore, both sarcopenia and chronic low grade inflammation are believed to contribute to frailty, characterized by a reduction in reserve capacity and a decreased resistance to stressors.

Physical exercise and especially resistance exercise are well investigated interventions to improve muscle strength. Besides these important strength effects, evidence shows anti-inflammatory effects of physical exercise. Exercise therapy can induce circulatory and intra-articular anti-inflammatory effects, even after a single bout of exercise. Regarding circulatory effects, the intensity of resistance exercise must be high enough to elicit this exercise induced responses.

In this symposium, Ivan BAUTMANS will present recent evidence from the SPRINT-study (<https://fria.research.vub.be/en/sprint>) showing that both high and moderate intensity of resistance exercise improves the stress response of peripheral mononuclear blood cells by mimicking in-vitro an acute infection by lipopolysaccharide challenge. However different inflammation-related genes are affected comparing these two modalities.

Since active muscle contractions are assumed to drive these exercise-induced immunological adaptations, Emelyn MATHOT will present a systematic literature review demonstrating that a flexibility training intervention is a very good candidate control intervention for exercise immunology studies.

Most evidence comes from studies involving healthy participants, Ivan BAUTMANS will present a systematic literature review with meta-analysis showing that exercise has also anti-inflammatory effects in patients with osteoarthritis.

Finally, Rose NJEMINI will present recent data pointing to the association between intra-articular inflammatory mediators in osteoarthritic knee joints and the degree of pain sensitization.



## ORAL PRESENTATIONS

## Exercise, Cognition, and Neuroplasticity 1

### Improving Cognitive Functions in Healthy Older Adults: A Comparison of Three Combined Training Programs

Authors: Clelia Carrubba<sup>1</sup>, Jean-Jacques Temprado<sup>1</sup>, Marta Maria Torre<sup>2</sup>, Antoine Langeard<sup>3</sup>, Laurin Jérôme<sup>1</sup>, Nicolas Hugues<sup>1</sup>

<sup>1</sup> Aix Marseille Université, France

<sup>2</sup> Institut des Sciences du Mouvement, France

<sup>3</sup> Université Caen Normandie, France

**Theoretical context and objectives:** Preventing and delaying age-related cognitive and functional decline is essential for the growing number of older adults. Combining aerobic and complex motor movement training, especially using new technologies<sup>1</sup>, seems to provide optimal benefits in this regard<sup>2</sup>. The combination can be customized in pre-defined circuit training, or recognized in natural activities such as Nordic Walking (NW) and Tai Chi (TAI). This study aimed to compare NW and TAI with a lab-customized Circuit Training combined with the Fitlight trainer™ (CT-FIT) technology, a fitness game specifically designed to enhance cognitive load during training. We expect that CT-FIT would provide greater improvements than the other natural solutions.

**Methods:** 44 older adults (71.7 ± 4.4 yr.) were randomly divided into three groups (NW, TAI, CT-FIT) and trained for 3 sessions of 75 min a week for 8 weeks. Cognitive [MoCA, Color-Words Stroop test (CWST), Trail Making Test (TMT A&B), Rey Complex Figure Copy Task (REY)], motor [(Unipedal Balance Test (UBT), Timed Up and Go (TUG), Chair-Sit and Reach test (CS&R), and Four-Square Stepping Test (4SST)], and physical functions [(Timed Sit-To-Stand (STS), Incremental Shuttle Walking Test (SWT)] were assessed at baseline, 4, and 8 weeks after the intervention.

**Results:** All cognitive, motor, and physical performances improved over time (p<.05). Among the cognitive tests, only the TMT B yielded a significant group difference in the number of errors, with TAI group reporting higher error scores than CT-FIT group (p<.05). Among the motor and physical tests, the TUG, UBT, and SWT showed significant time\*group interactions (p<.05), with CT-FIT group exhibiting greater improvements.

**Discussion:** 4 weeks of NW, TAI, or CT-FIT training positively affects cognitive functions in older adults, while 8 weeks seem to be needed for physical and motor outcomes. Despite expecting a superiority of the CT-FIT over the other natural activities, we did not find significant differences between the three groups. Nevertheless, the use of the Fitlight Trainer™ system in a CT program could increase training variability and allow coaches to set up individualized and enjoyable training programs.

## The Effects of Vestibular-Based Exercises and Calisthenic Exercises on Cognitive Functions in Older Individuals: A Randomized Controlled Trial.

Authors: Mert Volkan Ahin<sup>1</sup>, Ugur Cavlak<sup>2</sup>

<sup>1</sup> Zeytinburnu Semiha Sakir Huzurevi, Turkey

<sup>2</sup> Biruni University, Turkey

This study was planned to determine the effects of vestibular-based exercises (VBE) and calisthenic-based exercises (CBE) on the cognitive functions of the older individuals. A total of 30 people (21 male, 9 female; range: 65 –85) participated in the study. The mean average age of the participants was  $74.90 \pm 5.23$  years. In this randomized controlled study, 30 participants were divided into two groups: VBE Group (n: 15) and CBE Group (n: 15). Standardized Mini Mental State Test (SMMT) and 3 dual task (motor + cognitive: Dual Task 1, 2, 3) tests were used to evaluate the cognitive functions of the participants. All the evaluations made before and after the exercise program. Each group participants were divided into 3 groups (each group consisted of 5 persons) and involved in an 8-week (3 days a week) exercise program (warm-up, VBE or CBE, cool-down). When the results of the VBE and CBE groups before and after the treatment program were compared; the differences were found to be statistically significant in both groups ( $p < 0.05$ ). When the groups were compared with each other in terms of this improvements, there was no difference in the Dual Task 1 (DT 1) test scores ( $p > 0.05$ ) between the two groups. Significant difference between the groups in terms of SMMT results was found to be higher in favor of the VBE Group ( $p < 0.05$ ). When the Dual Task 2 (DT 2) and Dual Task 3 (DT 3) test results were compared, the statistical difference was found to be significant in favor of the CBE group ( $p < 0.05$ ). These research results showed that VBE and CBE are effective in improving cognitive functions in the older individuals. However, while VBEs increased cognitive functions, CBEs increased the dual task.

## Effect of High-Intensity Interval and Moderate-Intensity Continuous training on neuroplasticity, cognition and sensorimotor performance in aged rats

Authors: Cécile Marcourt<sup>1</sup>, Jérôme Laurin<sup>2</sup>, Nicolas Hugues<sup>2</sup>, Antoine Langeard<sup>3</sup>, Jean-Jacques Temprado<sup>1</sup>

<sup>1</sup> Institut des Sciences du Mouvement (ISM), Aix Marseille Université, France

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<sup>3</sup> Université Caen Normandie, France

**Introduction:** Aging causes a progressive decline in sensorimotor, cardiovascular and cognitive function. Endurance training has been shown to improve cognitive function by stimulating various processes such as neurogenesis and synaptic plasticity in the cortex and/or hippocampus. However, the benefits are highly dependent on the duration, intensity and frequency of exercise. To understand the hippocampal and cortical molecular pathways underlying the effect of training, the use of animal models is necessary. The aim of the current study is to compare 4 weeks of either high-intensity interval (HIIT) or moderate-intensity continuous (MICT) training on cognition, endurance and sensorimotor performance, and cerebral markers reflecting cerebral plasticity.

**Methods:** 24 aged rats (20 ± 2 months) were randomly divided into 3 groups: Control (n = 9), MICT (n = 7) and HIIT (n = 6). Endurance was assessed by an incremental treadmill exercise test. Sensorimotor performance was measured by grip strength and the adhesive removal test. Short-term memory was assessed with the novel object recognition test. At the end of the protocol, the animals' brains were removed to assess the concentration of cerebral markers related to brain plasticity by molecular analysis. Grip strength and endurance were measured three times: PRE, 2 weeks and POST training. Cognition and tactile sensitivity were assessed at POST only.

**Results:** At a behavioural level, both trainings improved i) lactate-threshold related speed, ii) maximal speed, iii) memory, tactile sensitivity and forelimb strength compared to the control group. On a structural level, both MICT and HIIT increase cerebral markers related to brain plasticity. However, MICT stimulates a greater number of cerebral markers involved in synaptic plasticity and cognition in both the cortex and hippocampus than HIIT.

**Discussion:** MICT and HIIT are effective in promoting memory improvement in aged rats through different molecular pathways, depending on the type of training and the cerebral region. In order to improve endurance programs for the elderly, the time course of molecular markers and their relationship to cognition remains to be determined.

## Activity and cognitive function in middle-aged and older adults - preliminary study results.

Authors: Natalia Gawron<sup>1</sup>, Aleksander Zębrowski<sup>2</sup>, Beata Hintze<sup>1</sup>

<sup>1</sup> The Maria Grzegorzewska University, Poland

<sup>2</sup> Jagiellonian University, Poland

The results of a cross-sectional study of middle-aged and older adults are discussed. Our objective was to assess cognitive performance, physical activity, and home and leisure activities of these individuals and to test whether higher levels of activity are associated with improved cognitive performance. We studied 52 women and 30 men, age  $M = 62$ ,  $SD = 7.2$  years. The participants had no neurological diseases, psychiatric diseases, significant perceptual or motor limitations. The following cognitive functions were tested: visuospatial, constructional, attention, working memory, mental rotation and executive functions. We used the standardised cognitive tests Block Design, Digit Span and Digit Symbol from the Polish version of the Wechsler Adult Intelligence Scales battery, the Colour Trails Test and experimental computer tasks (Link's Cube, Mental Rotation Task, arrow task, n-back task). Physical activity was measured using Onwalk 900 pedometers. Home and leisure activities were measured by a questionnaire covering domestic, social, cultural, intellectual, spiritual, family and recreational activities, in which participants reported how often they engaged in 48 fairly common tasks. Principal component analysis revealed two cognitive factors: visuospatial/executive and working memory. General linear models were used to test associations between cognition and activity. The results showed that there was no significant association between cognitive factors or home and leisure activities and the number of steps taken in 7 days. In addition, age, sex and home and leisure activities accounted for 30% of the variance in the visuospatial/executive function factor (home and leisure activities - 6%) and 19.5% of the variance in the working memory factor (home and leisure activities - 7%). Cognitive scores and sex, however, accounted for 17% of the variance in home and leisure activities. These findings can be interpreted as being in line with the theory of cognitive reserve. This suggests that rich and varied experiences, activities and knowledge gained over the life course can promote cognitive performance. It may also be important for middle-aged and older people to engage in physical activity, especially walking, to maintain cognitive function. However, it is likely that a larger study group will be needed to prove this, as has been the case with other studies on this topic.

## The impact of age-related hearing-impairment on cognitive and motor dual-task costs

Authors: Anna Wunderlich<sup>1</sup>, Bettina Wollesen<sup>2</sup>, Klaus Gramann<sup>1</sup>

<sup>1</sup> TU Berlin, Germany

<sup>2</sup> University of Hamburg, Germany

Age-related hearing decline exacerbates cognitive-motor interference (CMI) in older adults, leading to impaired motor performance and an increased risk of falls. This effect is independent of age and comorbidities and is more pronounced when additional tasks must be performed during movement. The stage at which hearing impairment enhances cognitive-motor interference remains unclear.

To answer this question, the study compared 43 young and 39 older healthy participants to 30 older hearing-impaired participants using a mobile brain/body imaging (MoBI) approach in single and dual-task conditions. Participants performed a visual and auditory stimulus discrimination task while seated or walking at their preferred speed. The stimulus discrimination task required participants to respond with a right or left manual response according to stimulus color or pitch, respectively. As there were only two types of stimuli within each modality, the presentation side of half of the stimuli was congruent with the correct response side. The study captured gait parameters using the OptoGait system (Microgate, Italy) and motion tracking with five motion trackers (HTC Vive, Taiwan) at the wrists, torso, and feet. The study compares the dual-task costs (DTC) of both modalities and dual-task to single-task walking. The method was published in a study protocol (Wunderlich et al., 2021).

During dual-task walking, all groups showed compensatory strategies such as slower walking speed. The intercept of DTC in six-min-walking distance is significant in both modalities ( $p < .001$ ,  $\eta^2p = .580$ ) with higher DTC in the visual modality ( $p = .015$ ,  $\eta^2p = .053$ ). While the main effect of group ( $p = .061$ ,  $\eta^2p = .050$ ) and the difference between younger and older healthy adults were not statistically significant ( $p = .380$ ), older adults with hearing impairment exhibit a stronger impact of cognitive-motor interference than young healthy adults ( $p = .019$ ). This preliminary analysis of walking performance suggests that hearing impairment exacerbates CMI in a general way that is not limited to the auditory modality.

The data recording is still ongoing but will be finalized at the time of EGRAPA 2024. This dataset will provide new insights into cognitive-motor interference in older healthy and older hearing-impaired adults.

## Aspects of Training in Advanced Age

### Concept-framed reviews of combined training studies in older adults: conventional intervention and exergames

Authors: Marta Maria Torre<sup>1</sup>, Jean-Jacques Temprado<sup>1</sup>

<sup>1</sup> Institut des Sciences du Mouvement, France

**Theoretical context and objectives:** Combined training can be delivered either through conventional interventions (CCT) or via exergames (EXG). The two groups of literature have, however, developed quite separately, based on different assumptions. CCT studies are more or less explicitly grounded on the hypothesis, inspired by the Adaptive Capacity Model, by which separated training modalities are effective in improving brain and cognition, their combination should allow them to cumulate their effects. On the other hand, EXG interventions have shifted from pure entertainment to training and rehabilitation roles in the last decades. Therefore, they are more or less explicitly grounded on the belief that the use of new technologies, virtual reality, video games, or brain training tools, when combined with physical and/or motor exercise, would "naturally" add a considerable plus-value, not only regarding motivation but also, for training effectiveness. This might explain why the literature on EXG was less conceptually grounded and, more descriptive than those of CCT. Here, we will answer the question of whether why, and in which conditions exergaming interventions are more effective relative to conventional interventions.

**Method:** Our analysis was based on a conceptualized model including seven interacting constructs (stimuli, settings, targets, markers, outcomes, moderators, and mechanisms), to afford a global picture of the determining factors of both literatures. Regarding CCT 12 reviews/meta-analyses have been selected. Among the articles they considered, 190 were eligible, and 25 have been retained. Regarding the EXG 22 review/meta-analyses 22 out of 163 eligible studies were retained.

**Results & Discussion:** The general principles underlying the effectiveness of both interventions were difficult to identify, due to the heterogeneity of existing literature. The comparison between the two was inconclusive due to the lack of related studies and because most EXG protocols are based on a “product first” instead of a “training first” approach. However, our model-based analysis suggested that when well-designed and well-conducted, combined interventions are more effective than separated physical and cognitive training to improve brain and cognition in older adults, independent of whether it was implemented as CCT or EXG.



## Defining and reporting exercise intensity in interventions for older adults: Results of a modified Delphi process

Authors: Mona Herden<sup>1</sup>, Bettina Wollesen<sup>1</sup>, Christoforos Giannaki<sup>2</sup>, Nicola Lamberti

<sup>1</sup> University Hamburg, Germany

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### Background

Many exercise studies, including older adults, do not report all relevant exercise characteristics. Especially the description of exercise intensity is missing and mostly not controlled. This leads to difficulties in interpreting study results and summarizing the evidence in systematic reviews or meta-analyses. Therefore, the aim of the present Delphi study was to gain recommendations about the categorization of exercise intensity and for the conducting and reporting of characteristics in future intervention studies with older adults by experts in exercise science and physiology.

### Methods

Two hundred ninety-seven international interdisciplinary participants of the EU COST action PhysAgeNet were invited to participate in three rounds of online questionnaires in April/May 2023. Up to N= 93 experts participated in each round. Round 1 included open-ended questions to solicit possible recommendations and categorizations for light, moderate, vigorous, and high intensity. In round 2, the experts rated their agreement using Likert scales (1–10) on the revealed categories and recommendations. Clusters with a higher average rating of M = 8.0 were summarized into round 3. In the final round, the results were presented for a final rating of agreement (based on a simple majority >50 %).

### Results

In round 1 a total of 416 qualitative statements were provided from thirteen questions. From round 1 to round 3 n=38 items were excluded and n=205 items were retained for the final consensus. In round three 37 participants completed the whole questionnaire. The experts showed overall agreement on the final categorizations with 6.7 to 8.8 out of 10 points on the Likert scale. They also showed broad consensus on the relevance of reporting exercise intensity and the recommendations for future conducting and reporting of study results. However, exercise types such as yoga, balance, and coordination training led to conflicting results for categorization into light or moderate.

### Discussion and Implications

The results of the current survey can be used to classify the intensity of exercise and suggest a practical approach that can be adopted by the scientific community and applied when conducting systematic reviews and meta-analysis articles when vital and objective information regarding exercise intensity is lacking from the original article.

## Sport in Old Age: An Example of Long-distance Running and Nordic Walking

Author: Miloš Bednář<sup>1</sup>

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General research question sounds: How to motivate people for lifelong physical activity? A lifelong perspective means to endure even in old age. For years we focused our attention on long-distance runners with the stage of minimally 20 years of competitive running. An indicator of this activity is participation in Europe's oldest continuously held 10 K running race "Běchovice - Praha". Each runner was able to participate in this race from 20 to 61 times. In earlier research with 168 runners (Bednář & Malinauskas, 2014) we were interested in aspects of motivation to continue running for a long time and in lifestyle joined with it. Now we can work with the data of 355 runners (67 are after death). We continue with the question of motivation, but changing its focus on wider area of physical activities in the moment they cannot continue in race running, typically due to musculoskeletal or cardiovascular problems. There is also one psychological-aesthetic reason for quitting racing, expressed in the phrase: "My running is no longer something to look at!"

Time between finishing of racing career and death is not easy period of life. We feel necessity to help runners to transform their former aims in the field of sport and offer them proper form of physical activity. We are persuaded that Nordic Walking is the best activity for this aim. It has set of benefits, especially tones legs, sculpts arms, cinches waist, tightens core, helps with balance and weight management, protects hips and knee joints, strengthens heart and lungs, improves lymph drainage, boosts blood circulation etc. Chest, arms, shoulders, abdominal muscles, and other core muscles are all involved as well as legs. Adding poles to walking leads to a powerful total-body workout but with lower-impact exercise option than running. We must also mention the benefits in terms of mental and social wellbeing reducing stress and anxiety. We are convinced that all of the above is the perfect tool to counteract the emptiness after the end of running career.

## Personalized Physical Activity Programs for Seniors: Why it is Important?

Authors: Prof. Aija Klavina<sup>1</sup>

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Personalized Medicine (PM) represents a shift from the conventional "one size fits all" model, embracing a tailored strategy for disease prevention, diagnosis, and treatment customized to an individual's unique biological traits. Essentially, PM places the person at the core of healthcare, aiming to optimize the management of both the existing condition and risks to diseases.

For example, in the realm of prediabetes management, physical activity (PA) plays a crucial role, serving as a cornerstone in the prevention and potential remission of diabetes. The positive impact of exercise on glycemic control is primarily attributed to the enhancement of whole-body insulin sensitivity. Furthermore, in cancer prevention and treatment regular PA not only reduces the risk of cancer but also demonstrates significant benefits in cancer patients by diminishing treatment side effects, decreasing recurrence rates, and improving overall survival. Exercise-induced effects on tumor size and incidence are associated with the remodeling of the tumor microenvironment, suggesting that exercise may serve as a therapeutic tool in addition to its preventive role. Overall, engagement in physical activity is linked to improved clinical outcomes in aging individuals, contributing to longevity.

This presentation aims to delineate the evidence-based physiological, psychosocial health, and quality of life benefits resulting from individualized physical activity interventions integrated into health therapy programs for the elderly. Additionally, we will emphasize the ecological model promoting a healthier lifestyle, providing evidence-based examples of facilitating and limiting factors associated with technological innovations that may enhance the well-being and active lifestyle choices of seniors.

## The effect of a selective balance enhancing physical exercise program on balance, gait, quality of life performance and risk of falls in old age elderly

Author: Lukas Mikalauskas<sup>1</sup>

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**Background:** Population ageing is widespread across the world. According to recent research data, falls are the second leading cause of unintentional injury death, accounting for as much as 55.8% of all accidental deaths among people aged 65 and over. Falls and the fear of falling can lead to mobility limitations and psychological trauma, affecting health-related quality of life. Research suggests that balance, gait training and muscle strengthening exercises plays a vital role for preventing falls in elderly, but programs parameters and implementation protocols like time, age group, setting, etc., in reducing the risk of falls remains unclear for optimal effectiveness.

**Purpose:** To evaluate the efficacy of 6-week selective balance enhancing physical exercise program performed individually at home and in community groups on balance, gait, quality of life and risk of falls among old age elderly.

**Hypothesis:** A progressive, easily adjustable and understandable selective balance enhancing exercise program performed individually at home is likely to be as effective or superior to that performed in community.

**Methods:** 28 participants included in this study, divided into two groups: Home-based – 14 (66,8 ± 6,4 years) and community-based – 14 (67,2 ± 5,8 years). Participants received 6-week selective exercise program, 4 times a week, 15-20 min. session. Gait, balance and quality of life parameters were measured before and after intervention by Tinetti balance and gait test, Timed Up and Go Test, 4 Stage Balance Test, 10-meter walk test and SF-36 questionnaire.

**Results:** Both groups showed statistically significant ( $p < 0,05$ ) improvements after intervention with time decrease of 8,4% in dynamic balance, time increase of 28,1% in static balance and 12,6% increase of scale score for fall risk in home-based group. Community-based group showed decrease of 7,6% in dynamic balance, increase of 20,7% in static balance and 13,7% increase for fall risk. No statistically significant difference between groups was found in pre-post measurement ( $p > 0,05$ ).

**Conclusion:** 6-week selective balance enhancing exercise program in home and community settings effectively improve balance, gait performance and reduce risk of falls among old age people.

## Exercise and Psychological Functioning 1

### Effects of Pilates vs Zumba dancing on Functional performances, mood, and QoL in postmenopausal women

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**Introduction:** This study aimed to compare the effects of Zumba dancing and Pilates training on functional performances, mood and quality of life (QoL) in postmenopausal women.

**Methods:** Fifty-four inactive postmenopausal women, aged 55-65 years, were randomly allocated to a control group (CG), a Pilates group (PG) or a Zumba group (ZG). Functional performances, mood, and QoL were assessed before and after the 12-week intervention period. Functional performances were evaluated using the 10m walking test for dynamic balance, 30-Second Chair Stand test for lower body muscle strength, FRT for flexibility, Timed Up and Go test for functional mobility. The mood was evaluated via BMIS questionnaire, and QoL by the SF-36 questionnaire. The 8-item Physical Activity Enjoyment Scale (8-item PACES) was used to assess enjoyment after practicing the 1st training session.

**Results:** both training modalities, Pilates and Zumba dancing, significantly improve functional performances, in terms of dynamic balance (PG ( $p<0.001$ )/ ZG ( $p<0.001$ )), strength (PG ( $p<0.001$ )/ ZG ( $p<0.05$ )), flexibility (PG ( $p<0.001$ )/ ZG ( $p<0.001$ )), and mobility (PG ( $p<0.001$ )/ ZG ( $p<0.001$ )), as well as mood (PG ( $p<0.01$ )/ ZG ( $p<0.001$ )) in postmenopausal women. Additionally, both intervention programs significantly improved their QoL [in Physical Function (PG ( $p<0.001$ )/ ZG ( $p<0.001$ )) domain as well as the SF36 total scores (PG ( $p<0.01$ )/ ZG ( $p<0.001$ ))] with better performance following Zumba dancing. However, only Zumba dancing significantly enhanced their QoL in the Social Function ( $p<0.001$ ), Mental Health ( $p<0.001$ ) and Role Limitation-Mental ( $p<0.05$ ) domains. Regarding, the 8-item PACES, the ZG showed significant ( $p<0.001$ ) higher scores in all the items compared to the PG.

**Conclusion:** 12-week Pilates training or Zumba dancing appears to be an ideal exercise for promoting functional performances, mood and QoL in postmenopausal women. However, Zumba training seems to be more effective resulting in optimal scores. Given that most women enjoyed Zumba better than Pilates exercises, it would be interesting to practice Zumba or Pilates exercises for 3 (1h) sessions/week for 12 weeks in order to promote functional abilities during performing daily living activities and mood as well as QoL in postmenopausal women.

## The effectiveness of physical activity on psychological and physical well-being in older breast cancer patients: A systematic review and meta-analysis

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Physical activity (PA) in breast cancer (BC) survivors is considered to increase physical and psychological well-being, ameliorate adverse physical and psychological effects of cancer treatment, and reduce the risk of cancer recurrence. However, most cancer patients are not sufficiently physically active because initiation and maintenance of PA are challenging in this population. The main aim of this review is to explore and update the evidence on the effectiveness of different types of physical exercise in improving quality of life and reducing fatigue, anxiety, and depression in older adults with BC. Following the PRISMA guidelines, we performed systematic electronic database searches in PsycInfo, Medline, Web of Science, PubMed, Scopus, and Cochrane Central Registry of Controlled Trials (CENTRAL) for studies published from inception to December 2023. We restricted inclusion to academic publications conducted with patients with BC diagnosis 55 years old (middle-aged), but mainly over 65 (older adult), published in English in peer-reviewed journals, and the participants performed some kind of physical exercise. The search was limited to the randomized, case-control, and cohort studies. Data will be extracted for intervention strategies and other details such as study setting, age, duration and intensity of PA, behavior change in physical exercise, and intervention effectiveness. This review will synthesize the existing evidence and pinpoint current gaps in the literature on the effects of different types of PA in diverse groups of older breast cancer patients. Findings from this meta-analysis will help to design effective exercise interventions to improve and/or maintain quality of life, reduce anxiety and depression, and promote PA initiation and maintenance in these patients. The study is related to the EU project IMPORTANT (HORIZON-MISS-2022-01, N° 101104589) and COST Action PhysAgeNet (CA20104).

## Meta-analysis on the chronic effects of exercise on depression in older adults: Protocol and main results

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**Objective:** This review aimed to investigate the effects of chronic exercise on depression severity and various depressive symptoms in Randomized Controlled Trials (RCTs) including older adults with an average age of at least 60 years and a minimum level of mild depression. Thereby the moderating effects of various intervention and individual characteristics were considered. The presentation focuses on the comprehensive review protocol along with the primary findings of exercise effects on depression severity and depressive symptoms.

**Method:** We searched Web of Science, Academic Search Complete, MEDLINE, CINAHL, APA Psycinfo, SPORTDiscuss, and Cochrane from inception until July 2023. Primary outcomes targeted changes in overall depression severity assessed with validated depression scales; secondary outcomes included changes in specific symptoms that are related to depression such as sleep quality, fatigue, anxiety, mood, apathy, weight changes, processing speed, and executive functions. These were measured from baseline until the end of the intervention and to any available intermediary measurement or follow-up. Meta-analysis was undertaken to synthesize the effects of chronic exercise on primary and secondary outcomes. The moderating effects of intervention and individual characteristics were investigated by subgroup-analyses and meta-regression. Publication bias was addressed through sensitivity analyses. The quality and certainty of the evidence were assessed using GRADE and RoB 2.

**Results:** The comprehensive search yielded 20,418 records, of which 136 peer-reviewed articles met the inclusion criteria. A preliminary random-effects meta-analysis of 104 RCTs, encompassing 151 group comparisons, revealed that compared to active and passive control groups, chronic exercise interventions were associated with a medium effect size of  $d = 0.53$  (95% CI, 0.45 to 0.62,  $z = 12.06$ ,  $p < .001$ ) in reducing depression severity. However, there was considerable heterogeneity ( $T^2 = 0.20$ ,  $Q = 670.84$ ,  $p < .001$ ;  $I^2 = 77.74\%$ ).

**Conclusion:** This study is up to date the most extensive review on chronic exercise effects on depression in older adults. The conclusions drawn may provide a foundation for developing evidence-based recommendations for personalized exercise programs aimed at alleviating depression in older adults.



## The effects of art therapy on cognitive function and self-esteem in older people

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**Introduction:** As life expectancy increases, the proportion of seniors in society is increasing, but healthy life expectancy is not increasing as rapidly. Mental health is one of the most important factors in healthy ageing (Jeste et al., 2022). Many studies have shown that the use of Art Therapy can improve adult's perceptions of their health, well-being and quality of life (Galassi et al., 2022). Art Therapy seeks to phenomenologically explore people's unresolved issues, identifying them and guiding them towards personal growth in awareness and flexible, creative adaptation. The aim of the study was to evaluate the impact of Art Therapy (AT) on the cognitive functioning and self-esteem of older people living independently.

**Study organisation and methods:** The study was carried out at the Lithuanian Sports University from October 2023 to January 2024. 59 elderly people aged 63-79 years participated in the study. The subjects were divided into two groups by convenience sampling: a treatment group (29) and a control group (30). Ten AT sessions were conducted. The control group was not subjected to AT.

**Methods:** The study was carried out in accordance with the basic ethical principles of freedom, anonymity, confidentiality, and integrity. Participants underwent the Trail Making Test (TMT) Parts A and B, self-esteem was assessed with the Rosenberg Self-Esteem Questionnaire. Statistical analysis of the data was carried out using MS Excel and R statistics (R Core Team, 2024).

**Results:** Before the experiment, 93.10% of the treatment group subjects had average self-esteem, while 6.90% had high self-esteem. After the AT sessions, participants with average self-esteem accounted for 82.76% and the remaining 17.24% of subjects had high self-esteem. After the study, there was a significant difference in TMT Parts A and B speed between the treatment and control groups ( $p < 0.05$ ). In the treatment group, TMT Part B speed improved by 26.02% compared to baseline ( $p < 0.05$ ). In the control group, there was no significant difference in the scores, and they remained similar to those at the beginning of the study ( $p > 0.05$ ).

**Conclusions:** Art therapy had a positive effect on the subjects' cognitive function and self-esteem when compared to control group.

## Role of functional and clinical parameters in predicting aging perception in older adults

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**Background.** The multidimensional phenomenon of the awareness of having grown older might be a central predictive factor in experiencing successful aging (Diehl et al., 2010; Wurm et al., 2017). This study aimed to investigate the role of functional and cognitive parameters, as well as body image, in the perception of aging among older adults.

**Method.** A cross-sectional design was used with 56 participants in older adulthood (mean age 69.0 ± 5.76 years, 48.2% women). Data collection included questionnaires and functional tests to gather demographic information, as well as motor and cognitive performance measures such as the MoCA, Trail Making Test (TMT), Chair Rise, Timed Up-and-Go, 6-minute walk, and Arm Curls. Physical activity was assessed using the German Questionnaire on Physical Activity in the Over-50 Population. Body image was evaluated using the Body Image Dimensional Assessment (BIDA) and the Multidimensional Body-Self Relations Questionnaire (MBSRQ). Additionally, Barker's Aging Perception Questionnaire (B-APQ) was administered.

**Results.** Exploratory multiple linear regressions revealed that there is a significant relationship between B-APQ timeline-chronic and TMT-B (adj. R<sup>2</sup>=.115), as well as between B-APQ emotional representations and motor and cognitive performance, and MBSRQ appearance and illness orientation (adj. R<sup>2</sup>=.504), B-APQ consequence-positive with physical activity (sport), MBSRQ health and illness orientation (adj. R<sup>2</sup>=.360), B-APQ negative control with motor and cognitive performance and falls (adj. R<sup>2</sup>=.371), and B-APQ positive control with medication, education, and physical activity (sport) (adj. R<sup>2</sup>=.290). Gender, living with a partner, and the dimensional assessment of body image did not significantly contribute to the explanation of age perception.

**Discussion.** The study indicates that the experience of aging is linked to physical and cognitive factors, as well as the relationship between the body and self. Researchers, health professionals, and older individuals need to comprehend the impact of various perceptions of aging on health outcomes. This understanding has implications for intervention research and public health practice.

## Behavioral Change and Exercise Promotion

### The Role of Pre-Intervention Motivation in Health Behavioral Change: Insights from Experiment

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Older generations facing obesity often encounter challenges in forming and sustaining healthy habits due to established lifestyle patterns and potential resistance to change. However, research suggests that tailored interventions, such as community-based programs and online platforms, can effectively support habit formation in older individuals, fostering positive behaviors related to nutrition, physical activity, and overall health. Understanding the unique factors influencing habit formation in the older generation is crucial for designing targeted strategies to promote sustained health improvements and tackling obesity.

In this randomized control trial, we thus examined innovative strategies, namely online health training and community-based health training, aimed at fostering behavioral change (specifically, establishing new habits) within the elderly population. The literature reveals various determinants that might influence the achievement of behavioral change, including, but not limited to, motivation for change, goal-setting, and coaching to reinforce behavioral change. As part of our approach, participants were encouraged to set individualized goals, and both their baseline motivation and post-intervention commitment towards these goals were measured. Additionally, we probed into the interplay between initial motivation and dropout rates throughout the health training sessions.

Based upon our model of behavioral change and prior research, we expected that a higher level of pre-intervention motivation correlates with a greater likelihood of attaining the goals set at the trial's outset. We also explored whether behavioral interventions are differentially effective for participants of varying pre-intervention motivation. We expected that participants with low pre-intervention motivation to change would have better outcomes (goal achievements) if assigned to community based health training compared to online health training and control group. We hypothesize that the community-based health training positively affected the post-intervention motivation.

Regression analysis has been employed to test these hypotheses. Based on the analysis of 266 participants higher level of pre-intervention motivation was associated with greater goal attainment only in online health intervention.

Final findings will be provided at the conference.

## The Impact of Education and Gender on Perceived Physical Activity Constraints among Community Dwelling Older Adults

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Physical activity is crucial for the well-being of community-dwelling older adults. It is an essential component of a healthy lifestyle, especially for this demographic (Macera et al., 2016). However, there are various barriers that can impede their engagement in physical activity. These barriers include chronic health problems, fear of falling, inadequate environmental support, and a lack of self-efficacy about exercise (Watts et al., 2018). The level of physical activity among older adults is influenced by various factors, including gender and education level (Dyck et al., 2015). Hence, the purpose of this study was to investigate the differences between educational attainment levels and genders with respect to perceived physical activity constraints. The research sample comprised 139 older women and 108 men residing in the community. Among the participants, 105 had completed primary school, 35 had attained secondary school education, 57 had graduated from high school, and 47 had received their education from higher education institutions. The data were analyzed using a two-way MANOVA. The 2-way MANOVA results indicated a significant main effect on perceived physical activity constraints by gender ( $p = 0.044$ ), educational attainment ( $p=0.005$ ), and interaction between the two ( $p=0.042$ ). The follow-up ANOVA indicated that older adults who graduated from higher institutions had significantly lower constraints scores than primary school graduates in body perception, income, family, skill perception, and willpower subscales with Bonferroni adjusted values. The follow-up pairwise comparisons also indicated that women had significantly higher constraints scores in the facility and social environment subscales compared to community-dwelling older men. These results suggest that demographic characteristics play a crucial role in shaping individuals' perceptions of the environment and its impact on physical activity engagement. These findings underscore the need for targeted interventions that consider demographic factors to effectively address perceived barriers and promote physical activity in this population.

## The physical activity, cognitive functioning and motivation in elderly

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It is known the positive effect of physical activity on cognitive functioning of elderly persons. The study purposed to determine the most common physical activity levels of elderly persons in Georgia and to determine its connection to cognitive functioning perceived by elderly persons and by people from their close environment; to determine the optimal range of physical activity levels that is connected to the acceptable levels of cognitive functioning; to determine the most common motivational factors supporting elderly people to become included to more intensive physical activities. 100 elderly persons and the same number of their close people participated in the study from different regions of Georgia. The physical activity levels were assessed by the International Physical Activity Questionnaire - Short Form, the Cognitive Functioning Self-Assessment Scale was used for assessment of perception of cognitive functioning and the RM 4-FM: Motivation for Physical Activity and Exercise/ Working Out—Questionnaires for determining the motivational factors. The study revealed low levels of vigorous or moderate physical activity in Georgia elderly population; the study results showed high positive correlation between cognitive functioning perceived by elderly persons and by people from their close environment; the cognitive functioning perceived by elderly persons had high positive correlation with the walking activity but not with vigorous or moderate physical activities; the walking activity was significantly frequent in elderly people in comparison to vigorous or moderate physical activities; towards motivation for inclusion in physical activity the elderly people showed mostly intrinsic motivation but not external regulation; the elderly persons motivation for inclusion in physical exercises significantly not connected to the introjected regulation. The study results will help in development of the proper strategies for inclusion of elderly persons in physical activities to improve their cognitive and physical health.

## Evaluation of an e-learning platform promoting physical activity for older adults and their carers

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**Introduction:** An e-learning platform to promote health and wellbeing of older adults and their carers was developed in a European funded project (WHOLE – Wellbeing and Healthy Choices for Older Adults and their Carers). The platform offered a physical activity program with exercises for the upper and lower body to improve the cardiorespiratory fitness, strength, flexibility, balance, and coordination. Carers used the platform and implemented the exercises together with older adults.

**Objectives:** An international pilot study was conducted to evaluate the exercise program and the e-learning platform with predefined criteria for 1) feasibility, 2) usability, 3) usefulness, and 4) achievement of objectives (Beywl et al., 2008).

**Methods:** 145 carers ( $44.6 \pm 13.3$  years) and 138 older adults ( $78.9 \pm 9.9$  years) from Austria, Bulgaria, Germany, Israel, and Greece took part in the pilot study. The platform was used for eight weeks by carers after a training by qualified personal. It was recommended to be active together on three days a week for at least 20 minutes. After the pilot phase carers completed an evaluation questionnaire (N = 75). Additionally, focus groups with 47 carers were conducted in all countries.

**Results:** 1) The exercise program was evaluated as safe and suitable for the target group, 2) the platform was seen as satisfactory regarding its design and usability, 3) the information was rated as useful and implementable, 4) carers felt better in their subjective view. However, some carers experienced problems due to the complexity of the program and its digital use. Additionally, the actual implementation of the exercise program posed a problem: neither the aimed duration nor the frequency of use was attained.

**Conclusion:** Both the platform and the exercise program are experienced positive by the carers. However, the capacities to implement exercises together in daily life are limited. It must be tested whether conceptual adaptations are possible.

## Assessing Aspects of Physical Fitness

### Association between relative handgrip strength and Metabolic Syndrome in Saudi men and women

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The present cross sectional explanatory study aimed to explore the association of MetS and HGS in relation to gender and adiposity indices in Saudi old men and women with a sample size of 555 (287 males & 268 females). Measurements included anthropometry, body composition, hand grip strength HGS, blood sample collection biochemistry, and a record of filling a physical activity questionnaire. Results showed that the average age of the study population was 55.1±9.3 years for men and 60.4 ±9.3 for women, and the probable sarcopenia were found in 15.6% of the participants, and half of the participants (50.8%) were considered as MetS patients. Male subjects with lower HGS were more likely to have MetS (64.5%) compared to high HGS group (46.5%), ( $p=0.04$ ). Data based on MetS showed that HGS/BMI, HGS/Weight & HGS/Fat (%) were significantly higher in control subjects compared to patients with MetS in all subjects and males, among men but not women while it was non-significant for females. According to ROC analysis, the highest AUC was obtained for HGS/WC, which was significantly higher than HGS for males and females ( $P > 0.01$ ) based on DeLong's test. The multinomial regression showed significant associations of age and adiposity indices for MetS in males, and showed significant association with HGS in females. Lastly, at lower quartiles of HGS the probability of having MetS was higher in females, and the same was found in males at lower quartiles of HGS/%Fat and HGS/WC. In conclusion, higher risk of MetS at lower quartiles of HGS was found in females, and adiposity moderated the relationship between HGS and MetS in men, suggesting that gender and adiposity play a significant role in the interrelationship between HGS and MetS.



## No changes in muscle morphology over 10 years in sprint-trained masters runners

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**Introduction:** Ageing is accompanied by a progressive decrease in muscle mass and oxidative capacity, and loss of capillaries. All these changes negatively impact on the exercise performance of older people. Regular endurance and resistance training can improve the oxidative capacity and muscle size, respectively, resulting in improved exercise performance. Disuse is therefore thought to be a significant contributor to the age-related decline in exercise performance and changes in muscle morphology. Master athletes maintain high levels of physical activity and exhibit an exceptional exercise performance. They are therefore an ideal model to disentangle the effects of ageing from those of disuse.

**Methods:** Here we obtained muscle biopsies from 25 master sprinters in 2002 (47-84 years) and again from the same individuals 10 years later. The self-reported weekly training hours were not changed significantly over the 10 years. In histological sections, no significant changes in fibre type composition, fibre size or capillary density were observed, but there was some indication of loss of capillaries as reflected by a lower capillary-to-fibre ratio for type II fibres. Despite these minimal alterations over 10 years in muscle morphology, 60-m sprint performance and countermovement jump power were significantly reduced, with larger reductions in the oldest athletes. Neither the reduction in 60-m sprint performance, nor the reduction in muscle power were attributable to slowing of the muscle, corresponding with the absence of a significant change in fibre type composition, but rather were due in part to a decreased muscle force generating capacity.

**Discussion:** The weakening we observed in master sprinters over 10 years was not explicable by muscle fibre atrophy. As the reduction in force generating capacity was uniform across the ages, other factors must contribute to the larger decrements in performance of older athletes, such as an impaired neural control and/or changes in muscle quality, e.g., due to intramuscular fat and connective tissue accumulation.

**Conclusion:** In conclusion, in master athletes exercise performance decreases over time, even in the face of maintained weekly training hours. Overall, it appears that regular sprint training (and probably any type of training) does not delay the age-related reduction in exercise performance.

## Development and initial validation of the Geriatric Balance Self-Efficacy (GBSE) Scale: a new scale for nursing home residents

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**Background:** There are few studies investigating the psychometric properties of fear of falling and fall-related self-efficacy scales in nursing home residents. A major limitation of most current scales is that they are based on responses to a questionnaire - i.e., the use of short sentences to indicate situations - and may not reflect a person's feelings when actually performing mobility-related situations. In addition, these scales have not been developed for people living in nursing homes. This study aimed to validate a falls-related self-efficacy scale for nursing home residents based on performance in real-life situations and pictures to place responses in a more complex environmental context.

**Methods:** Thirty-eight residents (mean age: 80.8 years; 47% women) participated in this cross-sectional study. The Geriatric Balance Self-Efficacy (GBSE) Scale (two conditions: performance and imagery) was administered to all participants in conjunction with the Montreal Cognitive Assessment, the Well-Being Inventory for Gerontopsychiatry, the Timed-Up-and-Go test, gait speed, a balance test (standing on foam with eyes closed) and a questionnaire (demographics, activities). Psychometric properties (construct validity, internal consistency, repeatability, and reliability) were assessed using principal component analysis, Cronbach's alpha, and intraclass correlation tests (ICC).

**Results:** The 23-item, three-dimensional instrument assessing fall-related self-efficacy in vertical and horizontal locomotion and in standing/sitting up explained 67.7% of the total variance. The internal consistency of the total scale was excellent (Cronbach's alpha: 0.908, 0.942, 0.968); test-retest reliabilities were excellent with ICCs  $\geq 0.86$ . The GBSE was able to discriminate participants with severe functional impairment (area under the ROC curve  $>0.91$ ) and had significantly better discriminatory power than a single question on fear of falling.

**Conclusions:** This new instrument can help healthcare professionals identify low and high fall-related self-efficacy in the geriatric population, making it an important reference point for providing appropriate interventions in nursing homes. The results of this study provide initial evidence of the reliability and validity of the scale for future research.

## Multinuclear MR based detection of training induced changes in the skeletal muscle of elderly

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The defects in muscle physiology, loss of function and strength occur with aging. Physical activity and regular training were shown to benefit the whole-body metabolism in healthy adults as well as in patients with early-stage neurodegenerative diseases. Proton (<sup>1</sup>H) and phosphorus (<sup>31</sup>P) magnetic resonance spectroscopy can assess different aspects of skeletal muscle physiology and biochemistry. In this study we aimed to assess skeletal muscle metabolites and oxidative capacity in the group of elderly before and after several years of regular training intervention.

At this pilot stage we have analyzed the data from six healthy volunteers (f/m: 5/1 ; age at the start of intervention: 68±3y ; BMI at the start of intervention: 25.5±3.4 kg.m<sup>-2</sup> ) who underwent regular training program consisting of one unit of aerobic-resistance- and one of unit aerobic-strength-exercise in small groups every week. Training continued even during restrictions related to COVID19 via on-line streaming. Localized <sup>1</sup>H and <sup>31</sup>P MRS was performed on gastrocnemius muscle at 7T MR system equipped with dedicated RF coils and MR compatible ergometer in resting state and during an established submaximal aerobic exercise protocol. The concentrations of carnosine, intramyocellular lipids, phosphor containing metabolites and measures of oxidative ATP production were assessed.

Seven years of exercise intervention decreased the skeletal muscle concentration of carnosine (3.7±0.6 mM to 2.4±0.5 mM) and glycerophosphocholine (2.8±0.6 mM to 2.4±0.4 mM) and improved the mitochondrial oxidative capacity Q<sub>max</sub> (0.44±0.12 mM/s to 0.71±0.15 mM/s). Levels of intramyocellular lipids and remaining phosphorus containing metabolites did not change. While the aging itself could have contributed to the changes in carnosine, the observed effect on glycerophosphocholine and mitochondrial oxidative capacity can unambiguously be credited to exercise as normal aging effects these read out in opposite direction.

In conclusion, we can state that this protocol is able to detect changes in skeletal muscle metabolism of elderly and can depict the metabolic effects of regular training intervention in longitudinal follow up studies. Future work will enlarge the study group, include non-exercising controls and provide further MR imaging based read outs of muscle function and morphology, such as muscle volume, fat infiltration, and tissue perfusion.

## Accentuated eccentric loading and blood flow restriction training: both increase lactate level and causes muscle damage in older men

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**Background:** Accentuated eccentric loading (AEL) may benefit performance by producing favorable adaptation in strength and power compared to concentric, isometric, and traditional (eccentric/concentric) training. However, due to high mechanical loading, AEL may induce muscle damage and an inflammatory response. Compared to AEL exercise, low-intensity blood flow restriction (BFR) exercise can achieve a sufficient metabolic response without causing parallel damage to the muscle, thus reducing the potential adverse effects of exercise. This study aims to investigate the effects of relatively equal volume, but different intensity single bouts of AEL and BFR on lactate levels and muscle damage (expressed by levels of creatine kinase, CK) in older men.

**Methods:** 48 recreationally active older men (60-74y) were randomized to a single session of AEL (n=13), BFR (n=21), or 45 min seated rest (n=14). Both exercise groups performed three lower body exercises at a relatively equal volume, but different intensities. AEL consisted of 4 sets of 4 repetitions each at 120% of 1 RM. BFR consisted of 4 sets of 12 repetitions at 40% of 1 RM with 50% lower limb occlusion pressure. Two-way repeated measures ANOVA was used to assess pre-to-post 1 min, 1 h, 48 h changes in capillary blood Lactate and pre-to-post 48 h changes in blood CK (U/L).

**Results:** A significant Group x Time interaction was found for Lactate ( $p=0.001$ , partial  $\eta^2=0.247$ ). Both AEL and BFR significantly increased La 1 minute after exercise ( $+1.97\pm 1.93$  mmol/L;  $+4.47\pm 3.08$  mmol/L, respectively), but not the control ( $-0.1\pm 1.22$  mmol/L). One hour post-exercise, Lactate returned to pre-exercise level in both groups. A significant Group x Time interaction was found for CK level changes ( $p=0.01$ , partial  $\eta^2=0.185$ ). CK levels significantly increased in both AEL and BFR 48h after exercise ( $+1.89\pm 2.4$  U/L;  $+2.25\pm 2$  U/L, respectively), but not in control ( $+0.05\pm 1.27$  U/L).

**Conclusions:** A single bout of both AEL and BFR exercises significantly elevated Lactate concentration in the blood, and at the same time induced muscle damage which is marked by post-exercise elevation of CK. It seems that unaccustomed exercise and not intensity is the determining factor in the occurrence of muscle damage.

This work was supported by the Research Council of Lithuania, No. S-MIP-22-12

## Health Aspects of Physical Activity

### Effects of body mass index on plantar pressure distribution in Polish postmenopausal women

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**Background:** Obesity is a risk factor for several dysfunctions and diseases, with negative effects on the morphology of the locomotor system, plantar pressure and body stability. The aim of the present study was to assess the effect of different body mass index (BMI) levels on plantar pressure distribution.

**Method:** 10 normal weight women (age: 66.7±3.4; BMI: 23.5±1.1) and 7 obese women (age:67.9±4.0; BMI: 32.2±1.7) participated in the study. Peak pressure, contact area and impulse were extracted using by the Footscan® platform in 10 zones during dynamic conditions. Differences in Peak pressure, contact area and impulse between participants with different BMI were determined using independent-samples t-tests, subject to data normality.

**Results:** The peak pressure in the MF and M2 region of the right foot of the normal group were lower than those of the obese group ( $P < 0.05$ ); the impulse in the T1, M1, M2 and M3 regions of the left foot and M1, M2 and M3 regions of right foot of the normal weight group was lower than those of the obese group ( $P < 0.05$ ); the contact area in the M3 MF, HM and HL regions of the left foot of the obese group were higher than those of the normal group ( $P < 0.05$ ).

**Conclusion:** Higher BMI values correspond to a higher peak pressure, contact area, and impulse in the postmenopausal women.

## BMI and biomechanical parameters of gait in postmenopausal women

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Obesity is a serious public health issue in the world, which is associated with postural instability leading to difficulty in managing daily activities and increasing the risk of falls. However, there is some controversy in the correlation between obesity and an increased dynamic balance in postmenopausal women. Biomechanical gait parameters have been proven valuable for the evaluation of balance and the risk of falls. Therefore, this research aims to analyze the relationship between BMI (body mass index) and the biomechanical gait parameters in postmenopausal women. There were 66 participants (mean age:  $69 \pm 4.282$  years; mean BMI:  $27.48 \pm 4.44$  kg/m<sup>2</sup>) recruited in this research, including 20 subjects with a healthy weight (BMI:  $22.82 \pm 1.4$  kg/m<sup>2</sup>), 29 overweight subjects (BMI:  $27.21 \pm 1.50$  kg/m<sup>2</sup>), 17 obese subjects (BMI:  $33.41 \pm 3.02$  kg/m<sup>2</sup>). The gait parameters were assessed by the balance platform Biodex Medical System SS. In this research, BMI was found to have a significant correlation with the maximum force in the left ( $r=0.305$ ) and right foot ( $r=0.282$ ), the load change time on the right foot ( $r=-0.252$ ), the difference in the forefoot change time between the right and left foot ( $r=0.635$ ), the difference in the length of gait in the “butterfly” diagram between the right and left foot ( $r=0.643$ ), the difference in the midfoot contact time between the left and right foot ( $r=0.605$ ), the maximum pressure in the left midfoot ( $r=0.259$ ), the contact time of right heel ( $r=-0.261$ ). Additionally, there were significant differences in the difference in the forefoot contact time between the right and left foot ( $F(2,60) = 21.31$ ), the difference in the single support in the “butterfly” diagram between the right and left foot ( $F(2,60)=26.464$ ), the difference in the midfoot contact time between the right and left foot ( $F(2,60)=20.378$ ), the left midfoot maximum force in the stance time ( $F(2, 60)=4.108$ ), and right ( $F(2,60) = 4.77$ ) and left ( $F(2,60)=5.232$ ) heel contact time among the healthy, overweight, and obese subjects. In conclusion, there is a correlation between the BMI and the biomechanical gait parameters in postmenopausal women. It is the first research to examine the relationship between BMI and biomechanical gait parameters in postmenopausal women in Poland. Due to the lack of underweight subjects, and the lack of knee, pelvis, and trunk data during walking, more high-quality studies are required to demonstrate our findings in the future.

## Older community-dwelling stroke survivors and ActivABLES for balance exercise

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**Introduction:** Balance impairments are among the most common issues that individuals suffer from after a stroke. In guidelines from WHO on physical activity for older people with chronic conditions, they should emphasize functional balance and strength training at least three times a week in addition to the other physical activity. Recently, there has been a huge increase in all kinds of smart solutions for balance training but not so many of the have been researched exclusively on older stroke survivors.

**Methods:** Eight community-dwelling older stroke survivors (aged 66-79 years), with mild or moderate disability, participated in a feasibility study of ActivABLES, which in addition to other physical activities, included balance exercises. A foam balance mat with pressure sensors was connected to a tablet, that gave individually tailored visual and audio feedback on center of mass and weight shifting while standing. The tablet also included three games, where balance was challenged. The participants were instructed on how to perform the exercises and was encouraged to do them daily for four weeks. Data collection included balance measures (Berg Balance Scale (BBS), ABC-scale, Timed-Up-and-Go (TUG)) before and after the four weeks, and qualitative interviews after the four-week use.

**Results:** Range of pre- and post-measure of balance were as follows: BBS pre 33-48, post 39-49; ABC pre 30-66,9%, post 23,1-73,8%, TUG pre 11,9-24,5 sec, post 11,7-21,9 sec. In the interviews, most of the participants reported that they followed the recommendation of doing the exercises. The visual feedback was thought to be important and encouraging but about half of the participants felt that there was a lack of variation in exercises. Some participants described self-initiated activities which challenged their balance.

**Discussion:** This study is a feasibility study of a simple equipment which can be used for home-based balance exercises. The sample is small, but the results still give indications on possibilities for balance exercises for community-dwelling stroke survivors, where they can be empowered and take more initiative in their exercise.

**Conclusion:** A simple equipment of a foam mat connected to a tablet can be useful for stroke survivors with slight or moderate disability to do balance exercises at home.



## The Association Between Time Reallocation Among Posture-Specific 24-Hour Movement Behaviours and Obesity Risk in Older Adults: A Compositional and Isotemporal Substitution Analysis

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**Background:** Obesity presents a significant public health challenge across age groups, particularly among older adults. Addressing this requires a focus on optimizing daily posture-specific behaviours, such as lying, sitting, standing, moving, and walking. This study investigates the link between reallocating time across these behaviours and the risk of obesity in older adults.

**Methods:** The study was conducted under the research project No. 22-02392S, funded by the Czech Grant Agency. Data from 309 older adults (average age  $71.74 \pm 5.35$  years; average body mass index (BMI)  $27.67 \pm 4.45$  kg/m<sup>2</sup>; 223 females) were analysed. Posture-specific 24-hour movement behaviours were monitored using three accelerometers worn for seven days. Data processing utilized R-studio and Acti4 software, with BMI derived from self-reported measurements serving as the obesity indicator. Compositional regression and isotemporal substitution models assessed the impact of reallocating time among different behaviours on BMI.

**Results:** On average, older adults spent  $619 \pm 103$ ,  $432 \pm 117$ ,  $207 \pm 67$ ,  $99 \pm 36$ ,  $25 \pm 15$ , and  $58 \pm 30$  minutes/day lying, sitting, standing, moving, slow walking, and fast walking, respectively. A statistically significant decrease in BMI was observed with transitions in movement behaviour patterns. Specifically, an increase in any form of movement at the expense of a similar decrease in lying resulted in a notable decrease in BMI ( $\beta = -4.64$ , SE = 1.67,  $p = 0.005$ ). The estimated BMI associated with a 30-minute lying-to-any movement reallocation was reduced by 0.37 kg/m<sup>2</sup>. Similarly, transitions from a seated posture to any movement ( $\beta = -4.84$ , SE = 0.01,  $p < 0.001$ ), including shifts from both slow ( $\beta = -2.27$ , SE = 0.86,  $p = 0.009$ ) and fast walking ( $\beta = -2.32$ , SE = 0.85,  $p = 0.007$ ), were associated with significant decreases in BMI (0.35, 0.68, 0.73 kg/m<sup>2</sup>, respectively, for a 30-minute reallocation). Conversely, a 30-minute increment in daily sitting at the expense of any movement or fast walking was significantly associated with an increase in BMI by 3.91 and 1.5 kg/m<sup>2</sup>, respectively.

**Conclusion:** The findings underscore the importance of how time reallocation among various posture-specific movements can substantially influence obesity indicators in older adults, advocating for more active lifestyle modifications in this age group.

## Meta-analysis of the effect of exercise on cardiovascular function in the elderly

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**INTRODUCTION:** Cardiovascular disease (CVD) is characterized by pathologic changes of the heart, blood vessels and cerebrovascular system, and exercise can modulate gut microbiota and lower the risk of CVD. The aim was to assess the benefits of exercise on cardiovascular function in the healthy elderly compared to a non-exercise intervention population. **METHODS:** PubMed, Emase, WoS, Cochranse Libiary, and Ovid were searched for literature using randomized controlled trial(RCT) types in the last 20 years and the inclusion indicators were heart rate(HR), systolic blood pressure(SBP), diastolic blood pressure(DBP), high density lipoprotein cholesterol(HDL-C), low density lipoprotein cholesterol(LDL-C), total cholesterol(TC), triglycerides(TG), and blood glucose(GLU), and the quality of the literature was evaluated by using Cochrane Risk of Bias Evaluation Tool. Data prepared using Review Manager 5. 3 and Stata 15. 1. **CONCLUSION:** Based on our evidence, exercise is beneficial in improving blood pressure outcomes in the healthy elderly, with effects on heart rate and metabolism needing further exploration. The follow-up ANOVA indicated that older adults who graduated from higher institutions had significantly lower constraints scores than primary school graduates in body perception, income, family, skill perception, and willpower subscales with Bonferroni adjusted values. The follow-up pairwise comparisons also indicated that women had significantly higher constraints scores in the facility and social environment subscales compared to community-dwelling older men. These results suggest that demographic characteristics play a crucial role in shaping individuals' perceptions of the environment and its impact on physical activity engagement. These findings underscore the need for targeted interventions that consider demographic factors to effectively address perceived barriers and promote physical activity in this population.

## Exercise, Cognition, and Neuroplasticity 2

### Are static and dynamic balance tests a criterion showing deterioration of cognitive functions in older adults? Preliminary results

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**Purpose:** The aim of this study is to examine whether static and dynamic balance tests can be an indicator of cognitive impairment in older adults. **Methods:** Sixty-one individuals between 65- 85 ages (mean age:  $78 \pm 7.23$  yrs.) living in nursing homes were included in the study. Four step square test (FSST) (mean:  $16.42 \pm 7.39$  sec.) and Timed Up and Go Test (TUG) (mean:  $12.67 \pm 3.69$  sec.) were used to assess dynamic balance. Single Leg Stance Test (SLST) (mean:  $7.93 \pm 10.30$  sec.) and Functional Reach Test (FRT) (mean:  $28.44 \pm 6.27$  cm) were used to assess static balance. Standardized Mini Mental Test (SMMT) (mean:  $25.14 \pm 3.97$ ) was used to evaluate cognitive functioning of the older adults. **Results:** The FSST and the SMMT ( $r = -0.411$ ;  $p \leq 0.001$ ) have a significant weak negative relationship. However, SMMT and the other balance tests, including TUG, SLST, and FRT have no relationship ( $p \geq 0.05$ ). Older adults who took longer time to complete the FSST received lower scores on the SMMT ( $p \leq 0.05$ ). **Conclusion:** The results obtained from this study indicate that the FSST, which can be used to assess dynamic balance, was related to the SMMT reflecting cognitive functioning in older adults.

## Older adults’ physical activity and cognitive performance in daily life context: a pilot study combining accelerometer-based physical activity and smartphone-based cognitive assessments

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**Background:** Physical activity has bidirectional associations with cognitive performance. In daily life, both are likely to have time-dependent fluctuations. While recent methodologies enable assessing momentary data, they are less used among older populations. The purpose of this pilot study was to assess 1) the feasibility of simultaneous smartphone-based ecological momentary assessments (EMA) of cognitive functioning and accelerometer-based physical activity assessments, and 2) to explore bidirectional associations between physical activity and cognitive functioning in daily life.

**Methods:** Twenty-eight Finnish community-dwelling adults aged 65–85 (mean 72.7) completed momentary assessments of cognition thrice daily over ten days using their smartphones. Cognitive performance was measured using tests for working memory (n-back), processing speed (symbol search task), and spatial working memory (dot memory task). Participants wore a tri-axial hip-worn accelerometer during waking hours for the same period. Sedentary, light, and moderate physical activity preceding and following each smartphone assessment were recorded in 20-, 60-, and 120-minute windows. Feedback was collected through interviews after the study period from all participants. Within-person correlations were analyzed using R based on data from study days 2–10 (the first day counted as a practice day).

**Results:** No dropouts occurred in the smartphone or accelerometer arms of the study. Protocol adherence was high, with participants showing a mean adherence of 80.0% ( $\pm 16.8$ , range 43–97%) for EMA assessments and wearing the accelerometer for at least 10 hours on 95% of study days on average. Feedback on the study protocol was generally positive. Preliminary analysis ( $n = 606$  cases) indicated that higher sedentary time (e.g., in 2-hour window  $r=0.14$ ,  $p=0.002$ ) and lower light physical activity ( $r=-.014$ ,  $p=0.001$ ) before smartphone assessments correlated with poorer n-back task performance. However, cognitive performance showed no association with physical activity or sedentary time post-EMA assessment.

**Conclusions:** Combining short smartphone-based assessments with separate accelerometer monitoring is a feasible method for assessing older adults in their daily environments.

## Effects of 12 weeks resistance training on brain structure in healthy older adults and older adults with mild cognitive impairment

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**Introduction:** With aging, there are changes in brain structures that lead to cognitive decline. Studies have shown that resistance training (RT) positively affects brain structures and promotes cognitive function in healthy older adults, as well as in older adults with mild cognitive impairment (MCI). However, few studies have examined the relationship between RT-induced cognitive and brain structural changes or compared the response to RT between healthy older adults and those with MCI. We tested our hypothesis that 12 weeks of RT would lead to increases of hippocampus (HPC) and prefrontal cortex (DLPFC) volume which would be associated with improved cognition. To examine this hypothesis, we compared healthy and MCI older adults pre and 12 weeks post RT intervention.

**Methods:** Data were collected from 70 older adults aged 60 to 85 years old with (n=36) and without (n=34) MCI who were assigned to a RT (n=31) or control group (n=39). RT consisted of 12 weeks lower limb training for two days per week. Brain volume was assessed with magnetic resonance imaging (MRI, 3 Tesla). Global cognition was assessed with the Montreal Cognitive Assessment (MoCA). Data were analyzed using a three-way ANOVA with TIME (pre, post), CONDITION (healthy, MCI) and GROUP (experimental, control) as factors.

**Results:** ANOVA results showed a nonsignificant between-subjects effect with moderate effect size for rHPC volume differences between healthy and MCI ( $p=0.093$ ,  $p\text{-}\eta^2 = 0.077$ ). Furthermore, results showed a nonsignificant between-subjects effect with moderate effect size in rDLPFC volume differences between healthy and MCI ( $p = 0.060$ ,  $p\text{-}\eta^2 = 0.095$ ). Finally, MoCA results showed a significant effect between healthy and MCI participants ( $p < 0.05$ ).

**Conclusion.** RT tended to increase rHPC volumes, although 12 weeks duration may not have been sufficient to find significant effects. rHPC and rDLPFC volumes were smaller in MCI compared to healthy participants, but the cognitive status did not influence the effect of RT on their volume changes. Further studies may be needed to repeat our analysis with longer RT duration or in a larger population.

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## Dose-response relationship of resistance training and the effects on circulating biomarkers of inflammation or neuroplasticity in older adults: A Systematic Review and Meta-Analysis

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**Background:** Resistance Training (RT) is considered a promising intervention to counteract inflammation and cognitive decline. However, evidence-based relationships between exercise dose (e.g., based on training period, frequency, intensity, volume) and circulating levels of biomarkers with potential to change inflammation and neuroplasticity remain unclear.

**Objective:** Therefore, the aim of this systematic review and meta-analysis was to determine the general effect of RT on levels of circulating biomarkers of inflammation, neurogenesis or neuroplasticity and to provide dose-response relationship of RT variables through an analysis of randomized controlled trials (RCTs) in older adults.

**Methods:** Electronic databases (PubMed, Web of Science and Scopus) were searched using predefined search terms to identify relevant studies. The initial search identified 7453 articles but only 44 studies were included for further analysis. A random effects meta-analysis was conducted using Review Manager version 5.3.4. by computing weighted between-subject standardized mean differences (SMDbs) between intervention and control group and a random effects meta-regression was performed to examine whether the effects of RT on circulating levels of biomarkers are predicted according to the combined values of the different training variables using IBM SPSS Statistics version 29.

**Results:** RT significantly increased the levels of IGF-1 (SMDbs=0.46) and IL-10 (SMDbs=0.92) compared to control and decreased the levels of IL-6 (SMDbs=0.57), TNF-alpha (SMDbs=0.44) and CRP (SMDbs=0.65). Results of the meta-regression for studies reporting on levels of biomarkers of neuroplasticity or neurogenesis revealed that the variables “training volume per program duration” ( $p = 0.002$ ) and “rest between exercises” ( $p=0.005$ ) had significant effect on circulating biomarkers that have been associated with induction of neuroplasticity (i.e., BDNF and IGF-1). Results of the meta-regression of studies reporting on levels of biomarkers of inflammation will be reported on the conference.

## Sport, Gymnastic Movement and Dance Reduce the Decline of Critical Cognitive and Physical Functions in Elderly with Mild Cognitive Impairment

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As the world's population ages, the importance of maintaining health and functionality in older adults becomes increasingly important. Aging is inherently variable, with progressive physiological, motor, and cognitive decline accompanying the process, leading to an increase in "age-related" chronic diseases. Therefore, strategies aimed at extending the health span (the time one lives in optimum health) are receiving growing attention to preserve quality of life and to ease the socioeconomic impact of age-related diseases.

Cognitive decline is a significant challenge faced by the elderly, with conditions ranging from normal age-related forgetfulness to more serious states such as mild cognitive impairment (MCI) and dementia. Age-related cognitive decline and MCI are estimated to affect 1 in 6 people worldwide by 2050. MCI signifies a phase between the expected cognitive decline of normal aging and the more severe dementia, encompassing memory, language, thinking, and judgment difficulties exceeding normal age-related changes. Consequently, preventative strategies that maintain autonomy in the elderly have become vital for managing cognitive decline and MCI.

However, the brain can undergo functional and structural adaptations throughout life, despite age-related degradation processes. Empirical evidence from epidemiological cross-sectional and intervention studies suggests a correlation between physical training and a reduced risk of dementia and mortality. Lifestyle factors are critical for healthy aging. Activities promoting physical and cognitive health are linked with neuroplasticity and considered protective factors against age-related degradation processes.

Here we report the effects of a randomized controlled trial using a six-month dance and sport intervention on parameters of physical and mental fitness in older adults with MCI. We found increased volume in parahippocampal and middle frontal gyri in the intervention group, changes in concentration of oxygenated hemoglobin and improvement in memory (verbal fluency). Further significant improvements were found in dynamic and static balance ( $p=0,004$ ) and in leg strength ( $p=0,001$ ).

These results demonstrate, both structurally and functionally, that adults with MCI who participate in sport, gymnastic activities and dance improve both physical and cognitive functions but these gains are lower compared to age-matched healthy, physically active seniors.

Keywords: mild cognitive impairment, seniors, physical activity, cognitive training, aging, intervention



## Technology-assisted Physical Activity

The ESSENCE project: Empathic platform to personally monitor, stimulate, enrich, and assist elders in their environment

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### Aim

The emergence of COVID-19 highlighted the need to adapt and create new care models aimed at older people. The main objective of the ESSENCE project was to promote the creation of a new home care model based on stimulation, monitoring, tele-care and connection between users and professionals. The specific objective of the pilot study carried out in Extremadura was to evaluate the usability and the degree of satisfaction of the participants with the functionalities integrated into the ESSENCE digital platform.

### Methodology

From September 2022 to April 2023, a prospective observational study was carried out in a non-frail or pre-frail population over 64 years of age in Extremadura. A series of technological devices have been delivered and installed in their homes for use over 8 months. Through them, they have been able to carry out physical, cognitive and social stimulation activities. At the end of the study, people's satisfaction with the digital tool was evaluated, as well as its usability.

### Results

Of the 56 participating people, 77% of the sample stated that they were satisfied with the functionalities of the digital platform. The physical activity module showed high values in satisfaction. The median time spent using the platform has been 2.5 hours per week. The average value obtained in SUS was 68, placing it at the acceptability threshold for the usability of the system.

### Main conclusion

The results demonstrate that the ESSENCE platform is a system with enormous potential that has generated a high degree of participation and satisfaction in the study participants.

## Usability and Psychometric Properties of the MOBITEC-GP App for Real-Life Mobility Assessment

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Modern technologies such as the Global Navigation Satellite System and accelerometers which are integrated in every smartphone enable tracking mobility patterns over time, which in turn enables early detection of mobility impairments. Aim of the MOBITEC-GP project was to develop a mobile app which measures walking speed and spatial mobility under everyday conditions. Reliability and validity of the application was tested first (Study 1). The applicability in everyday life and the acceptance by older adults (Study 2) was also investigated. In study 1, participants underwent several supervised walking speed assessments as well as a 1-week life-space assessment during two assessment sessions 9 days apart. Fifty-seven older adults (47.4% male, mean age= 75.3 years) were included in the study. The app showed moderate to excellent test-retest reliability and validity of walking speed measurements of 50 meters and above and of most 1-week life-space parameters, including life-space area, time spent out-of-home, and action range. Study 2 revealed a good usability of the app (mean System Usability Scale score=77.18) among older adults (N=60 with  $\geq 2$  chronic conditions) for a 1-week usage of the app including both, a 1-week life space assessment and at least one gait speed measurement in a 30-minute stroll. The MOBITEC-GP app is a reliable, valid and usable tool for the assessment of real-life walking speed (at distances of 50 metres and above) and life-space parameters of older adults. Future studies should look into technical issues more systematically in order to avoid invalid measurements.

## Quantitative Evaluation of Physical Activity Impact on Myoelectric Activities in Leg and Foot Muscles During Dynamic Balance Tests in the Elderly

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**Theoretical context and objectives:** Physical inactivity and excessive sedentary behavior are important public health problems, particularly in older adults, leading to increased mortality and fall-related injuries. Physical activity (PA) has strongly been recommended, especially strengthening the muscles in the core area, to improve balance. However, high-quality studies are required to increase the strength of evidence for the effect of PA on balance. This study aims to use surface electromyography (sEMG) to quantitatively evaluate the effects of PA on myoelectric activities of leg and foot muscles during dynamic balance tests in the elderly.

**Methods:** A total of ten healthy elderly people (age $\geq$ 65 years) living in a Nursing Home were recruited, with 5 classified as sedentary and 5 as physically active. sEMG was measured during the functional reach test (FRT) using a wearable Shimmer3 EMG device. Electrodes were placed on flexor hallucis longus (FHL) and extensor hallucis longus (EHL), gastrocnemius (MG), and tibialis anterior (TA) muscles, and various sEMG parameters were extracted from the time and frequency domain. Statistical analysis, including the Mann-Whitney U test was conducted.

**Results:** We found statistically significant differences for RMS ( $p=0.011$ ), max power ( $p=0.019$ ), entropy ( $p=0.011$ ), and signal energy ( $p=0.011$ ) variables only in the MG muscles between the sedentary and physically active individuals. We also found significant results for RMS ( $p=0.030$ ) and signal energy ( $p=0.017$ ) variables in the FHL muscle and signal energy ( $p=0.017$ ) variables for the EHL muscle between males and females.

**Discussion:** During the FRT, sedentary individuals exhibited higher MG and TA muscle activation than physically active individuals, suggesting increased muscle effort for balance maintenance. In gender comparison, males exhibited significantly higher activation in FHL and EHL muscles than females. This suggests that, in proximal muscle weakness and loss of flexibility, the located in the peripheral muscles may compensate by becoming more active. Sedentary individuals may need to exert more muscle power or energy to achieve the same level of balance as physically active individuals. These findings contribute to understanding the relationship between PA, muscle activation, and dynamic balance in the elderly, emphasizing the importance of promoting regular PA for preventing falls.

## Technology-assisted physical activity interventions for older people in their home-based environment – a scoping review

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Technology-assisted physical activity interventions for older adults in their home-based environment have been used to promote physical activity. While previous studies and reviews focused on health-related outcomes of such interventions, this scoping review focuses on the technology used and aims to map its feasibility and acceptability.

We identified 8496 sources. After title and abstract screening, 455 full texts were assessed, and 148 were included, representing 12,717 participants aged 74 (SD 6) years. In total, 93 (63%) sources reported on the population's health status. In 15 (10%) sources, the participants were defined as healthy; in 13 (9%) and 12 (8%) sources, the participants lived with cardiovascular diseases and cognitive impairments, respectively.

The main purpose of the interventions was balance (51%), strength and power (43%) or cardiorespiratory fitness (20%) enhancement. In studies where the participant's health status was reported as healthy, 53% implemented exergames compared to only 27% in studies with participants with a clinical condition. Mobile apps (20%) and trackers (11%) were implemented likewise in both groups. The technology was embedded to provide continuous exercise information (28%) and exercise feedback (28%) or to record real-time movement data (26%).

Adverse events were reported in 66 (45%) of the sources and included 39 mild, 8 moderate, and 2 severe events, of which 2 mild events were related to technology. Dropout rates were reported in 100 (68%) studies, with no differences between intervention (16±15%) and control (14±12%) groups. Dropout reasons related to technology in 3%. Adherence was reported in 78 studies (53%) and was slightly higher in the intervention group (79±20%) compared to the control group (71±25%). General enjoyment of the technology was captured in 55 studies (37%) and was rated positive (91%), neutral (7%) or negative (2%). Occasionally reported wishes were related to goal setting, feedback, technical support, exercise variation, and social setting.

In conclusion, various technologies were successfully used in healthy and clinical older populations. The embedded technology was not a reason for additional dropouts, lead to slightly better adherence, and adverse events were rarely related to technology. When assessed, the technology was well accepted and positively enjoyed.

## Exercise and Psychological Functioning 2

### Efficacy of Community-Based and Online Behavioral Interventions: Preliminary Insights on Health Outcomes

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**Introduction:** In older populations, there is a high prevalence of increased cardiovascular risk associated with arterial hypertension, obesity, type 2 diabetes and physical inactivity. Addressing the cardiovascular risk factors in this demographic is crucial for promoting overall well-being and mitigating the burden of chronic diseases. However, elderly people are considered to be more reluctant to change lifestyle behavior which might lead to limitations in decreasing the cardiovascular risk. The prospect of personalized behavioural lifestyle interventions that includes physical activities emerges as a promising avenue in this age cohort, yet further extensive research is substantiation to prove its efficacy.

**Methods:** We aimed to assess the effectiveness of community-based and online behavioural interventions designed to enhance the health of elderly participants (the outcome variables included blood pressure readings, waist circumference (in cm), Body Mass Index (BMI), community section body composition, 30-second Chair Stand Test and 2-minute Step Test). The participants were randomly assigned to two intervention groups (online and community) through simple and block randomization methods. Participants in the community module engaged in six community meetings, that included promoting of physical activities, and received eight phone calls to encourage adherence to their personalized goals. Meanwhile, interactions with participants in the online module were facilitated through a dedicated online platform. Each intervention spans 14 weeks. Baseline health status and fitness measurements were conducted at the beginning and conclusion of the interventions (week 14). Paired T-test was used to assess the effect of the intervention.

**Results:** The primary hypothesis of this experiment posits that, when compared to the control group, the intensive modules (community-based and online-based) will exhibit significantly greater efficacy in producing positive behavioural and health outcomes. The group of 71 participants in the community part (mean age 69 years, 56-80) and 70 participants (mean age 64.9 years, 55-76) in the online type were included. Both types of interventions were efficient in reducing BMI (community  $p < 0.001$ , online  $p = 0.001$ ), weight (community  $p < 0.001$ , online  $p < 0.001$ ), and waist circumference (community  $p = 0.011$ , online  $p < 0.001$ ) and improving fitness capacity (30-second Chair Stand Test - community  $p < 0.001$ , online  $p < 0.001$  and 2-minute Step Test community  $p < 0.001$ , online  $p < 0.001$ ). Moreover, the community type led to the normalization of blood pressure (systolic  $< 0.001$  and diastolic  $< 0.001$ ) and a decrease in the percentage of visceral fat ( $p = 0.049$ ).

**Conclusion:** Fourteen-week community and online behavioural intervention with the use of coaching principles is efficient in the elderly. It can lead to weight loss, waist circumference

decrease with the decrease of visceral fat, normalise blood pressure, and improve fitness health of seniors.

### Impact Physical Activity Enjoyment on Self-Efficacy in Daily Activities Among Elderly

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Physical activity (PA) in elderly as Activity of the daily living (ADL) and instrumental ADL (IADL) are fundamental to maintain an acceptable level of quality of life in older age. However, while the level of ADL and IADL is typically and clinically measured, the self-efficacy (SE) in accomplishing ADL and IADL is not so common. The aim of this work is to evaluate the SE in ADL and IADL (measured with a 5-item Likert scale questionnaire) in a group of elderly and compare with PA level (assessed through IPAQ-it) and PA enjoyment (evaluated through the PACES-it-8 items questionnaire).

The study involved 68 elderly volunteers, with an average age of  $74.4 \pm 7.18$  years, height of  $162 \pm 7.6$  cm, weight of  $66.3 \pm 12.1$  kg, BMI of  $25.2 \pm 4.02$ , and an average PA level of  $2336 \pm 2460$  MET/minute per week. Participants were asked to complete a four-session questionnaire covering demographic information, PA enjoyment, PA level, and SE level on ADL, IADL. Statistical analysis was performed using Pearson's correlation.

The results showed no correlation between PA level and total SE level ( $r=0.04$ ;  $p=0.721$ ). Interestingly, older subjects presented similar ADL SE levels compared to younger elderly ( $r=-0.049$ ;  $p=0.698$ ), but IADL SE was found to be affected by age ( $r=-0.284$ ;  $p=0.02$ ) with older presenting lower level of IADL SE. Total SE level was higher in subjects with lower BMI ( $r=-0.376$ ;  $p=0.002$ ) and those with greater PA enjoyment ( $r=0.425$ ;  $p<0.001$ ). The IADL question regarding confidence in using means of transportation yielded the lowest SE score. This may underscore the importance of enhancing walking efficiency among the elderly to facilitate their mobility.

These preliminary results suggest that enjoyment of PA plays a key role in enhancing SE level in ADL and IADL, as well as physical fitness represented by BMI. These findings may provide important insights for PA professionals in increasing elderly quality of life.



## Motor reserve impact on motor severity and quality of life in Parkinson’s Disease patients

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Increasing evidence supports the beneficial effects of lifelong physical activity (PA) on cognition and mobility. Recently, it has been hypothesized that motor reserve (MR) may be associated with a greater ability to cope with senescence and the normal or pathological motor skill decline increasing the overall quality of life. Aim of the study was to analyze the possible impact of MR on dopamine binding and motor severity in early-diagnosed patients with Parkinson’s Disease (PD). The study included 40 drug-naive PD patients (age 68.35±7.5 ys), who underwent cognitive and motor assessment and 123I-FP-CIT-SPECT imaging. Gait parameters were evaluated in normal, fast and dual-task conditions using Mobile Health Technologies (MHT) in a supervised setting. Motor Reserve Index questionnaire (MRIq) was administered and individuals were categorized into high-MR or low-MR. The relationship between MR and dopamine binding was assessed using a voxel-wise regression model.

Clinical differences between patients with high and low MR were assessed using a two-sample t-test or chi-squared test, whereas differences in motor parameters were explored using a MDS-UPDRS-III, sex and height-adjusted ANCOVA model.

MR was negatively correlated with dopamine binding in left putamen and pallidum in the voxel-wise model. High vs low-MR PD were comparable for demographics, motor and cognitive severity, whereas High-MR PD showed lower dopamine binding in left putamen ( $p=0.029$ ) as compared to low-MR. No differences in gait parameters emerged in normal conditions, whereas in motor dual task condition, high-MR PD showed lower step-time ( $p=0.002$ ), step-time variability ( $p=0.045$ ), and higher step-length ( $p=0.045$ ). Low-MR PD showed higher motor task interference referring to dual task ( $p<0.001$ ).

Motor reserve emerged as important modulator of dopamine basal ganglia circuitries at onset of PD, with important impact on motor impairment and performances assessed by MHT. These results highlight the importance of having a high MR through PA both for dopamine binding and for gate efficiency in PD patients resulting in an improvement of overall quality of life.



## POSTER PRESENTATION

## Poster Session 1

### #3 Marcel Leppée: Adherence with antihypertensive medications in elderly

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<sup>1</sup> Gospic Primary Health Centre

The study's goal was to ascertain whether and to what degree patient age affected medication adherence. The research examined the relationship between these two categories as well as medication adherence in general and antihypertensive therapy adherence. Beyond the rationale for the prescription of therapy, the study sought to determine whether patients thought their therapy would improve their health and whether they could follow their doctor's recommendations. Age-group-specific comparisons were made between hypertensive patients and the entire study population. The 33-item self-administered questionnaire was used in the study, which was planned as a cross-sectional survey. With particular attention to participants using antihypertensive medications, the study comprised 635 people who either collected or purchased medications for the treatment of chronic illnesses (n = 361). Of the 635 study participants, more than half (n=361; 56,9%) were receiving treatment for arterial hypertension and perhaps additional conditions. For most research participants, forgetfulness was the primary cause of missing doses of medication, followed by absence from home and drug shortage. There was no statistically significant difference seen when the entire study population and the participants receiving treatment for arterial hypertension were compared based on their age categories (adherent, nonadherent, and all combined). Elderly individuals who are in excellent physical health also take their medications more consistently. We came to the conclusion that there was no relationship between medication adherence and age and that there was no difference in medication adherence between patients taking antihypertensive therapy and the overall patient group.

## #4 Aysegul Ilgaz : A Bibliometric Analysis of Technology Supported Physical Activity Studies among Older Adults

Authors: Aysegul Ilgaz <sup>1</sup>

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**Background:** Maintaining or initiating regular physical activity is important for successful and healthy aging. Technological interventions can support and encourage older adults to begin and maintain physical activity. Thanks to technological developments in many countries, the rate of elderly people adopting a sedentary lifestyle can be reduced and the level of physical activity can be increased. It is important to identify the current status of research activities, research gaps, current trends, produce evidence-based knowledge, and identify studies on technology-supported physical activity of the elderly.

**Aim:** The purpose of this study was to analyze peer-reviewed literature to identify trends in studies on technology-assisted physical activity in older adults and to demonstrate the latest developments by focusing on the author, country, citation, keywords, etc.

**Methods:** In the study, a bibliometric analysis methodology was performed. The data were searched in the “Web of Science Core Collection” database in English between August and September 2023. Data were analyzed using the Vosviewer program, which is a mapping and visualization software program. Author, country and organization analysis of published articles, journal and citation analysis, country, and author collaboration analysis, journal and co-author citation analysis, word and abstract analysis were assessed. The keywords (technolog\* and physical activity and older\*) were used and a total of 2307 studies were reached.

**Results:** 1069 authors from 73 countries and 853 institutions contributed to 2307 studies related to technology supported physical activity in older adults, published in 282 different journals. The most productive author with 15 articles was Abby C. King. International Journal of Environmental Research and Public Health, Journal of Medical Internet Research, BMC Geriatrics are the journals in which the most articles are published and the most cited journals. The first three countries that gave the most support to the published articles are the United States of America, England and Canada. The most frequently used keywords in published studies are “physical activity”, “older adults”, “technology”, “exercise”, “aging”, and “mhealth”.

**Conclusion:** The number of studies on the technology supported physical activity in older adults has gradually risen over the years. This topic has already become an active area of study. Identifying research trends, current status on physical activity supported with technological interventions among older adults can guide practitioners, researchers, and scholars. Research collaborations and author networks should be promoted to give priority this subject.

## #9 Salah Kachouri Physical activity for cognitive excellence: Investigating the impact on office-based male students performance. A pilot study.

Authors: Salah Kachouri <sup>1</sup>

<sup>1</sup> Akdeniz University, Faculty of Nursing, Dumlupinar Boulevard, 07058, Antalya, Turkey

This pilot study investigates the impact of a 30-minute cycling session at 50% VO<sub>2</sub> max on the cognitive performance of four sedentary male students during an eight-hour office workday, with 10-minute rest every 50 minutes. The study explores the relationship between pre-work cycling and mental performance, along with associations between heart rate variability during cognitive tasks and physical activity before work. Hypothesizing that the exercise session would enhance cognitive performance and reduce mental fatigue, we conducted cognitive tasks and cycling sessions, collecting data using the ANAM battery, Polar H2 heart rate sensor, and Kubios HRV 2.2 software. Findings reveal significant correlations between exercise and cognitive performance, particularly in attention and processing efficiency. While memory research showed weaker correlations, positive indicators of enhanced spatial processing were observed. Heart rate variability analysis, especially LH/HF tests, yielded encouraging results, suggesting a positive physiological response to physical activity. Kubios HRV software analysis demonstrated positive changes in LF/HF ratio, MHR, and RMSSD, supporting the physiological benefits of physical activity. In conclusion, incorporating a 30-minute cycling session at 50% of VO<sub>2</sub> max before the workday may enhance cognitive function and alleviate stress-related effects. Further research with larger sample sizes and diverse cognitive tasks is recommended for a comprehensive understanding of these effects.

### #13 Özge Selin Çevik: Do we really care about our old-age population? Increasing awareness about exercise in elderly care centers that located different regions of Turkey

Authors: Özge Selin Çevik, Zeynep Altinkaya, Zeynep Eda Erden <sup>1</sup>

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**Aim:** Elderly care centers have the necessary infrastructure to meet the healthcare needs and daily care requirements of elderly individuals . However, in fact, most of our elderly people do not perform much physical or mental activity other than watching TV for hours. Therefore, it is very important for public health to inform the staffs and the elderly in the care centers about physical activity. Therefore, the main purpose of our project is to raise awareness of our elderly people about the exercise.

**Material and Method:** In each city (Mersin, Karaman) at least two different regions were chosen. A preliminary meeting was held with the care center coordinator to introduce the content of the study. Informative materials were prepared before visiting the centers, and two trainers were prepared for. Additionally, various sports equipment for the elderly (such as pilates bands, hand grips, dumbbells, and tonic hand eggs, etc.) were given to the centers. In the theoretical part, the importance of exercise in healthy aging was explained, covering physiological, psychological, and anatomical aspects. In the practical part, simple exercise practices using the equipment were taught, which the elderly could perform during their daily routines.

**Results:** At the end of the study, a total of 4 elderly care centers were included, each with at least 15 male and female elderly participants. Additionally, at least 5 staff members from each center attended the training sessions, ensuring widespread impact. Furthermore, in two of the centers, family members who visited the elderly residents also participated in the training. During the training sessions, the elderly showed a significant level of interest and emotional motivation was observed.

**Conclusion:** We did not only give this information to the elderly, but affected a social awareness by including their care center coordinators and staff.

## #15 Aylin Tanriverdi: Physical activity patterns are related to frailty in older adults with heart failure

Authors: Aylin Tanriverdi, Buse Ozcan Kahraman, Ebru Ozpelit, Bihter Senturk, Bahri Akdeniz, Mehmet Birhan Yilmaz, Sema Savci

**Background:** Frailty and heart failure have an intertwined relationship, with each condition exacerbating the other (1). On the other hand, low physical activity is the most important determinant of frailty in the community-dwelling elderly population (2). However, there is a lack of studies that examine the relationship between physical activity patterns and frailty in older adults with heart failure. Therefore, this study aimed to examine the relationship between physical activity patterns and frailty in older adults with heart failure.

**Methods:** Thirty-eight older adults with heart failure were enrolled in this cross-sectional study. Physical activity was objectively assessed with an accelerometer for seven consecutive days. Time spent per week in light-intensity physical activity (LPA; 1.5 to 2.9 METs), moderate-intensity physical activity (MPA; 3.0 to 5.9 METs), and vigorous-intensity physical activity (VPA;  $\geq 6.0$  METs) were analysed using the software. Frailty was evaluated with the Fried Frailty Phenotype criteria, which consists of five components including weight loss, exhaustion, physical inactivity, walking speed, and grip strength.

**Results:** The mean age of participants was  $67.3 \pm 5.3$  and the mean ejection fraction was  $30.18 \pm 6.83$ . The majority of patients were male (94.7%), overweight (57.9%), and New York Heart Association functional class II (63.2%). A total of 24 participants (63.2%) were frail and 14 participants (36.8%) were non-frail. Frailty was significantly correlated with MPA ( $r = -0.458$ ,  $p = 0.004$ ) and VPA ( $r = -0.360$ ,  $p = 0.026$ ). There was no correlation between frailty and LPA ( $r = -0.159$ ,  $p = 0.340$ ).

**Conclusions:** This study indicates that MPA and VPA are related to frailty in older adults with heart failure. Therapeutic interventions that enhance both MPA and VPA may help to counteract frailty in older adults with heart failure.

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## #16 Pinar Gultekin: Evaluation of environmental factors affecting older adults participation in physical activities in urban areas: An example of Düzce city

Author: Pinar Gultekin

Different studies in the literature reveal that the rapid development of technology and the increase in the rate of urbanization lead old ages individuals to a sedentary life. People in old ages access to physical activity opportunities, green spaces and safety in their living spaces can also be counted among the factors that affect participation in physical activity. Within the scope of this study, the socio-demographic characteristics of the users were evaluated with the outdoor design elements that support or prevent the participation of old ages urban people in physical activity in the immediate vicinity of their residences.

As the study area Düzce City Arapçiftliği neighborhood was chosen in Düzce City. The population of the study area was evaluated in terms of gender, education level, average age and income status. Field work was carried out in the study area, and photographs were taken from 5 different streets where the older population is dense. The photographs were presented to 10 different researchers who have studies about the importance of physical activities in outdoor design. They were asked to evaluate outdoor design elements (flooring element, parking lot, pavement width, lighting element, dustbin, etc.), variety of physical activity (walking path, bicycle path, fitness elements), accessibility, presence of green areas with the range of 1-10 point from insufficient to sufficient.

Field studies were carried out in order to determine the tendency of the older individuals living on the 2 streets with the highest and lowest scores to participate in physical activity. Field studies were carried out 5 times in total and on weekends in clear and sunny weather. Oral interviews were conducted with 28 older individuals who performed physical activity.

After the observations, user interviews, environmental and social evaluations; On the street, where the participation in physical activities is more intense, lighting elements, fitness equipments and width of the road are described as more adequate for physical activities by the experts. And the street that is described as insufficient by the experts, there are safety concerns, insufficient lighting, inappropriate walking path, etc. It is seen that physical activity participation is low due to reasons. Within the scope of the results and recommendations in the study; Suggestions have been made to emphasize the environmental design that supports participation in physical activity, to address safety concerns, and to ensure the participation of not only young individuals but also older adults in physical activity in daily life.

Keywords: Inclusiveness Design, Duzce, Physical Activity, Old Age, Environmental Design.



## #17 Bojan Masanovic: The Effects of Autophagy and Physical Activity on Body Composition, Body Mass Index, Stress, Health Behavior, Cognitive Abilities and Social Inclusion in the Elderly: An Overview of the Project Development and Outputs

Author: Bojan Masanovic <sup>1</sup>

<sup>1</sup> Faculty for Sport and Physical Education, University of Montenegro, Niksic, Montenegro.

Aging brings with it irreversible and progressive changes that include the function of cells, tissues, organs as well as the entire organism over time. Changes in old age lead to a gradual loss of functions. EAPA-BCH project aimed to determine the effects of autophagy and physical activity on body composition, body mass index, stress, health behavior, cognitive abilities and social inclusion of the elderly using advanced practices. It was in accordance with the European strategy 2020 to pay special attention to the elderly (55 years old and more), as a category that is at risk. The EAPA-BCH project had a more than two year duration (April/2020-November/2022), resulting in five main outputs: 1) systematic review; 2) experimental research program; 3) identification of experimental program effects; 4) promotional activities; 5) manual publication; 6) the one scientific article, published on 1 international review. Systematic review aimed to support later research process with already existing knowledge. Implementation of the experimental research program and identification of its effects were priority activities. It's aimed to knowledge (produced by the conducted experiment) directed at the preparation and publication of a high-quality manual with guidelines on proper nutrition and optimal physical activity for the elderly. Manual is in some way main output because of its practical and useful value in the future. While, remaining outputs were created to support above mentioned in terms of promotion and dissemination to a wider audience. Wide-spread and consistent adoption of the EAPA-BCH manual, will improve health and well-being of a vulnerable social group, and thus will provide strengthening of the entire social community. This overview has been done within a national project EAPA-BCH that was approved by the Ministry of Education, Science and Innovation (No. 03/1-062/20-346/2 from 28 April 2020), as well in line with the objectives of COST Action CA18136 –EFAP.

## #22 Aleksandra Catic-Dordevic: Polypharmacy as a factor of influence for physical activity in older

Author: Aleksandra Catic-Dordevic <sup>1</sup>

<sup>1</sup> Associate Professor at Faculty of Medicine University of Nis, Serbia

**Introduction:** A large number of the population older than 60 years has chronic pharmacotherapy. In addition, we can often identify drugs that may increase the risk of falls in their pharmacotherapy. Therefore, as aim of study, we considered the number of drugs and falls risk increase drugs (FRID), but as well gender and body mass index (BMI) with respect to physical activity (PA) in this population.

**Materials and methods:** The cross-sectional study was conducted from December 15th 2023 to January 15th 2024 with a representative number of volunteers from the city of Nis, Serbia (approximately 67,000 inhabitants older than 60). Demographic and pharmacotherapy data were collected using an electronic approach to structured questionnaire. In addition, all 179 participants were self-evaluated their level of current PA using International Physical Activity Questionnaires (IPAQ)). Data and statistical analysis were done by SPSS 20 with statistical significance  $p < 0.05$

**Results:** Out of all 188 respondents, we analyzed 179, including 88 women and 91 men, while 15 questionnaires were completed by participants younger than 60. The assessed IPAQ questionnaires showed that 26 participants (14.52%) were inactive, 76 (42.46%) were moderately active and 77 (43.02%) were highly active. The gender, BMI, or the presence of a FRID were not associated with and did not influence the assessed PA in the observed population. In 125 participants with chronic pharmacotherapy, almost significant difference was demonstrated in self-assessed PA between patients with and without presence of polypharmacy (5-10 drugs daily noted in 37 participants) tested with Chi square= 4.917, and  $p=0.086$  (without polypharmacy 12.5% of non-active, 39.8% moderate and 47.7% high vs. with polypharmacy low 21.6% of non-active, 51.4% moderate and 27% high).

**Conclusion:** Our results draw attention to the elderly with polypharmacy highlighting that more than 5 drugs could be significant for the level of PA. Future investigations with an expanded number of participants and age range are needed to confirm these results.

### ACKNOWLEDGMENT

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## #23 Şengül Akdeniz: Perceived benefits of yoga and the experiences of older adults aged 65 years and older who practice yoga about falls

Author: Şengül Akdeniz

**Introduction:** Physical activity is one of the most important factors affecting health status in the elderly. With physical activities, muscle loss can be balanced and risks such as falls and fractures that may occur as a result can be reduced. Yoga is an integrative mind-body practice that can improve mental and physical health. Yoga is a holistic intervention where each participant's experience is subjective.

**Method:** This research is a descriptive study prepared in accordance with qualitative research. The research sample consisted of 16 older adults over the age of 65 who volunteered to participate in the study and regularly practiced yoga twice a week. The research data were collected through individual interviews and participant observation with yoga practitioners. A personal information form and a semi-structured interview form were used to obtain data for the interviews. Written informed consent was obtained from all participants. The data obtained as a result of individual interviews were analyzed with descriptive analysis method. In this analysis method, the participants' statements regarding the research questions were also included.

**Results:** When the data obtained were evaluated, it was determined that the age range of the participants was between 65-75 years, 15 of them were female and the duration of yoga practice of the participants ranged between 5-10 years. It was determined that 4 participants had never fallen since they started practicing yoga, 11 participants had fallen only once, and one participant had fallen 3 times. It was stated that the reasons for the falls of the participants who experienced falls were related to environmental factors. A total of seven themes emerged from the data analysis: 1. Benefits for Physical Health, 2. Benefits on Mental Health, 3. Benefit for the management of fall risk and fear of falling, 4. Facilitating daily life, 5. Improving quality of life, 6. Breath management, 7. Socialization.

**Conclusion:** In terms of the practical impact of the research results; in line with the experiences of the older adults participating in the research, it is predicted that "practicing yoga adequately and regularly will be of great benefit in protecting the health of older adults.

## #24 Zaur Gasimov: The survey of family physicians on the provision of care to elderly patients

Author: Zaur Gasimov <sup>1</sup>

<sup>1</sup>Scientific-Research Institute of Cardiology named after acad.J.Abdullayev

The study was conducted in selected primary healthcare institutions in 11 districts of Baku city. Out of the surveyed institutions (18), doctors of only one institution stated that there is a doctor in the position of geriatrician. 265 family doctors participated in the survey, of which 230 (86.8%) were women and 35 were men (13.2%). The length of service of the survey patients is divided as shown below: 1-5 years - 5,3%, 6-10 years - 18,5%, 11-15 years - 38,9%, 16-20 years - 32,4%, 21 year and more - 4,9%.

In the answers of 96.2% of doctors, it was noted that patients are covered by outpatient care. Family doctors were asked questions about the assessment of physical health, functional, cognitive, emotional and social-household status of elderly patients and suggested to mention 2-3 criteria. In addition, doctors were asked about the use of any standards, protocols and methodological recommendations in the examination or treatment of elderly patients in their daily work.

Assessment of physical status: In their answers, doctors indicated the main criteria for assessing the physical health of elderly patients, such as asking for complaints, collecting anamnesis and medical history, and objective examination. Assessment of functional status determines the patient's ability to perform basic needs without the help of others, self-care, use of technical means and activity in daily life. Daily activity characterizes a person's ability to freely: eat food, dress, go to the toilet, bathe, move around the room, perform small tasks at home, freely use public transport or a vehicle, etc. 735 answers were received from doctors to the question of what is included in the assessment of functional status in elderly patients, and 422 of them corresponded to the given question.

77.7% of doctors gave a positive answer to the question of whether you use specialized standards, methodical recommendations or protocols.

## #27 Solveig A. Arnadottir: Physical Activity Scale for the Elderly to capture physical activity patterns of older adults receiving health promoting visits in Iceland: Comparison of 2013 and 2020 during the COVID-19 pandemic

Authors: Solveig A. Arnadottir<sup>1</sup>, Heidrun D. Stefansdottir<sup>1</sup>, Osk J. Arnadottir<sup>2</sup>

<sup>1</sup> University of Iceland, Department of Physical Therapy

<sup>2</sup> The Healthcare Institution of North Iceland

Introduction: Sedentary behaviour increases in older age, making physical activity (PA) especially beneficial for older adults. Health-promoting (HP) visits provide opportunities to promote healthy lifestyles among older individuals at home.

Objective: This study examines the PA patterns of older adults in North Iceland who received HP visits in 2013 and during COVID-19 pandemic in 2020, analysing the data by various background variables.

Methods: In this sequential cross-sectional study, data from 553 community-dwelling older adults (75-96 years) in North Iceland from two periods, 2013 and 2020 (COVID-19), were analysed. The physical Activity Scale for the Elderly (PASE) was used to assess PA during leisure time (PASE-leisure), domestic work (PASE-home, and physically demanding work (PASE-work), with total score (PASE-total) which can range from zero to over 400. Linear and logistic multivariable regression was used to analyse independent associations between PASE scores and six background variables: Year of HP visit (2013, 2020), age-group (75-84, 85+), gender (man, woman), cohabitation (living alone, with a spouse), season (less daylight, more daylight), residency (urban, rural).

Results: HP visits in 2020 (COVID-19) was independently associated with higher PASE-leisure scores ( $p < 0.001$ ) and lower odds of physically demanding work (PASE-work,  $p = 0.008$ ), but were not associated with PASE-total or PASE-home. Being in the 75-84 years age-group was independently associated with higher PASE-total and PASE-home scores ( $p < 0.001$  for both), higher odds of physically demanding work ( $p = 0.034$ ) but was not associated with PASE-leisure. Being a man was independently associated with higher scores on all PASE scales ( $p = 0.046$  for PASE-leisure,  $p < 0.001$  for others). Living alone was independently associated with higher scores on PASE-leisure ( $p = 0.038$ ) but was not associated with other PASE scales. Receiving an HP visit in the season with more daylight was independently associated with higher PASE-total and PASE-home scores ( $p = 0.002$  and  $0.004$ , respectively) but not with PASE-leisure or PASE-work. Urban versus rural living was not independently associated with any of the PASE scales.

Conclusion: Understanding the PA pattern of older adults in North Iceland is valuable for healthcare professionals to motivate and educate less active groups. The results can enhance health-promoting services and activities for older community-dwelling adults, in Arctic contexts.

## #28 Črtomir Matejek: Tensiomyography as a technology for maintaining physical vitality in older populations

Authors: Črtomir Matejek<sup>1</sup>, David Kukovica<sup>1</sup>, Mojca Žvajker<sup>1</sup>, Tina Vršnik Perše<sup>1</sup>

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Tensiomyography (TMG) is a non-invasive tool that has shown significant promise in assessing and enhancing the physical fitness and health of older populations. This technology measures muscle contractile properties, offering insights into the age-related changes in skeletal muscle function, which is particularly relevant for older adults.

As individuals age, there is an inevitable decline in muscle mass and function, often exacerbated by decreased levels of physical activity. This phenomenon is not just limited to non-athletes but also affects master athletes, who, despite maintaining higher levels of physical activity, cannot fully escape the effects of aging on their muscles.

TMG's ability to non-invasively measure muscle characteristics like contraction time makes it an invaluable tool in the realm of geriatric fitness and rehabilitation. It provides a quantitative method to assess muscle health, which can guide tailored exercise programs for older adults. By understanding the specific muscle characteristics of an individual, fitness and rehabilitation programs can be more effectively designed to counteract the age-related decline in muscle function.

For older individuals, especially those who may not be engaged in regular athletic activities, TMG can be instrumental in diagnosing muscle weaknesses or imbalances. This information can then inform targeted interventions to improve muscle function, enhance mobility, and potentially reduce the risk of falls and related injuries.

In rehabilitation contexts, TMG can track muscle recovery and adaptation over time, offering a quantifiable measure of progress. This can be particularly motivating for older adults, providing tangible evidence of improvement and encouraging continued participation in rehabilitative exercises.

TMG technology holds significant potential in supporting the physical fitness and diagnostic needs of the older population. Its ability to provide detailed insights into muscle function can be instrumental in designing effective fitness programs, diagnosing muscular issues, and enhancing overall physical well-being for the elderly. This technology, therefore, stands as a beacon of hope in promoting active and healthy aging (Šimunič et al., 2018).

### #33 Michel Audiffren: Meta-analysis on the chronic effects of exercise on depression in older adults: Moderator analyses on characteristics of the intervention and individuals

Authors: Michel Audiffren<sup>1</sup>, Melanie Mack<sup>2</sup>, Andreea Badache<sup>3</sup>, Arzu Erden<sup>4</sup>, Sandra Haider<sup>5</sup>, Antonia Kaltsatou<sup>6</sup>, Burcu Kömürçü Akik<sup>7</sup>, Iuliia Pavlova<sup>8</sup>, Pinelopi S. Stavrinou<sup>9</sup>, Yael Netz<sup>10</sup>, Christoforos D. Giannaki<sup>11</sup>, Claudia Voelcker-Rehage<sup>12</sup>

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**Introduction:** The prevalence of depression in Europe was estimated to be around 6% of the population of aging people. The main symptoms of depression include: poor concentration, feelings of excessive guilt or low self-worth, hopelessness, suicide ideation, disrupted sleep, changes in appetite or weight, and fatigue feelings. Regular exercise has gained attention in clinical practice and research as a promising noninvasive treatment option for late-life depression. However, given the high heterogeneity of this mental disorder, personalized exercise regimens might be even more promising. The aim of the present meta-analysis is to examine the effectiveness of chronic exercise interventions in reducing depression and to evaluate how several moderators related to the characteristics of the interventions and the participants modulate this effectiveness.

**Methods:** Randomized control trials (RCTs) were searched in the following electronic databases through a list of keywords related to exercise, depression and aging: Web of Science, Academic Search Complete, CINAHL, APA Psycinfo, SPORTDiscuss, and Cochrane. Pairs of reviewers selected and extracted information from 136 RCTs. Moderators related to interventions included: frequency and duration of exercise sessions, type and intensity of exercise, duration of the intervention, cognitive demand of exercise, social interaction, study design, type of analysis and control group. Moderators related to individual characteristics included: age, sex, level of depression and education, functional capacity, comorbidities, and global cognition. Subgroup analyses were conducted for categorical variables and meta-regression for continuous variables.

**Results:** Preliminary data showed that the level of depression at baseline, the type of exercise and the age of the population significantly moderate the effect of chronic exercise on depression measured with validated depression scales.

**Conclusion:** Interventions using exercise are effective in reducing depression. However, certain types of exercise, such as aerobic and resistance exercises, seem more effective in combating depression and certain populations more responsive to the positive effects of chronic exercise.



### #35 Laimute Samsoniene: Applied drama for the psycho-emotional health and creative adaptation of seniors

Authors: Laimute Samsoniene<sup>1</sup>, Saulė Gotberge, Violeta Rimkeviciene

In this study, psychosocial health is understood as a multidimensional construct that includes psychological and social components of health [1]. The researchers paid attention not only to the physical health care of seniors, but their psychological and social well-being. Drama therapy is a group experience that provides an opportunity to share personal experiences [2]. Methodological provision: drama therapy (DT) techniques help the elderly to express themselves, improve their cognitive functions, emotional expression and creative adaptation.

Study organization and methodology: the study was carried out on 1/10/2022 - 30/04/2023 in a social care home for the elderly, with 6 seniors aged between 77 and 99 years. Research methods: Profile of Emotional Competence PEC; The Trail Making Test, pulse and blood oxygenation - Contec CMS50D<sup>®</sup>; qualitative research methods by semi-structured interviews. The results of the study were systematised and analysed using Microsoft Office Excel. The research was conducted in accordance with the main ethical principles: voluntary, anonymous, confidential and honesty.

The results of the study: all the participants showed improvements in concentration of attention, emotional expression and cognitive function after DT sessions. As the goal and objectives of each session were different, different pulse dynamics were observed: pulse rate increased during the more physically active DT sessions, while pulse rate decreased during the sessions focused on emotional expression. Two themes emerged from the thematic analysis: (1) "Living in a social care home is like living in a "thickened" community", sub-themes: "Facing loneliness", "The bond created by the therapeutic group - benefits for the individual and the community"; (2) "Drama therapy in old age - an emotional occupation that encourages relearning", sub-themes: "The power of play: activating emotions and motivating action", "Images and metaphors - a comfortable path to self-reflection", "Facing old age: exploring changes in mind and body".

Summary of the study: (1) DT had a positive effect on seniors' cognitive functions, emotional health and participation in group sessions. (2) DT sessions contributed seniors community building, encouraged the use of social tools and provided positive emotions. The games in the therapy helped seniors easier to look at the process of ageing and to accept the changes in the body naturally. The therapeutic embodiment and the metaphors used facilitated the subjects' created adaptation processes.

## #44 Anatoliy Melnyk: Intellectual assistive tools for monitoring of physical activity in old age

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Regular physical activity is proven to improve human health and helps to extend the active life period of older people. Remote monitoring tools that track vital signs and daily activities can alert elderly and their supervisors of any deviations from normal health parameters, facilitating early intervention in an emergency. However, none of the commercial platforms offer the possibility of setting their own limits or criteria for observing parameters so that a person strives to achieve them, for example, number of steps, calories burned, amount of sleep and the number of personalized physical activities. Another problem is that you can't take a watch from one platform and connect it to another's service. It is therefore necessary to use a different application for each user. It would take a lot of time to observe each user on each platform separately. This is why it is necessary to have a custom platform with a comfortable GUI, adjustable monitoring features, and the ability to fetch data from all possible products on the market.

Intellectual assistance tools for monitoring physical activity in the elderly will be presented in our paper. The algorithms that can analyze the collected data and translate results into actionable insights that allow implementing an effective system for categorization involves leveraging advanced are presented. The principle of analysis of vital signs, the scale of their assessment and dependence on the level of criticality and recommendations on the overall assessment of the condition of the elderly are proposed. An algorithm to inform the elderly about their functional state is proposed and implemented. The features of personal data protection and anonymization are also considered in the paper. The GUI offers intuitive graphs and analytical tools that provide a visual representation of elderly health parameters under monitoring. To enhance user control GUI provides the supervisor with the ability to set limits on specific health parameters. This feature ensures that any deviation beyond predefined thresholds triggers immediate notifications, allowing for swift intervention and preventive measures. Incorporating machine learning algorithms enable predictive analytics, offering insights into potential health issues before they manifest.

## #45 Arzu Erden: Factors affecting the body awareness levels of convicted prisoners

Authors: Arzu Erden, Fatma Ayhan

**Background:** Body awareness is an interactive and dynamic process that occurs with the individual perceiving his / her body and its actual actions. Body awareness both directly and indirectly predicted mental health outcomes. Low body awareness has been linked to psychological resilience in the previous literature.

**Objective:** The purpose of this study was to examine the relationships between the body awareness levels of convicted prisoners and their anxiety, depression risk, body perception, psychological resilience, and physical activity levels and body mass index (BMI) values.

**Materials and Methods:** The study population in this descriptive, cross-sectional research consisted of 346 convicted prisoners. Data were collected using a sociodemographic information form, the Body Awareness Questionnaire (BAQ), the Hospital Anxiety and Depression Scale (HADS), the Body Perception Questionnaire (BPQ), the Brief Psychological Resilience Scale (BPRS), and the Physical Activity Questionnaire – Short Form (PAQ). BMI was also calculated.

**Results:** The mean age of the participants was 31.13 years, 38% being at risk of anxiety and 77% at risk of depression. Total BAQ score exhibited significant negative correlation with anxiety risk level and depression risk level, and positive correlation with BMI and psychological resilience levels, while no correlation was observed with physical activity level. In addition, convicted prisoners at risk of anxiety and depression exhibited lower body awareness levels than those with no such risk.

**Conclusion:** Convicted prisoners' body awareness levels are directly associated with the risk of anxiety and depression, psychological resilience, physical activity level, and BMI.

**Keywords:** Prisoner; body awareness; anxiety; depression; physical activity

## #46 Liza De Dobbeleer: A comparative study of an innovative E-health system and the analogue Martin Vigorimeter for measuring vitality capacity biomarkers in community-dwelling older adults

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**Objective:** This study aimed to evaluate Eforto®, an innovative e-health system designed for the (self-)monitoring of intrinsic capacity through measurements of maximal handgrip strength (GSmax) and muscle fatigability. We compared the performance of Eforto® with the standard analogue system Martin Vigorimeter (MV).

**Methods:** A total of 61 community-dwelling older individuals (mean age = 85.6±3.2 years, 55.7% women) underwent measurements of GSmax and muscle fatigability using both MV and Eforto® in a random order. Following each test, participants were asked about experienced pain, its intensity, and whether pain hindered their ability to sustain the contraction. Additionally, the Borg scale for perceived exertion was utilized to derive rate of perceived exertion (RPE) scores. Four cases (2 women and 2 men) were excluded for the statistical analysis to prevent inter-assessor bias or one men due to lost data on the Eforto® platform.

**Results:** No statistically significant differences were observed in GSmax and muscle fatigability outcomes between MV and Eforto® (all p>0.05). Strong correlations were identified between GSmax (r = 0.95), fatigue resistance (FR) (r = 0.81), and grip work (GW) (r = 0.73) (all p<0.001). There was no significant (p=1.00) difference between both handgrip systems in the number of times participants answered “yes” to the question “Did you feel pain during the FR test?”. Furthermore, there was no significant (p=1.00) difference between both systems in the number of times participants answered “yes” to the question “Did the pain prevent you from squeezing as long as possible?”. Overall, no significant difference was found in the intensity of pain between both handgrip systems for all participants ((0.05/10, 95% CI[-0.51-0.62]) p=0.849) and for participants who felt pain during the FR test ((0.25/10, 95% CI[-2.73-3.23]) p=0.857). Furthermore, based on RPE scores, participants reached similar maximal fatigue levels when performing the muscle fatigability test with MV compared to Eforto® (5.2/10 and 5.3/10, p=0.594).

**Conclusion:** The study found no significant differences in GSmax, muscle fatigability outcomes, pain experiences, or levels of exertion between Eforto® and the standard MV system. Eforto® is comparable to the standard MV system regarding accuracy and comfort for the users.

## #50 Yangjun Liu: Relationship between physical activity and waist circumference & leptin among postmenopausal women

Authors: Yangjun Liu<sup>1</sup>, Zbigniew Ossowski<sup>1</sup>, Magdalena Dzitkowska-Zabielska<sup>1</sup>, Guoping Qian<sup>1</sup>, Humińska-Lisowska Kinga<sup>1</sup>, Sawczyn Monika<sup>1</sup>, Szwarc Andrzej<sup>1</sup>, Wei Xie<sup>1</sup>, Wiech Monika<sup>1</sup>

<sup>1</sup>School of Physical Education and Health, Chengdu University of Traditional Chinese Medicine, Chengdu, China & Faculty of Physical Culture, Gdansk University of Physical Education and Sport, Gdańsk, Poland

Postmenopausal women often experience dysregulation of leptin secretion, which can lead to overweight and obesity. The purpose of this study was to determine the association of daily step count with waist circumference and leptin among postmenopausal women.

A total of 89 women aged 60-80 years participated in the study. Physical activity levels were assessed using a POLAR accelerometer over a 7-day period recording the daily number of steps. Waist circumference was performed using a centimeter and blood leptin levels were determined.

The study showed that daily step count showed a significantly negative correlation with waist circumference ( $r = -0.31$ ) and a negative correlation with leptin ( $r = -0.245$ ).

Our study suggests that regular physical activity may be helpful in reducing waist circumference, which may have an effect on leptin levels.

Keywords: physical activity, abdominal obesity, postmenopausal

## #51 Justina Kilaitė: Association of Physical Performance with Hypertension and Frailty in Older Adults

Authors: Justina Kilaitė<sup>1</sup>, Valentina Ginevičienė<sup>1</sup>, Asta Mastavičiūtė<sup>1</sup>, Rūta Dadelienė<sup>1</sup>, Ieva Eglė Jamontaitė<sup>1</sup>, Erinija Pranckevičienė<sup>1</sup>, Ildus I. Ahmetov<sup>1</sup>, Vidmantas Alekna<sup>1</sup>

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Objective: The aim of this study was to compare physical performance in older people who had hypertension and frailty and without these conditions.

Materials and methods: An inclusion criteria to this cross-sectional study were: age 65 or more years, unrestricted mobility, MMSE  $\geq$  21. Physical performance was evaluated by short physical performance battery (SPPB). A score of 8 or less points was evaluated as having poor physical performance. Diagnosis of hypertension was retrieved from medical records. Frailty status was defined using Fried's criteria: weakness, low walking speed, low physical activity, weight loss, exhaustion. Participants were classified as robust, prefrail and frail if they scored 0, 1–2, 3 points, respectively. Correlation between poor physical performance in older people with and without hypertension and frailty was assessed by Chi-squared test. Multinomial logistic regression was used to assess the odds of having hypertension and frailty in poor physical performance.

Results: The study included 55 community dwelling older adults: 12 (21.42%) men and 43 (78.58%) women. Mean age was  $77.98 \pm 7.62$  years, ranging from 65 years to 95 years. Out of all participants 27 (48.2%) were classified as having poor physical performance, of which 7 (25.92%) were men and 20 (74.08%) were women. Out of all participants 43 (78.18%) had hypertension. According to frailty criteria 17 (30.4%) participants were frail. All participants with frailty also had hypertension. A statistically significant association was found between physical performance in participant with and without hypertension and frailty ( $\chi^2 = 4.89$ ,  $p = 0.027$ ). Logistic regression revealed that increase in SPPB by one point significantly reduces the risk of frailty and hypertension (OR: 0.55 (0.32-0.94)).

Conclusion: Results of our study shows that there is a relationship between poor physical performance and hypertension with frailty. Also increase in SPPB score is associated with reduced risk of having hypertension and frailty.

This project has received funding from the Research Council of Lithuania (LMTLT), agreement No S-MIP-22-36.

## #60 Bartłomiej Wrzesiński: The Relationship Between Body Mass Index and Postural Stability in Postmenopausal Women

Author: Bartłomiej Wrzesiński <sup>1</sup>

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**Background:** The increased level of fat mass causes a shift and change in the body's center of gravity, which affects the maintenance of sense of balance. Reduced postural stability increases the risk of falls and injuries, which can be especially dangerous for postmenopausal women. Due to the limitations of research in this area, the aim of the study was to determine the relationship between body mass index (BMI) and postural stability:

**Material and Methods:** Seventy-two women (M=69 years) participated in the study. Postural stability was assessed using the Biodex Medical System SS balance platform with the closed-eye test. Body composition analysis was performed using Inbody 720.

**Results:** Body mass index was significantly correlated with the Overall Stability Index (OSI) in postmenopausal women ( $r=0.29$ ).

**Conclusions:** Increased BMI may negatively affect postural stability. Therefore, it is important to maintain an appropriate BMI through a healthy diet and regular physical activity, which improves postural stability indicators and prevents possible complications

Keywords

BMI, Postmenopausal Women, Postural Stability, Falls



## Poster Session 2

### #61 Magdalena Cyma-Wejchenig: Recruitment Strategies for Engaging Older Adults in Physical Activity and Technology-Based Health Programs: A Systematic Review Protocol

Authors: Magdalena Cyma-Wejchenig<sup>1</sup> Sunwoo Lee<sup>2</sup>, Iuliia Pavlova<sup>3</sup>, Ana Isabel Morais<sup>4</sup>, Veysel Alcan<sup>5</sup>, Ilke Kara<sup>6</sup>, Rafał Stemplewski<sup>7</sup>

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This systematic review aims to identify and analyze recruitment strategies for engaging older adults in physical activity and technology-based health programs. The review follows the PRISMA 2020 guidelines and utilizes the PICOS criteria for study inclusion. It employs a detailed, multi-phase search strategy using MEDLINE, EMBASE, SPORTDiscus, CINAHL, and Web of Science. The search was conducted on October 24, 2023. Groups of two independent reviewers are assigned to select studies using the Rayyan, extract data, and assess quality with Cochrane’s tools. In the case of any disagreements, conflicts are resolved by a third reviewer. The review includes quantitative and qualitative studies focusing on older adults (Mage ≥ 60) regardless of their health conditions. Reviews, protocols, dissertations, case studies, and non-peer-reviewed conference proceedings were excluded. Initially, 1737 records were identified, reduced to 930 after removing duplicates.

A calibration exercise for the screeners was conducted before screening, achieving over 80% agreement. After abstract screening, a total of 185 articles were retained for full-text screening. The review is currently in the meticulous phase of study selection and screening. Data extraction will focus on information about study participants, main intervention characteristics, technology, and recruitment methodology (selection/allocation, barriers, facilitators, as well as rates of recruitment, approval, refusal, and adherence). The prevalent trends and patterns in recruitment strategies and their effectiveness will be elaborated as primary outcomes.

Preliminary observations indicate a rapidly evolving field that embraces both established practices and innovative digital solutions. This review is expected to streamline recruitment methods for older adults in physical activity and technology-based health programs, bridging the gap between traditional methods and modern approaches. The review will offer valuable guidance for health practitioners, program designers, and researchers, leading to more effective recruitment strategies for ageing populations.

The study's protocol has been registered in the Prospero repository (CRD42023488032).

## #62 Erika Karkauskiene: A systematic review of strategies to minimize sedentary behaviour in older adults residing in long-term care facilities

Authors: Erika Karkauskiene<sup>1</sup>, Rima Solianik<sup>2</sup>, Mark A Tully<sup>3</sup>, Maria Giné-Garriga<sup>4</sup>, Cristina Font-Jutglà<sup>5</sup>, Anna Escribà-Salvans<sup>5</sup>, Vilma Dudoniene<sup>1</sup>, Marius Brazaitis<sup>2</sup>, Javier Jerez-Roig<sup>2</sup>

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**Introduction.** Sedentary behaviour (SB) is a prevalent concern among older adults residing in long-term care facilities (LTCFs), as they tend to spend a significant portion of their awake hours sitting or reclining. Since SB is associated with diverse health issues among older adults, global health recommendations emphasize the importance of reducing sedentary time and promoting physical activity (PA) in this population. This systematic review explores the effectiveness of interventions aimed at reducing SB among individuals aged 60 and above living in LTCFs.

**Methods.** Following PRISMA guidelines, a comprehensive search of relevant literature was conducted across seven databases (Cochrane Library, MEDLINE, Scopus, PEDro, ScienceDirect, ClinicalTrials.gov, Google Scholar) until September 2023.

**Results.** The primary outcome was SB measured using self-reports and tracking devices. Six studies met the eligibility criteria: three quasi experimental studies and three randomized controlled trials (RCTs). One study demonstrated a significant decrease in SB compared to usual care, while others found no significant differences. No study reported social health outcomes. Notably, interventions focusing on SB rather than PA demonstrated potential positive impacts on SB reduction. Limitations such as small sample sizes, heterogeneity, and bias underscore the need for future research.

**Discussion and conclusion.** The mixed findings suggest that the effectiveness of interventions to reduce SB among older adults in LTCFs is uncertain, and additional high-quality research is necessary to establish more conclusive evidence. Larger-scale RCTs are essential to facilitate the development of robust evidence in this field. This knowledge can guide the development of effective interventions and contribute to enhancing the overall well-being of older adults living in LTCFs.

### #63 Salit Bar-Shalom: Effect of 6-months of progressive resistance training on the brain structural and neurochemical properties and their interplay with gains of intrinsic capacity in older adults with MCI: A protocol for a randomized controlled trial.

Authors: Salit Bar-Shalom<sup>1</sup>, Oron Levin<sup>2</sup>, Nerijus Masiulis<sup>2</sup>, Wouter Vints<sup>2</sup>, Vida Cesnaitiene<sup>2</sup>, Gal Ziv<sup>1</sup>, Yael Netz<sup>1</sup>

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Some of the most common features of the aging process include brain structural and functional deterioration along with cognitive decline and increased frailty. The WHO introduced the holistic concept of intrinsic capacity as a way of monitoring ageing and functional ability over time. Intrinsic capacity measures five capacities: locomotion, vitality, cognitive, sensory and psychological, and it throws light on the evolution of reserves over time.

A great amount of research has been conducted in the past years to explore the effect of physical activities on the physical, cognitive and psychological aspects of old people. The aim of the current study is to investigate the effect of resistance training on brain structure and on intrinsic capacity of older individuals with MCI, as well as the interaction between these two components.

The study is designed as a randomized-controlled trial (RCT) with one intervention condition (40 participants) and one active-control condition (40 participants). Intervention group: 2-3 training sessions/week, 24 weeks; four lower-limb muscle-strengthening exercises. Control group: 2-3 training sessions/week of flexibility training of lower limb muscles (24 weeks). Inclusion criteria: Community-dwelling, apparently healthy, 65+ years old volunteers with MCI or at high risk of MCI (a score of 18 to 25 on the Montreal Cognitive Assessment - MoCA).

The study hypotheses are:

For older individuals with mild cognitive impairment (MCI), aspects of intrinsic capacity will be improved following 24 weeks of intensive resistance training.

For older individuals with MCI, larger grey matter volume, higher levels of N-acetyl aspartate (NAA), and lower levels of myoinositol will be associated with higher levels of intrinsic capacity at baseline.

An increase in the regional gray and white matter volumes, regional cortical thickness, and shifts in the neurochemical properties of the primary sensory-motor cortex, posterior cingulate cortex, and prefrontal cortex, following 24 weeks of progressive resistance training, will be associated with improvements in intrinsic capacity.

The results of this research may reveal the connection between brain components and the risk of vulnerability among old individuals, as well as providing tools for developing a training program to improve intrinsic capacity.

This protocol was registered at AS PRDICTED #156286 on Dec 20th 2023.

## #64 Gamze Yalcinkaya Colak: Investigation of the relationship between chronotype, sleep quality, and physical activity in participants of the Refreshment University

Authors: Gamze Yalcinkaya Colak, Gokcen Aydın Akbuga, Evren Yasar

**Background:** The chronotype is an individual difference that is known as closely associated with physical activity, sedentary behavior, and sleep quality in young populations. However, there is still a lack of evidence regarding the association between physical activity and chronotype for the aging population.

**Purpose:** Our study assessed the association between chronotype, sleep quality, and physical activity in individuals of the Refreshment University (RU).

**Method:** Forty participants of the RU (17 males, 23 females; mean age:  $63.87 \pm 8.86$ ; mean BMI:  $28.54 \pm 3.82$ ) were included and completed questionnaires of The Morningness-Eveningness Questionnaire (MEQ), the International Physical Activity Questionnaire-Short Form (IPAQ-SF), and the Pittsburgh Sleep Quality Index (PSQI). The correlation analysis was conducted with the Spearman correlation coefficient.

**Results:** Participants of the RU had generally morning chronotype, good sleep quality, and sufficient physical activity levels according to mean values of related questionnaires. The IPAQ-SF total activity score was correlated with the PSQI ( $r: -0.324$ ,  $p=0.04$ ) and the MEQ ( $r: 0.382$ ,  $p=0.01$ ). The vigorous activity scores of the IPAQ-SF had also a positive correlation with the MEQ scores ( $r: 0.426$ ,  $p=0.006$ ). Further, the sleep onset latency and PSQI scores were found negatively correlated with the MEQ scores ( $r: -0.365$ ,  $p=0.002$ ;  $r: -0.374$ ,  $p=0.01$ ).

**Conclusion:** Higher levels of physical activity might be associated with the tendency to be morning chronotypes in individuals of the RU. Similarly, sleep quality might be enhanced via physical activity level. The recognition of this association could play a necessary role in targeting physical activity programs on the basis of Refreshment University's curriculum. Physical activity approaches could be considered a beneficial method to improve sleep quality in the aging population.

**Keywords:** Aging population, chronotype, physical activity, sleep quality.

## #66 Wouter Vints: Myokines as mediators of cognitive improvements in older adults: living systematic review and meta-analysis

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**Background:** There is a lack of agreement about the underlying mechanisms of the exercise-induced cognitive improvements. Recently, myokines, factors released into the blood circulation by contracting skeletal muscle, were proposed to mediate the beneficial effect of exercise on cognition. We plan to continuously map the rapidly accumulating knowledge on pathways between acute or chronic exercise-induced myokines and cognitive domains enhanced by exercise.

**Method:** We present the protocol for a living systematic review and meta-analysis. Randomized controlled studies will be systematically collected at baseline and every 6 months for at least 5 years. Literature search will be performed online in PubMed, EMBASE, PsycINFO, Web of Science, SportDiscus, LILACS, IBECs, CINAHL, SCOPUS, ICTRP, and ClinicalTrials.gov. A random effects meta-analysis with mediation analysis using meta-analytic structural equation modeling (MASEM) will be performed. The primary research question is to what extent exercise-induced myokines serve as mediators of cognitive changes. Secondly, the pooled effect size of specific exercise characteristics or specific older adults' populations on the relationship between exercise, myokines, and cognition will be assessed.

**Discussion:** Our results will expand the understanding of the role of myokines in relation to exercise-induced cognitive changes. This may ultimately lead to increased knowledge on individualized exercise programs to target age-related cognitive decline.

**Registration:** Systematic review and meta-analysis protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO) on the 24th of April 2023 (registration number CRD42023416996).

## #69 Emelyn Mathot: Are circulating inflammatory markers in older adults influenced by physical interventions? An umbrella review

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Ageing-related alterations of the immune system involve a chronic low-grade inflammation called “inflammageing”, characterized by increases in the levels of pro-inflammatory molecules, which impair the maintenance of immunological homeostasis. Different modalities of exercise interventions have been proposed to reduce inflammageing in older adults. The objective of this umbrella review was to determine the effect of exercise on basal levels of the pro-inflammatory biomarkers C-reactive protein (CRP), tumour necrosis factor alpha (TNF- $\alpha$ ), interleukin 6 (IL-6), and anti-inflammatory marker interleukin 10 (IL-10) in older adults. We searched PubMed and Web of Science databases for relevant systematic reviews and meta-analyses in accordance with PRISMA guidelines. Assessment of the methodological quality of studies was performed with AMSTAR 2. The review protocol for this study was registered in PROSPERO (CRD42023411860). After screening 228 studies for eligibility, 11 systematic reviews were included in the qualitative synthesis (9 meta-analyses). The included reviews investigated the effect of resistance, aerobic, functional, multimodal, high intensity interval and combined training, tai-chi, yoga, treadmill, bench step exercises, and multicomponent aerobic exercises. All reviews described the effects of 6 weeks to 12 months long-term interventions with a frequency ranging from 1 session a week to daily exercise sessions. All articles were of medium or high methodological quality. In general, a decrease of CRP levels was found after long-term exercise in older adults, across different types of exercise interventions. Regarding TNF- $\alpha$ , most articles described a decrease in circulating levels after different types of exercise interventions. Although some studies showed lower concentrations after exercise, effects on IL-6 were less conclusive. Only two reviews described the effects of exercise on IL-10, showing increases, decreases or no effects.

In general, our umbrella review show that different types of exercise interventions can lower circulating pro-inflammatory parameters CRP, TNF- $\alpha$  and IL-6 in older adults. However, more studies are necessary to ascertain the effect of exercise interventions in older individuals on IL-10.

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## #77 Signe Tomsone: Physical activity level in a population of older adults in Latvia

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WHO defines healthy ageing as “the process of developing and maintaining the functional ability that enables wellbeing in older age.” Functional ability is about having the capabilities that enable all people to be and do what they have reason to value. Physical activity can be an effective mean of prevention of many psychosomatic disorders.

Aim of this study is to asses the level of physical activity in a population of older adults in Latvia.

Method. Tertiary data from “The study of health-affecting habits and functional abilities of the population of Latvia over working age” (2020) was used. The stratified random study sample included residents of Latvia aged 65 and over and was proportional to the general population. The data were collected in all regions of Latvia. Data on physical activity was collected using the International Physical Activity Questionnaire Short Version (IPAQ).

Results. 2568 respondents participated in the survey of which 33.4% were men (n = 876) and 66.6% were women (n = 1692). Statistically significant higher proportion of women was in all age groups. More than half of the participants (52.9%) indicated that their health status was average, while 29.4% of participants rated their health as bad or very poor. Nine out of ten participants (92.0%) said they had someone who could help if they needed help and support and relatives (family) help the most - 85.2%. Most of participants (74.3%) had moderate levels of physical activity. In the age group of 80 years and older there was a higher proportion of participants who did not exercise at all (19.2%) or had low level physical activity (6.3%).

Conclusions. The results of the study indicate that the majority of respondents had an average level of physical activity, however, the methodology chosen for the study allowed evaluating only general information about the intensity of physical exercise and the time spent on activities. More information on the different types of physical activities performed by older adults in Latvia and the regularity of physical activities would be needed.



## #78 Aija Bukova-Zideluna: Association between Vigorous Physical Activity and Chronic Diseases among the Elderly in Latvia

Author: Aija Bukova-Zideluna <sup>1</sup>

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The objective of the study was to examine the relationships between vigorous physical activity (VPA) and the risk of major chronic diseases among adults aged 50 and above in Latvia.

Data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) with respondents aged 50+ of Wave 8 (year 2020) in Latvia was analysed. The survey included questions about the frequency of engaging in vigorous physical activity (e.g., sports, heavy housework, physically demanding occupation), as well as inquiries regarding whether participants had been informed by their doctor about the presence of the following conditions: heart attack or other heart problems, hypertension, stroke, high blood cholesterol level and diabetes. Data analysis involved descriptive statistics, and comparative analyses were performed using Pearson's chi-square test, the T-test, and logistic regression to evaluate the results.

Among the cohort of 798 respondents, prevalent chronic conditions included hypertension (49.8%), myocardial infarction (18.5%), elevated blood cholesterol (14.8%), diabetes (9.6%), and stroke (6.7%). Almost half of the participants revealed a lack of VPA (49.7%), in comparison, 17.4% reported participating in VPA once a week and 32.9% participated more frequently than once a week. Among both men and women, the frequency of chronic diseases was lower among those who reported participating in VPA once a week or more. For men, participation in VPA once a week or more was prospectively related to lower odds of heart attack, high blood cholesterol level, and stroke. Women who participated in VPA more than once a week had lower odds of having a heart attack, high blood cholesterol level, and stroke. Men with VPA more than once a week have lower odds of diabetes, while there was no association between diabetes and VAP for women. Hypertension was a chronic disease that did not show an association with physical activity.

Engaging in VPA appears to correlate with a lower risk of chronic diseases in both men and women. Even participation in VPA once a week appears to be sufficient to reduce the risk of chronic diseases in adults 50 and older.

## #79 Deniz Aminirakan: Effects of combined resistance and cognitive training on motor and cognitive performance in older adults $\geq 65$ years – a systematic review

Authors: Deniz Aminirakan<sup>1</sup>, Dagmar Linnhoff<sup>1</sup>, Bettina Wollesen<sup>1</sup>, Klaus Mattes<sup>1</sup>

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**Introduction:** The aging population confronts difficulties linked to the decline in abilities essential for independent living, encompassing cognitive and physical performance. While resistance and cognitive training have proven beneficial in enhancing muscle strength, mobility, and cognitive performance in older adults, the optimal combination and training load for their integration is unclear. This systematic review aims to examine the effectiveness of combined resistance and cognitive training on cognitive and physical outcomes in healthy older adults.

**Methods:** Two independent reviewers conducted a search in electronic databases (MEDLINE, Web of Science, Psych INFO) following PRISMA guidelines. Inclusion criteria for studies were: participants  $> 65$  years, without medical conditions, engaging in at least 15 minutes of resistance training/ resistance exercise combined with cognitive training conducted sequenced or simultaneously, control group comparisons, and reporting at least one physical and cognitive outcome. Quality assessment was utilized a modified Cochrane assessment.

**Result:** Out of 4682 studies, only 9 were included. The age range of the cohort was  $65.5 \pm 6.3$  to  $83.9 \pm 6.3$  years. The total sample sizes were 802 females and 366 males, distributed across at least two and a maximum of four groups with included participants ranging from 18 to 376. Three studies employed sequential dual-task intervention, while six trials used simultaneous cognitive-motor training. Study durations varied from four to 52 weeks, incorporating diverse intervention designs and training protocols. Six of the nine studies approved positive impacts on both domains of cognition and mobility which included executive function, working memory, attention, processing speed, and gait speed, balance, muscle strength, respectively.

**Conclusion:** The findings from this systematic review suggest that combined resistance exercise and cognitive training can have a positive impact on muscle strength, mobility, and cognitive performance for older adults aged 65 and above. Notably, longer-term interventions ranging from 12 to 52 weeks, with higher training frequencies of 2 to 4 times per week, appear more likely to yield robust enhancements in cognitive functions and motor abilities.

## #80 Stefanie Dahl: Dyadic exercise interventions for care recipients and their caregivers – an overview

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**Introduction:** The benefits of physical activity for the health of (older) adults are well documented (e.g., Warburton et al., 2006). However, the body of research in the care setting is still limited and inconsistent. In addition, exercise programs are rarely used by the intended target group. Dyadic interventions that simultaneously address both participants in a care dyad (care recipients and their caregivers) could overcome this barrier. Therefore, this talk focuses the effects of jointly performed dyadic exercise interventions on the physical, mental, and psychosocial health of care recipients and caregivers.

**Methods:** Two databases (PubMed and the German database SURF) were searched for intervention studies focusing on dyadic physical activity interventions with a joint exercise program for a care dyad. No inclusion or exclusion criteria (e.g., regarding the setting of the study) were defined to get a comprehensive overview of the state of research.

**Results:** 14 studies were identified. Studies mainly focussed on different factors of physical and mental health such as physical fitness or objective and subjective health. Studies also addressed various aspects of psychosocial health such as quality of life or burden of care, but to a lesser extent.

Overall, the exercise programs for care dyads showed mixed results and do not appear to have an impact on many of the health variables of the participants studied. However, it is important to emphasize that – with a few exceptions – no negative effects were triggered by the interventions.

**Conclusion:** Joint dyadic exercise interventions appear to be safe to conduct and do not represent an additional burden for caregivers. However, effects on the health of caregivers and care recipients are rarely detected. Qualitative studies emphasize the need for a changed focus on alternative variables such as quality of relationship in the care dyad (Prick et al. 2014).

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## #85 Dovile Kiele: High intensity resistance exercises can change the thigh muscle contractile properties in older adults

Authors: Dovile Kiele<sup>1</sup>, Wouter Vints<sup>1</sup>, Oron Levin<sup>1</sup>, Nerijus Masiulis<sup>1</sup>, Vida Cesnaitiene<sup>1</sup>

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**Background:** Skeletal muscle aging is a complex process characterized by a decline in muscle mass, strength and muscle contractile properties. High-intensity resistance (HIR) exercises increase muscle strength and hypertrophy. One of the methods to measure muscle contraction function changes due to aging is tensiomyography (TMG).

**Objectives:** This study compared the effect of HIR training vs control (CON) group in older men on changes in muscle parameters measured with TMG. We hypothesized, that HIR training, would induce adaptations in thigh muscle contractile properties after 3 months of HIR training.

**Methods:** In total 26 healthy elderly male participants took part in this study. They were randomized into 2 groups: 1) CON group (n=11) –remaining their daily physical activities as usual for 3 months, 2) HIR exercises group (n=15) – exercising 2 times per week for 45min in 3 months (24 training sessions in total) HIR exercises (6 cycles of 1 eccentric, 3 concentric training sessions) were provided. The exercises were design to increase the thigh muscles strength: leg press, knee extensions and flexions. TMG measurement was performed before and after 3 months. Vastus lateralis (VL), rectus femoris (RF), biceps femoris (BF) and semitendinosus (ST) muscles were tested. Muscle displacement (Dm), contraction time (Tc), and radial displacement velocity (Vc) were calculated. A repeated measures ANOVA was used to assess the significance of differences among the factors: group (HIR, Control), and Time (Before, After).

**Results:** HIR training produced significant changes in the neural and muscular profile of the thigh muscles. The RF, ST, VL, but not BF muscle, showed reduced muscle Vc and Dm ( $p<0.05$ ) after HIR intervention and significantly differed from control ( $p<0.05$ ).

**Conclusion:** In conclusion, our study showed that the thigh muscles contraction velocity decreased and the stiffness increased after a 3 months HIR exercises. The results suggest that HIR training may be effective in altering muscle properties and neuromuscular adaptations of the thigh muscle group.

This work was supported by the Research Council of Lithuania, No. S-MIP-22-12.

## #87 Jekaterina Danilova: Association between frailty status and risk of falls in community-dwelling older women

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The highest frequency of falls among elderly depends on low physical activity and slow walking speed. Walking speed is a reliable and sensitive measure of functional abilities, closely associated with frailty. Due to hormonal changes during menopause, longer life spans, chronic disease, women are more likely to develop frailty than men. Therefore, the aim of the study was to examine the relationship between physical frailty, incidence of falls and gait speed among older women.

**Material and Methods:** The study included 43 community-dwelling elderly women (aged 77.63±2.21 years). Measures included self-reported history of falls incidence (FI) during one-year period, and socio-demographic characteristics. Frailty was defined according to five Fried's criteria: weakness, low gait speed (GS), low physical activity, weight loss, and exhaustion (robust [0 score], pre-frail [1-2 score] and frail [>3 score]).

**Results:** According to frailty status 10 (23.3%) participants were evaluated as being robust, 21 (48.8%) having pre-frailty and 12 (27.9%) were frail. FI were reported in 26 (60.5%) participants, among them 11 (25.6%) were with frailty criteria. Low GS was determined in 26 (60.5%) participants, and 12 (27.9%) of them had frailty. Among elderly women the median of GS was 0.716 m/s, significantly different from the median norms of older adults living in the community 1.17–1.27 m/s ( $p < 0.001$ ), according to the Irish longitudinal study on aging (TILDA). Correlation analysis showed a significant relationship between frailty and FI ( $r = 0.52$ ;  $p = 0.005$ ), and between frailty and GS ( $r = 0.56$ ;  $p = 0.002$ ), but GS does not correlate with falls ( $p > 0.05$ ). Logistic regression analysis revealed that among the older women, frailty was significantly associated with a higher risk of falls, compared with those without frailty (OR: 1.258 (4.7-0.34)  $p=0.02$ ).

**Conclusion:** This study did not find a significant difference between falls and gait speed among older women. However, frailty was significantly associated with an increased risk of falls among community-dwelling older women. It is necessary to screen and recognize frailty status to prevent falls among older women population.

This project has received funding from the Research Council of Lithuania (LMTLT), agreement No S-MIP-22-36.

## #88 Una Veseta: Physical activities as therapy for 68 old woman with type 2 diabetes mellitus, clinical depression and condition after ischemic stroke: case study

Author: Una Veseta <sup>1</sup>

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**Purpose:** The present study aimed to report the effects of 12 weeks of a physical activities on blood glucose levels, blood pressure, heart rate, balance, aerobic capacity, and quality of life of a 68 old woman with type 2 diabetes mellitus, clinical depression and condition after ischemic stroke.

**Method:** The Patient was sedentary with a history of clinical depression from 2016, type 2 diabetes from 2018 and suffered an ischemic stroke in 2023. The consequences after an ischemic stroke are balance disorders. Body mass index 23%. In November 2023, she started a 12-week program, 12 face-to-face training sessions. For aerobic training was performed up to 10 min long cyclic exercise with a heart rate up to 60% of the maximum heart rate. Resistance training followed a minimal dose approach with 6 exercises performed with 2 sets to muscle fatigue. Each workout consisted of static and dynamic balance exercises and stretching exercises. Training took place once a week with a physiotherapist and three times a week independently at home.

**Results:** After check-up, the patient presented a reduction in blood glucose, systolic and diastolic blood pressure, and heart rate at rest. There were also improvements on cardiorespiratory fitness (The Six-Minute Walk test +200m), static balance (Romberg test + 10s) and quality of life (Quality of Life Questionnaire (Schalock & Keith 1993) +23 points). More importantly the patient was happy and proud to able to come from home to the physiotherapy center all by herself, without the help of relatives, and thus became more independent in her daily activities.

**Conclusions:** These results suggest that physical activities might help to improve general health and quality of life in a patient with clinical depression and type 2 diabetes mellitus.

## #90 Vera Simovska: A mathematical model for predicting the effectiveness of non-drug programs: Digital-assisted physical activity, lifestyle and diet in obese adults and older adults

Authors: Vera Simovska<sup>1</sup>, Mila Vidin

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**Background:** By applying discriminant analysis, differences between two or more groups of obese adults and older adults can be observed based on morph-functional and biochemical variables. To differentiate a certain number of variables as predictors for discrimination of individuals in adequate groups of non-drug programs, a “step-by-step” discriminant analysis was applied.

**Objective:** The procedure involves determining several discriminative functions that are a simple linear combination of independent variables in the case where the difference between groups is defined by also an output variable that represents the effect of the applied program.

**Method:** Considering the differences between the groups that determine the two types of non-drug programs: “A”: digital-assisted PA with an intensity of 50-60% of the VO<sub>2</sub>max (ml/kg/min) and “B”: daily lifestyle PA, the future subject that is the effectiveness of the programs, is classified. Both groups received a moderate hypocaloric diet.

**Results:** Discrimination was performed with the help of a discriminative function whose standardized canonical coefficients of the discriminative function and coefficients of the classification function for inclusion in one of the two groups determine the inclusion of the individuals to an adequate program. The following four variables were singled out as predictors for discrimination important in the selection of the programs: VO<sub>2</sub>max (ml/kg/min), the skin fold thickness above the m. triceps (DKNTR), body mass index (BMI) and basal metabolic rate (BMR/24h) (Tables 1/2). The classification accuracy is 90.5%. This analysis can be viewed from the perspective of the expected effects of two non-drug programs. Similarly, discriminant analysis “step-by-step” is carried out. The differentiation of the mentioned five variables, which is a linear combination represents a prognostic index in terms of the expected effect: DKN-TR, BMI, BMR/24h, HDL-C, and reduction of body weight after 30 days of treatment (Tables 3/4). The result shows that the accuracy is 90.3%.

**Conclusion:** Adults and older adults with abdominal obesity who would be included in a non-drug program which applies a digital-assisted PA and diet would achieve average values of the specified five variables within the prognostic index which are identical to the final values achieved in the group “A”.



## #94 Niharika Bandaru: Exploration and novel conceptual framework for digitalizing a cognitive-motor test integrating with an ICT-rollator (inter-communication technology rollator) for healthy seniors and seniors with dementia

Authors: Niharika Bandaru<sup>1</sup>, Anita Hökelmann<sup>1</sup>

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As age increases, there is a decline in cognitive function, processing speed, and psychomotor function and this cognitive decline can be reduced or maintained by physical activity. In the current study, we aimed to use technology for all the elderly also with dementia by helping with memory, spatial orientation, and other cognitive and motor tasks. It can be achieved by testing with a digitalized cognitive-motor test before and after the digitalized physical activity Intervention with ICT-Rollator. The ICT-Rollator is for testing to get regular feedback about the status and training against cognitive and motor decline. Meanwhile, in the process, we developed the psycho-motor test to analyze the cognitive and motor function using technology for all seniors and those with dementia. The core of human behavior serves as the foundation for the development and digitization of the psycho-motor test used in the current study.

Evidence shows enough studies aimed at incorporating technologies for physical activity for the elderly. Still, there is a lack of research for integrating technologies for testing cognitive and motor abilities at the same time in healthy elderly and seniors with dementia.

The psycho-motor test, which measures motor and cognitive abilities like memory, spatiotemporal orientation, mobility, coordination, shape, and color recognition, reading skills, focus, decision-making, and attention, was administered to 12 seniors with dementia and 12 healthy seniors of 65+ age. As the study is still in process the current paper focuses on the exploration, challenges, and solutions to digitalize the innovative psycho-motor test for integrating with ICT-Rollator. Therefore, psycho-motor tests could help seniors and therapists to measure or inspect motor-cognitive functions while using the ICT-Rollator. Further research focuses on the technology integrations for the improvement of motor-cognitive functions as well as physical, and psychological outcomes in the elderly with different chronic illnesses.

Keywords: Physical Activity, Chronic Diseases, Seniors, Inter-Communication Technology Rollator, Dementia, Motor-Cognitive functions, Cognitive-Motor test.

## #96 Lina Mickevičienė: Cognitive task mistakes in dual task conditions predict posture stability

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**Background:** It is well known that motor and cognitive functions decline with age. Dual tasking can lead to poorer performance in one or both domains. Performing a cognitive task while maintaining postural stability, known as the "dual-task" condition, may increase cognitive demands and decrease postural control capacity. Failure to attend to postural control under dual-tasking conditions may lead to impaired balance, particularly in older adults. The present study was designed to assess how cognitive function affects postural stability in dual-task conditions.

**Methods:** A total of 51 healthy older male participants (> 60 years of age) took part in this study. We used the ANAM 4 test battery to assess cognitive functions such as verbal working memory, immediate recognition, and attention. directed attention and executive function, visuo-motor response timing and response inhibition. For the dual task condition, we used the posturography method with a single piezoelectric force plate (KISTLER, Switzerland, Slimline System 9286) to measure postural sway activity and the mathematical calculation task.

**Results:** We found that the ANAM4 Memory test, which reflects working memory, immediate recognition and attention were related to postural stability. The higher number of errors in this test had a significant correlation with higher center of pressure (COP) sway activity ( $r=0,398$ ,  $p=0,007$ ). We also found that subjects who deviated more from the correct answer at the mathematical task had greater sway activity of the COP in the dual task conditions. ( $r=0,318$ ,  $p=0,023$ ). Details will be provided in the presentation.

**Conclusion:** Poorer verbal working memory, immediate recognition and attention predict poorer postural stability. Higher mistakes in the mathematical task are related with higher sway activity in dual-task conditions. Even a small decline in cognitive function could increase postural instability.

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## #97 Dorė Orentaitė: The associations of depressive symptoms, physical activity and activities of daily living in community-dwelling older adults

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**Objective:** The aim of this study was to investigate the associations of depressive symptoms, physical activity and activities of daily living in community dwelling older adults.

**Methods:** This cross-sectional study was conducted on community dwelling older adults aged  $\geq 65$  years with normal cognition and mild cognitive impairment. A total of 51 older adults (78.4% women) with average age  $77.82 \pm 1.04$  years were involved in this study. Exclusion criteria were chronic diseases with acute organ failure, musculoskeletal and nervous system diseases, restricting mobility. Cognitive status was evaluated using the Mini Mental State Examination (average was  $27.49 \pm 0.28$ ). Geriatric Depression Scale (GDS) short form was used to measure depressive symptoms. The level of physical activity was assessed using Physical Activity Scale for Elderly (PASE). Katz Index of Activities of Daily Living (ADL) was used to evaluate the independence in basic activities of daily living. The relationship between variables was calculated using Spearman correlation coefficients with statistical significance  $p < 0.05$ . Data was analysed using IBM SPSS Statistics 29.0.2.0 version.

**Results:** The average score of GDS was  $3.2 \pm 0.34$ . Depressive symptoms were observed in 46 of 51 patients, 31.4% of individuals having scored mild and moderate depression. The average score of PASE was  $101.55 \pm 9.51$  and of ADL –  $5.55 \pm 0.14$ . The analysed data showed that 86.6% of individuals were independent, 11.7% had moderate functional impairment and 2% – severe functional impairment. The analysis revealed a statistically significant moderate negative correlation between depressive symptoms and physical activity ( $r = -0.533$ ,  $p < 0.001$ ). There was found a statistically significant weak negative correlation between depressive symptoms and independence in activities of daily living ( $r = -0.367$ ,  $p = 0.008$ ). The analysis demonstrated a statistically significant moderate positive correlation between physical activity and independence in activities of daily living ( $r = 0.74$ ,  $p < 0.001$ ).

**Conclusion:** Depressive symptoms were statistically negatively associated with lower levels of physical activity and independence in activities of daily living in community dwelling older adults.

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## #97 Domantas Feoktistovas: The associations of muscle strength, gait speed and fear of falling in community-dwelling older adults

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**Objective:** The aim of this study was to investigate the associations of muscle strength, gait speed and fear of falling in community dwelling older adults.

**Methods:** An inclusion criteria to this cross-sectional study were: age 60 or more years, unrestricted mobility, MMSE  $\geq 21$ . Grip strength was assessed by hand held dynamometer. A cut-off value of 16 kg for women and 27 kg for men was used to determine low muscle strength. Gait speed was assessed by 4 meter walk test. A cut-off value of  $\leq 0.8$  m/s determined low walking speed. Fear of falling was assessed by Falls Efficacy Scale International (FES-I). The relationship between variables was calculated using Spearman correlation coefficients with statistical significance  $p < 0.05$ . Data was analyzed using IBM SPSS Statistics 29.0.2.0 version.

**Results:** A total of 131 participants (41 (31.29%) men and 90 women (68.71%)) were involved in this study. The median grip strength was 28 (IQR 24-34) and gait speed was 0.59 (IQR 0.48-0.73). FES-I median score as 19 (IQR 16-26.75). The analysis revealed a statistically significant negative correlation between grip strength and fear of falling ( $r = -0.242$ ,  $p = 0.008$ ). Also there was a statistically significant negative correlation between gait speed and fear of falling ( $r = -0.245$ ,  $p = 0.007$ ).

**Conclusions:** It was found that decreased grip strength is correlated with increased fear of falling. Moreover, higher fear of falling was also correlated with decreased walking speed.

## #102 Kristina Visagurskienė: What lifestyle aspects are important for healthy aging?

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**Introduction:** The problem of an aging society has been studied for several decades. Many scientific studies have proven and confirmed that maintaining good health in old age depends a lot on our lifestyle. However, various biomarkers and indicators for healthy aging are still being sought. A number of questionnaires and indexes have been created that help clarify the links between quality of life, physical and mental health, and social well-being in an aging population (Aronson, 2020; Dieteren et al., 2020; Silva, N., Rajado, A.T., Esteves, F. et al., 2023). This study examined some factors that can influence healthy ageing to construct a healthy ageing score comprising the crucial lifestyle domains relevant to ageing well.

**Methods:** We used the Healthy Aging Quiz (HAQ) and conducted an online survey of individuals aged 50 and over. We divided the subjects into three age groups: 50-64 years old, 65-74 years old, 75 years old and older. The data were analyzed using descriptive and analytical approaches. The survey asked respondents about their physical activity, unhealthy habits, eating habits, balance and fall risk, sleep, incidence of chronic diseases, social connections and productivity, optimism and adaptation.

**Results:** In this study, 857 people participated, of which, 47 were men and 810 women. The mean (SD) age was 66.3 (7.3) years. It was determined that only 14.8 percent respondents were physically active enough. As many as 91 percent of sufficiently physically active individuals choose lifestyle components that support healthy aging. Optimism and initiative to solve problems ( $r=0.31$ ,  $r=0.35$ ), socialization and cognitive activities ( $r=0.24$ ), illness and sleep ( $r=0.27$ ) were correlated with each other.

**Conclusion:** Only half of the respondents in the youngest age group chose lifestyle decisions favorable to healthy aging. A trend has emerged that after the age of 65 there is probably a turning point and people start to take care of their healthier lifestyle. Lifestyle components such as adequate physical activity, a proper diet, better social connections, proper body composition, and optimism contribute to healthier aging and reduce the risk of chronic diseases.