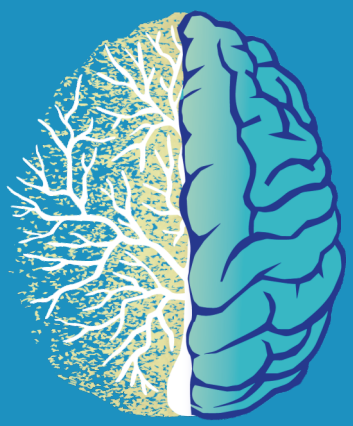
II INTERNATIONAL CONGRESS "PROMOTING BRAIN HEALTH THROUGH EXERCISE ACROSS THE LIFESPAN"

GRANADA 19TH–20TH SEPTEMBER 2024



PROGRAM AND ABSTRACTS BOOK

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Welcome to BHE 2024,

Thank you for joining us in Granada for the II International Congress “Promoting Brain Health Through Exercise Across the Lifespan" (BHE 2024). We are thrilled to hold the 2024 BHE in this historic city, the most beautiful and iconic city in Spain.

The BHE will provide international experiences on understanding the effects of exercise and associated predictors on brain health across age groups and health conditions. It is our goal at the BHE to promote lifelong brain health, a crucial component in pursuing overall health and longevity.

The BHE 2024 Scientific Program features an impressive agenda, including 10 plenary sessions, 10 oral communications and more than 100 posters. We have gathered researchers from around the world to present advances in several key areas related to brain health –lifestyle behaviors, health-related indicators or mechanisms linking the effects of exercise on brain.

Over the next two days, there will be many networking opportunities – through coffee breaks, lunches at the Conference site, cultural walking tour, and dinners– allowing researchers to connect, exchange ideas and foster collaboration to advance the field of exercise neuroscience.

While you are here, we encourage you to immerse yourself in Granada’s unique blend of history, art and culture. Although your BHE schedule may be busy, be sure to take advance of the historic sites, renowned restaurants, and wonderful attractions, all easily accessible on foot.

We are so pleased to welcome you to the BHE 2024 and hope you have a wonderful time with us in Granada.

Sincerely,

Dr. Irene Esteban Cornejo
President of the Scientific Committee for the BHE 2024 Congress

Dr. Patricio Solis-Urra
President of the Organizing Committee for the BHE 2024 Congress

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- BSc. Francisco Javier Morales Navarro. University of Granada, Spain

Invited Speakers

Dr. Belinda Brown, Associate Professor at Murdoch University's Centre for Healthy Ageing, specializes in researching lifestyle factors influencing cognitive health in older adults. Her work emphasizes the impact of physical activity on reducing Alzheimer's-related brain proteins, enhancing cognitive function, and maintaining brain volume. Through a multidisciplinary approach integrating cognitive neuroscience, neuroimaging, exercise science, genetics, and biostatistics, Dr. Brown aims to understand the mechanisms underlying these effects. Her research highlights the malleability of cognitive function, brain volume, and dementia-related markers in later life, with a key emphasis on the positive contribution of physical activity to optimal brain health.

Dr. Kirk Erikson is Director of Translational Neuroscience and Mardian J. Blair Endowed Chair of Neuroscience at the AdventHealth Research Institute, Neuroscience Institute. He also continues an adjunct appointment as Professor of Psychology and Neuroscience at the University of Pittsburgh. 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. Dr. Erickson's research has been funded by numerous awards and grants from NIH, the Alzheimer's Association, and other organizations. He has been awarded a large multi-site Phase III clinical trial examining the impact of exercise on cognitive function in cognitively normal older adults. 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 a Distinguished Scientist Award by Murdoch University in 2018. Dr. Erickson was a member of the 2018 Physical Activity Guidelines Advisory Committee, and chair of the Brain Health subcommittee charged with developing the second edition of the Physical Activity Guidelines for Americans. 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.

Dr. Irene Esteban-Cornejo is Ramon y Cajal research Assistant Professor at the University of Granada. She co-leads the research team on exercise neuroscience within the Profith group. She has dedicated herself to advancing knowledge to improve cognitive and brain health across the lifespan. Her expertise is expanded from observational to intervention studies, as well as from behavioral to neuroimaging data, allowing a deep understanding of the interactions between exercise, brain and cognition in clinical (e.g., overweight/obese children, cardiac patients...) and aging population (e.g., cognitively healthy older adults). Nowadays, her works explores the effects of acute and chronic exercise intervention (e.g., moderate aerobic exercise, resistance exercise) aimed at preserving or improving cognitive functions and uncovering mechanisms of action in the prevention and treatment of Alzheimer's Disease.

Dr. Thomas Karikari is an esteemed Associate Professor in the Department of Psychiatry at the University of Pittsburgh, concurrently serving as a scientist at the Clinical Neurochemistry Laboratory, University of Gothenburg, Sweden. His primary research focus revolves around deepening our comprehension of the molecular and biochemical foundations underlying pathological alterations in the Alzheimer's brain. Dedicated to translational research, Dr. Karikari endeavors to leverage his findings to pioneer innovative biofluid-based diagnostic tools with practical applications in clinical settings. His commitment to advancing Alzheimer's disease diagnosis is particularly evident in his exploration of fluid biomarkers. Groundbreaking developments in this realm, spearheaded by Dr. Karikari, include the emergence of novel tests capable of predicting Alzheimer's by analyzing biomarkers in blood—an advancement poised to revolutionize early detection and intervention strategies in Alzheimer's research and clinical practice.

Dr. Teresa Liu-Ambrose, PhD, PT, is a Professor and Tier 1 Canada Research Chair in Healthy Aging at the University of British Columbia, Department of Physical Therapy. Renowned for her leadership, she directs the Aging, Mobility and Cognitive Health Laboratory, the Vancouver General Hospital's Falls Prevention Clinic, and co-directs the Centre for Aging SMART at VCH. As the head of the Canadian Longitudinal Study on Aging Data Collection Site at UBC, Dr. Liu-Ambrose also leads the CLSA Neuroimaging Working Group and the CLSA COVID-19 Brain Health Study. Additionally, she co-leads the CLSA Healthy Brains, Healthy Aging initiative. Her groundbreaking research revolves around exploring the impact of exercise and lifestyle interventions on cognitive and mobility outcomes in older adults. Dr. Liu-Ambrose's findings have translated into practical applications, influencing clinical practices, community programs, and international guidelines to promote healthy aging.

Dr. Evelyn Monninkhof is assistant profesor at the University Medical Center Utrecht. She has impactful contributions in cancer epidemiology, obesity, and physical activity. Joining the Julius Center for Health Sciences and Primary Care in October 2003, she serves as a methodological consultant for the Department of Radiotherapy while actively engaging in the teaching of Epidemiology & Evidence-Based Medicine. Evelyn's research focuses on the intricate connections between physical activity, obesity, and (breast) cancer risk. Her significant involvement in randomized controlled trials includes the SHAPE-1 and SHAPE-2 studies, where she explores the effects of exercise and weight loss on hormone levels in postmenopausal women. Pioneering trials such as the UMBRELLA-Fit and PAM (Physical Activity & Exercise) studies underscore her commitment to advancing our understanding of the interplay between lifestyle factors and cancer outcomes. In addition to her research endeavors, Evelyn plays a crucial role in trials like DENSE, evaluating the cost-effectiveness of screening methods, and the FLAME trial, investigating the impact of radiotherapy on disease-free survival and side effects in localized prostate cancer patients. Her work reflects a dedication to improving cancer prevention, treatment, and overall patient outcomes.

Dr. Francisco B. Ortega is professor and co-director of the PROFITH Research Group in the Department of Physical Education and Sports at the University of Granada. In 2009, he got the National post-doc grant to stay at Karolinska Institutet for 2 years + 1 year (accumulating 3 years postdoc). During these 3 years living in Sweden, he did 3 short research stays at the University of South Carolina with the world-famous epidemiologist Prof. Steven Blair. Dr. Ortega is worldwide known as expert on physical fitness, cognition and brain in young people. Nowadays his research is focused on objective assessment of physical activity using accelerometry as well as on the effects of exercise on physical and brain health outcomes. Dr Ortega is the principal investigator of 6 national Spanish grants on exercise and cognition/brain. He currently works in two randomized controlled trial examining the effect of exercise on brain health in coronary heart disease patients

Dr. Archana Singh-Manoux, PhD, is a epidemiologist holds the esteemed position of Research Professor (DR1) at INSERM, Paris, where her work on the determinants of cognitive decline and dementia has significantly contributed to the field. As an Honorary Professor at University College London, her influence extends across international borders. Dr. Archana Singh-Manoux expertise lies in the research of cognitive decline and the factors contributing to dementia. Her extensive studies encompass numerous facets such as socioeconomic status, occupation, psychosocial dynamics, behavior, and biological elements, providing a holistic perspective on these intricate matters. Furthermore, she delves into the influence of social factors on the health of older individuals, revealing the underlying mechanisms behind disparities in health. Not only does Dr. Singh-Manoux's profound research enhance our understanding of cognitive well-being, but it also addresses broader concerns surrounding unequal health outcomes in aging communities, making invaluable contributions to the field of gerontology.

Dr. Dorthe Stensvold is professor in exercise medicine at the Cardiac Exercise Research Group, Norwegian University of Science and Technology, with expertise in exercise physiology with a special focus on aging and health. Dr. Stensvold is the principal investigator for the Generation 100 study (ntnu.edu/cerg/generation100), which is an ongoing research project that examines the long-term effects of exercise training on health and longevity in older adults, including brain magnetic resonance imaging. In 2021 was selected to be the Norwegian representative in European Cooperation in Science and Technology (COS)-action Network on evidence-based physical activity in old age. Dr. Stensvold have been involved in several internationall projects related to exercise and health in older adults.

Prof. Sandrine Thuret is Head of the Neurogenesis & Mental Health Laboratory and Head of the Basic & Clinical Neuroscience Department at the Institute of Psychiatry, Psychology & Neuroscience within King's College London, UK. She is Director of the MRC Doctoral Training Partnership in Biomedical Sciences, and co-Director of the Wellcome-funded PhD programme in Mental Health Research for Health Professionals. Professor Thuret has a background in bioengineering, molecular, cellular, behavioural and ageing biology. She graduated from the University of Heidelberg, Germany with a PhD in Neuroscience where she contributed to the understanding of dopaminergic neurons development. She then did her postdoctoral research at the Salk Institute with Prof. F.H. Gage, CA, USA, where she investigated the role of stem cells in the mammalian central nervous system. Her lab (thuretlab.com) is investigating environmental (including exercise) and molecular regulatory mechanisms controlling the production of new neurons in the adult brain and how these impact mood and memory, in health and disease. Overall, she has made significant novel contributions to our understanding of neural stem cell biology in the context of regeneration, neurodegeneration, mental health and neurogenesis with over 8000 citations. She is a TED speaker with over 14 million views and currently leading two international research consortia on cognitive aging, Alzheimer's disease and brain plasticity

Program

Thursday, 19th September 2024

Time	Talk	Speaker	Chair	
8:00	**Registration**			
9:00	**Opening** Dr. Pedro Mercado. Rector of University of Granada, Spain Dª. María de Nova Pozuelo. Managing Director of Sport Promotion, Junta of Andalusia, Spain Dra. Irene Esteban-Cornejo. University of Granada Spain Dr. Patricio Solis-Urra. University of Granada Spain			
9:30	**Risk factors for dementia - a prevention perspective**	Dr. Archana Singh-Manoux	Dr. Irene Esteban-Cornejo	
10:20	**Selected Oral Communication: Lifestyle behaviors, health-related indicators and brain health in disease conditions**		Dr. Isabel Martin Fuentes	
	Sex-dependent longitudinal associations between exercise and cognition in Autosomal Dominant Alzheimer's Disease	Kelsey R. Sewell		O01
	Altered Amygdala and Hippocampus Resting-State Functional Connectivity Among Adults with a History of Adverse Childhood Experiences:The Moderator Role of Lifetime Physical Activity	Lemye Zehirlioglu		O02
	Effects of combined exercise training in adults with schizophrenia in the health-related quality of life: CORTEX-SP study	Sara Maldonado Martín		O03
11:00	**Poster exhibition**			
11:25	**Coffee break**			
11:50	**Environmental modulation of Adult Hippocampal Neurogenesis: Impact on mood and cognition**	Dr. Sandrine Thuret	Dr. Angel Toval	
12:40	**Physical activity and the effects on cognition and the brain in breast cancer patients**	Dr. Evelyn Monninkhof	Dr. Dorthe Stensvold	
13:30	**Lunch break**			
15:00	**Importance of blood biomarkers in accelerating exercise research**	Dr. Thomas Karikari	Dr. Patricio Solis-Urra	
15:50	**Selected Oral Communication: Lifestyle behaviors, health-related indicators and brain health during adulthood and old age**		Dr. Maria Rodriguez-Ayllon	
	Inflammation: Baseline Findings from the IGNITE Study	Lauren Oberlin		O04
	Physical Activity Promotes Primary Motor Cortex	Sónia S. Sousa		O05

	Neuroplasticity over the Course of Aging Is sedentary behaviour associated with prefrontal cortex hemodynamics during single and dual-tasks in older adults?	Víctor Segura-Jiménez		O06
16:30	**Coffee break - poster exhibition**			
17:00	**Resistance exercise, executive function and Alzheimer's-related markers in older adults. Preliminary findings from the Agueda trial**	Dr. Irene Esteban-Cornejo	Dr. Kirk Erickson	
19:30	**Cultural walking tour (meeting point: ETSAG main entrance)**			
20:45	**Tapas dinner and flamenco show (meeting point: Peña de la Platería)**			

Friday, 20th September 2024

Time	Talk	Speaker	Chair	
9:00	**Exercise to Promote Cognitive and Brain Health in Mild Cognitive Impairment**	Dr. Teresa Liu-Ambrose	Dr. Anna Carlen	
9:50	**Moderators of the relationship between physical activity and brain health**	Dr. Belinda Brown	Dr. Sol Vidal	
10:40	**Poster exhibition**			
11:05	**Coffee break**			
11:30	**Physical activity, exercise, fitness and brain health in pediatric ages: Lessons learned in 10 years of ActiveBrians**	Dr. Francisco B. Ortega	Dr. Belinda Brown	
12:20	**Selected Oral Communication: Lifestyle behaviors, health-related indicators and brain health during infancy, childhood and adolescence**		Dr. Francisco Ortega	
	Effects of Life Cycle Exercise Interventions on BDNF for Brain Health: A Meta-Analysis of randomized controlled trials with Moderator Analysis	Carlos Cristi Montero		O07
	Greater Fitness and SES Protects Against the Impacts of Early Life Stress on Youth Cognitive and Brain Health	Nicole Logan		O08
	Effect of a concurrent exercise intervention during pregnancy on children's intelligence: findings from the GESTAFITOS Project	Sandra Sánchez-Parente		O09
	The effects of an online exercise program on psychological health in young pediatric cancer survivors: the iBoneFIT multicenter randomized control trial.	Andrea Rodriguez-Solana		O10
13:10	**Lunch break**			
14:40	**Is exercise intensity important for brain health, cardiovascular health and quality of life in older adults?**	Dr. Dorthe Stensvold	Dr. Esmee Baker	
15:30	**Exercise and brain health in late adulthood: Updates from the IGNITE study**	Dr. Kirk Erickson	Dr. Teresa Liu-Ambrose	
16:20	**Closing ceremony**			
	Dra. Irene Esteban-Cornejo. University of Granada Dr. Patricio Solis-Urra. University of Granada Dra. Isabel Martín-Fuentes. University of Granada Dr. Angel Toval. University of Granada, Granada			
20:30	**Dinner (Meeting point: Hotel Vincci Albaycín)**			

Posters

1. Lifestyle behaviors, health-related indicators and brain health during infancy, childhood and adolescence.

2. Lifestyle behaviors, health-related indicators and brain health during adulthood and old age.

Pilot Study

Selected Oral Communications

Sex-dependent longitudinal associations between exercise and cognition in Autosomal Dominant Alzheimer's Disease

Kelsey R. Sewell, *AdventHealth Research Institute, Neuroscience, Orlando, Florida, USA*
Hamid R. Sohrabi, *Centre for Healthy Ageing, Health Futures Institute, Murdoch University, Murdoch, Western Australia, Australia*
Jeremiah Peiffer, *Centre for Healthy Ageing, Health Futures Institute, Murdoch University, Murdoch, Western Australia, Australia*
Randall J. Bateman, *Department of Neurology, Washington University St. Louis, St. Louis, Missouri, USA*
John C. Morris, *Department of Neurology, Washington University St. Louis, St. Louis, Missouri, USA*
Eric McDade, *Department of Neurology, Washington University St. Louis, St. Louis, Missouri, USA*
Ralph N. Martins, *Department of Biomedical Sciences, Macquarie University, North Ryde, New South Wales, Australia*
Kirk I. Erickson, *AdventHealth Research Institute, Neuroscience, Orlando, Florida, USA*
Belinda M. Brown, *Centre for Healthy Ageing, Health Futures Institute, Murdoch University, Murdoch, Western Australia, Australia*

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Exercise may preserve cognitive function and delay or prevent Alzheimer's disease (AD). This study examined longitudinal associations between self-reported exercise levels and cognition in individuals with Autosomal dominant Alzheimer's disease (ADAD) mutations who are destined to develop AD. We investigated whether associations between exercise and cognition depended upon disease stage and sex, and whether exercise trajectories differed in ADAD mutation carriers vs. non-carriers in the years preceding first cognitive symptom onset. Participants (n = 508) were ADAD mutation carriers and non-carriers drawn from the Dominantly Inherited Alzheimer's Network (DIAN) aged 39.0 10.8 years (57% female). Participants reported their average time partaking in various leisure-time exercise activities (e.g., walking, running, cycling etc.) over the past 12-months to yield a measure of exercise minutes per week. Associations between exercise and global cognition, and interactions with sex and disease stage, were examined using linear mixed models. Greater baseline exercise predicted better longitudinal cognitive performance, regardless of disease stage (β = 0.04, SE = 0.02, p = .005). Further analyses indicated this effect was sex-dependent, such that males demonstrated cognitive benefit from exercise, but females did not. In the years preceding first cognitive symptoms or last follow up visit (for those who remained asymptomatic), mutation carriers showed an overall decline in their exercise level compared to mutation non-carriers (β = -0.17, SE = 0.06, p = .002). These findings demonstrate that exercise is associated with preserved cognitive function across disease course in those with ADAD mutations, but also that AD-related pathways may influence exercise levels before cognitive symptom onset. The causal direction of this research is difficult to ascertain, thus future study designs investigating the therapeutic potential of exercise in both ADAD and late-onset AD should be considered before clinical recommendation of exercise is implemented.

Altered Amygdala and Hippocampus Resting-State Functional Connectivity Among Adults with a History of Adverse Childhood Experiences:The Moderator Role of Lifetime Physical Activity

Lemye Zehirlioglu
Richard Nkrumah
Traute Demirakca
Gabriele Ende
Christian Schmahl

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Adverse Childhood Experiences (ACE) such as abuse and neglect represent a profound influence on the developing brain, with long-lasting functional reorganizations of corticolimbic systems in adulthood. Physical activity (PA) is crucial for maintaining cognitive and brain health throughout the lifespan and has the potential to remediate the effects of ACE on the brain. This retrospective study aims to assess how lifetime physical activity levels influence resting state functional connectivity (rs-FC) among adults with a history of ACE (n=67). Trauma history was assessed with Childhood Trauma Questionnaire (CTQ) and physical activity data was collected via the Lifetime Leisure Physical Activity Questionnaire which assesses the history of 24 different leisure time physical activities for five different age episodes. We conducted magnetic resonance imaging using a Siemens 3 Tesla Prisma-Scanner. Interaction models including PA and CTQ were created in CONN toolbox, to focus on whole-brain seed-to-voxel connectivity, with the corticolimbic regions i.e amygdala, hippocampus and anterior cingulate gyrus as seeds. We found significant connectivity between the amygdala and the somatosensory network, the hippocampus and the ventral attention network. We couldn't find any significant connectivity with the anterior cingulate gyrus as a seed. Significant models were later explored with Hayes Macro Process moderation models. All models were significant and PA was moderating the relationship between rs-FC and ACE. Simple slope analysis indicated that in the low PA group, connectivity between the corticolimbic regions and somatosensory and ventral attention networks decreased with ACE severity. While lower PA levels worsen this relationship, in the high PA group, the trajectory was driven in the opposite direction with ACE severity. In this group connectivity was getting higher between the corticolimbic regions and somatosensory and ventral attention networks with increased ACE severity. Findings indicate the importance of prescriptions of physical activity in clinical settings to improve mental health.

Effects of combined exercise training in adults with schizophrenia in the health-related quality of life: CORTEX-SP study

Sara Maldonado-Martin, *University Of The Basque Country (Upv/Ehu)*
Mikel Tous-Espelosin, *University Of The Basque Country (Upv/Ehu)*
Nagore Iriarte-Yoller, *Araba Mental Health Network, Psychiatric Hospital Of Alava*
Cristobal Pavon

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In people with schizophrenia (SZ), the health-related quality of life (HRQoL) is often compromised due to the presence of psychiatric symptoms along with medication side effects, psychosocial determinants, such as decreased self-esteem and social stigma, and an unhealthy lifestyle, including a lack of physical activity, Thus, promoting a healthy lifestyle and interventions aimed at increasing physical activity should be a priority, given the health benefits of exercise. It is well known that combined exercise (i.e., aerobic and resistance training) training improves HRQoL by contributing to perceived well-being. Therefore, the study aimed to determine changes in HRQoL following a 20-week combination of low-volume and high-intensity interval training and resistance supervised exercise training program (EX) compared to a Treatment-As-Usual (TAU) group.

One hundred twelve participants diagnosed with SZ (20.4% women, 41.3±10.4 yr old) were enrolled from the Mental Health Network in the Basque Country (Spain). The 36-item Short Form Survey questionnaire was used to assess HRQoL pre and post-intervention period. After the intervention period, physical functioning (=12.9%), general health (=15.3%), mental health (=8.3%), and physical component summary (=5.1%), increased ($P<0.05$) in EX group. In contrast, no significant changes were seen in the TAU for any domains studied. Following the Bonferroni correction, there were significant differences between groups. Thus, the EX group showed significant ($P<0.05$) improvements (i.e., higher values) compared with the TAU group in physical functioning (difference = 14.3; 95% CI, 5.8-22.8), general health (difference = 11.7; 95% CI, 5.0-18.5) and physical component summary (difference = 4.6; 95% CI, 1.1-8.2), and no significant between-group differences were found in any other domains. A supervised combined exercise program in people with SZ helps to improve physical and psychological health. Exercise should be considered a co-adjuvant program when treating a population with SZ to improve their HRQoL.

Associations between Cardiorespiratory Fitness and Plasma Biomarkers of Alzheimer's Disease and Peripheral Inflammation: Baseline Findings from the IGNITE Study

Lauren Oberlin, *AdventHealth Research Institute*
Kelsey Sewell, *AdventHealth Research Institute*
Cristina Molina-Hidalgo, *AdventHealth Research Institute*
Audrey M. Collins, *AdventHealth Research Institute*
Shivangi Jain, *AdventHealth Research Institute*
Marcos Olvera-Rojas, *University of Granada*
George Grove, *University of Pittsburgh*
Chaeryon Kang, *University of Pittsburgh*
Arthur F. Kramer, *Northeastern University*
Edward McAuley, *University of Illinois at Urbana-Champaign*
Jeffrey Burns, *University of Kansas Medical Center*
Charles Hillman, *Northeastern University*
Eric Vidoni, *University of Kansas Medical Center*
John M. Jakicic, *University of Kansas Medical Center*
Anna Marsland, *University of Pittsburgh*
Jill Morris, *University of Kansas Medical Center*
Xuemei Zeng, *University of Pittsburgh*
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Kirk I Erickson, *AdventHealth Research Institute*

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BACKGROUND: Cardiorespiratory fitness (CRF) has been linked to reduced risk of age-related cognitive decline and dementia, though the mechanisms underlying these relationships are not well understood. In a sample of cognitively unimpaired older adults, we evaluated the association between CRF, inflammatory cytokines, and Alzheimer's Disease (AD)-related biomarkers.
METHODS: CRF (VO2peak) was measured with a graded exercise test performed on a motorized treadmill. We obtained plasma measures of inflammatory biomarkers (C-reactive protein [CRP], Interleukin-6 [IL-6], Tumor Necrosis Factor-α [TNF-α], Interleukin-1 receptor antagonist [IL-1Ra]) and AD biomarkers (Aβ42/Aβ40 ratio, phosphorylated tau-181 [ptau181] and 217 [ptau217], glial fibrillary acidic protein [GFAP], and neurofilament light chain). Hierarchical linear regression models evaluated the association between CRF and each biomarker, adjusting for age, sex, study site, race, Apolipoprotein E ε4 (APOE4) carriage, and body mass index (BMI).
RESULTS: The sample consisted of 648 adults (mean (SD) age=69.88 (3.75)), including 461 women (71.1%). Participants had an average VO2peak of 21.68 mL/kg/min (SD=5.06). Higher CRF was associated with lower levels of neurofilament light ($\beta = -0.15$, $t = -2.78$, $p = 0.005$) and lower levels of all inflammatory biomarkers (CRP, IL-6, TNF-α, IL-1Ra; all $p < 0.05$). CRF was not associated with Aβ42/Aβ40, ptau181, ptau217, or GFAP after adjusting for covariates. Associations were not moderated by APOE4 carriage, sex, or race.
CONCLUSIONS: In cognitively unimpaired older adults, CRF was associated with plasma biomarkers of neurodegeneration and peripheral inflammation, but not with AD-specific biomarkers. These results suggest that CRF might be associated with elevated cognitive health in later life by mitigating inflammatory and neurodegenerative pathways and not by modulating pathophysiological processes associated with AD.

Physical Activity Promotes Primary Motor Cortex Neuroplasticity over the Course of Aging

Sónia S. Sousa. *Psychological Neuroscience Laboratory, Psychology Research Center (CIPsi), School of Psychology, University of Minho, Braga, Portugal*
Anabela Silva-Fernandes, *Psychological Neuroscience Laboratory, Psychology Research Center (CIPsi), School of Psychology, University of Minho, Braga, Portugal*
Marisa M. Ferreira, *Psychological Neuroscience Laboratory, Psychology Research Center (CIPsi), School of Psychology, University of Minho, Braga, Portugal*
Joana Carvalho, *Research Center in Physical Activity, Health and Leisure (CIAFEL), Faculty of Sport, University of Porto, Porto, Portugal*
Adriana Sampaio, *Psychological Neuroscience Laboratory, Psychology Research Center (CIPsi), School of Psychology, University of Minho, Braga, Portugal*

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Introduction: In recent decades, public health institutions have emphasized the crucial role of physical activity (PA) in maintaining brain health and preventing age-related conditions such as dementia. Research has demonstrated that higher levels of moderate to vigorous physical activity (MVPA) are associated with improved cognitive functions and the preservation of brain structure during the aging process.
Objective: This study aims to examine the relationship between physical activity levels and brain structure in healthy adults, employing Voxel-Based Morphometry (VBM).
Methods: Thirty-eight individuals aged 20-77 years (Mage = 52.21; SD = 20.46; Med = 65.00) underwent one-week measurements of physical activity using accelerometers and a neuroimaging assessment. MRI data preprocessing and postprocessing were conducted using the VBM toolbox as implemented in SPM12. The study included a group of 18 physically underactive adults (MVPA <150 min/wk; Mage = 53.00; SD = 20.79; Med = 65) and 20 physically active adults (MVPA ≥150 min/wk; Mage = 51.50; SD = 20.67; Med = 65.00).
Results: Heightened gray matter densities were observed in the left precentral gyrus (MNI coordinates: -30, -14, 45; K = 205, z = 4.46, peak pFWE < 0.05) in physically active subjects, compared with physically underactive individuals.
Discussion: The present findings align with existing evidence demonstrating increased gray matter volumes and cortical thickness in regions of the motor cortex, including the precentral gyrus and supplementary motor area in both young and older adults. The results derived from the present study suggest the presence of heightened neuroplasticity in the precentral gyrus, the site of the primary motor cortex, among participants engaging in at least 150 minutes of naturalistic MVPA weekly. Importantly, this brain region plays a key role in important cognitive processes such as the control of voluntary motor movement, socio-emotional processing, and executive functions -all cognitive processes known to decline with aging.

Is sedentary behaviour associated with prefrontal cortex hemodynamics during single and dual-tasks in older adults?

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Background: There is a growing body of scientific evidence suggesting a correlation between sedentary behaviour (SB) and cognitive decline in older adults.
Objective: To determine whether time spent in SB is associated with prefrontal cortex hemodynamic responses during single and dual cognitive and motor tasks in older adults.
Methods: A total of 61 healthy older adults (70.3 ± 6.5 years) completed three conditions: standing or sitting and responding to a working memory task (single cognitive), overground walking or finger tapping (single motor), and a dual-task (simultaneous performance of the cognitive and motor conditions). Functional near infrared spectroscopy (fNIRS) was used to capture the prefrontal cortex hemodynamic response (μM). This technique measures changes in cerebral oxygenation (ΔHbO2) and deoxygenation (ΔHbR) during task performance. Time spent in SB (mins/day) was assessed using the Global Physical Activity Questionnaire (GPAQ). The association between SB (independent variable) and ΔHbO/ΔHbR (dependent variable) were assessed with individual linear regression analyses. Further linear regression analyses were conducted to control the effect of potential covariates (age, sex, years of education, subjective cognitive decline and speaking other languages).
Results: Greater time spent in SB was associated with increased ΔHbO (β=0.367, p=0.004) and ΔHbR (β=0.365, p=0.004) during the dual-task condition. Results remained unchanged after controlling for potential covariates (ΔHbO, β=0.356, p=0.004; ΔHbR, β=0.354, p=0.004). No association between time spent in SB and ΔHbO or ΔHbR was observed during the single tasks (all p>0.05).
Conclusions: Increased duration of SB was found to associate with greater changes in prefrontal oxygenation and deoxygenation only during dual-task performance. These results indicate potential variations in executive processes based on individuals' SB. It is possible that higher time spent in SB is associated with a greater use of cognitive resources during a challenging dual-task and that would be by the associations with cerebral oxygenation we found.

Effects of Life Cycle Exercise Interventions on BDNF for Brain Health: A Meta-Analysis of randomized controlled trials with Moderator Analysis

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Background: The current understanding of the exercise-induced effects on brain-derived neurotrophic factor (BDNF), related to brain health, remains inconclusive, thereby hindering the formulation of personalized exercise recommendations and comprehensive guidelines across the entire life cycle.
Objectives: The primary aim of this systematic review and meta-analysis was to determine the overall and age-group effects of exercise interventions on BDNF, while the secondary aim was to evaluate possible moderators.
Data sources: Searches were conducted in the Cochrane Library, CINAHL, PubMed, ScienceDirect, Scopus, SPORTDiscus, Web of Science, and manually.
Study selection: Randomized controlled trials and crossover designs in apparently healthy children, adolescents, adults, and older adults were used to test the effects of exercise on BDNF levels.
Data extraction: A multilevel meta-analysis was conducted using Hedges'g effect size (ES). Meta-regression and subgroup analyses were performed exploring possible moderators. The methodological quality, heterogeneity, and publication bias of the studies were assessed.
Results: Fifty-nine articles comprising 2,216 participants were included in this meta-analysis. The overall effect was moderate (ES = 0.53, 95% CI = 0.40-0.66). Moderate effects were found in children/adolescents (ES = 0.55, 95% CI = 0.12-0.97) and adults (ES = 0.62, 95% CI = 0.47-0.76), while a small effect was observed in older adults (ES = 0.41, 95% CI = 0.13-0.70). Several factors showed moderate effectiveness of the intervention on BDNF, such as participant body mass index, BDNF sample (serum vs. plasma), methodological quality of the studies, and exercise features (skill, mode, intensity, and duration of intervention).
Conclusion: This study suggests that exercise interventions are effective in increasing BDNF levels throughout the entire life cycle; however, their effectiveness can be moderated by both participants and exercise characteristics. The findings of this study offer valuable insights into refining exercise prescription strategies, with a specific focus on BDNF, to promote optimal mental health outcomes.

Greater Fitness and SES Protects Against the Impacts of Early Life Stress on Youth Cognitive and Brain Health

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Healthy development during childhood is integral to optimal cognitive function. The long-term cognitive benefits of PA are well known, yet, evidence shows that early-life stressors (ELS) such as learning difficulties, anxiety, and low socio-economic status (SES) negatively influence childhood cognitive functions. We sought to encapsulate the positive effects of PA on neurocognitive function despite ELS.

Participants (N=1157, F=441), aged 7-21 (11.99±2.96) from the Child Mind Institute Healthy Brain Network open-access dataset completed a cross-sectional design of demographics, mental health, cognitive function, resting-state EEG, and fitness assessments. Between-group differences in neurocognitive outcomes were analyzed. Regressions were performed to calculate the variance of each predictor on cognitive function.

Greater PA levels were associated with greater executive function (card-sort), t=2.33, p=.020; processing speed t=-2.03, p=.042; inhibition (flanker) t=2.66, p=.008; and working memory t=2.55, p=.011. Greater SES was associated with greater executive function t=-5.82, p=.001; inhibition t=-6.30, p=.001; working memory t=-6.94, p=.001; and list sort t=-5.82, p=.001. Greater PA was associated with lower EEG Power in Alpha band t=1.986, p=.048. Correlation analyses indicated that EEG Power across all bands (alpha, beta, theta) was inversely associated with all cognitive functions; negatively associated with depression and panic disorders; and positively associated with PA (p's<.05). Regression analyses revealed executive function was positively associated with fitness (ß=0.173, 95% CI = 0.067 to 0.633), and inversely with learning problems (ß=0.192, 95% CI = -0.448 to -0.146). This fitness trend was unique to executive function, as regressions on other cognitive outcomes were only sensitive to SES (income, parent's education) and ELS (learning problems, anxiety, ADHD) predictors.

Results suggest that children with higher fitness and SES, and fewer instances of ELS likely have greater neurocognitive functioning compared to their peers. Future work should examine the protective threshold of fitness on cognition.

Effect of a concurrent exercise intervention during pregnancy on children's intelligence: findings from the GESTAFITOS Project

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Background: In the absence of contraindications, pregnant women should be encouraged to engage in combined aerobic and strength-conditioning exercise (concurrent exercise) to improve maternal and child health. However, little is known about the potential influence of exercise during pregnancy on intelligence development during childhood.
Purpose: To analyze the effect of a supervised-concurrent exercise training program during pregnancy on children's intelligence at 4-5 years of age.
Method: One hundred and fifty-nine pregnant women from the GESTAFIT project participated in this study and were allocated into exercise (n=72) or control group (n=87). The exercise group followed a 60-min 3 days/week concurrent exercise training program from the 16th gestational week until birth. Children's intelligence was assessed with the Kaufman Brief Intelligence test 4-5 years after the exercise intervention.
Results: Children of the exercise group showed greater verbal and composite intelligence than children of controls ($p<0.01$ and $p<0.05$, respectively). No significant differences between groups were found in non-verbal intelligence (all $p>0.05$). When analyses were stratified by sex, per protocol analyses showed that males of the exercise group performed better in verbal and composite intelligence than controls ($p=0.033$ and $p=0.004$, respectively), and females of exercisers presented greater verbal intelligence than females of controls ($p=0.039$). Intention-to-treat analyses indicated that males of the exercise group manifested better composite intelligence ($p=0.020$), while females presented greater verbal intelligence ($p=0.009$).
Conclusion: A supervised-concurrent exercise training program during pregnancy improves verbal and composite intelligence of children at 4-5 years of age. The effect of concurrent exercise training during pregnancy seems to be especially effective in verbal intelligence for males and female children, and composite intelligence just for males. The current results suggest that prescribing exercise to pregnant women is an effective strategy to enhance the intelligence of their offspring.

The effects of an online exercise program on psychological health in young paediatric cancer survivors: the iBoneFIT multicenter randomized control trial.

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Aim: To examine the impact of a 9-month online exercise intervention on the psychological health (i.e., well-being and distress) in young paediatric cancer survivors.
Materials and methods: 116 participants (aged 12.1 ± 3.3 years; 42% female) from the iBoneFIT multicenter randomized control trial (Ref. ISRCTN61195625) were randomized to an intervention or a control group. The intervention group received an online exercise intervention based on plyometric jumps and dietary counselling regarding calcium and vitamin D, while the control group only received dietary counselling. Psychological health was divided into psychological well-being (i.e., self-esteem, optimism, happiness and positive affect) and psychological distress (i.e., depression, anxiety and negative affect) which were measured with questionnaires. Data were analysed using a constrained baseline longitudinal mixed model adjusted for baseline differences between groups. Effect size values of 0.2 to 0.5 are considered small, 0.5 to 0.8 are considered medium, and greater than 0.8 are considered large.
Results: The exercise intervention improved psychological distress, with the difference between groups being -1.09 (95% CI: -2.11 to -0.08; P=.035) and with small effect sizes in all included outcomes; depression (-0.24 [95% CI: -1.14 to 0.67], P=.607), anxiety (-1.55 [95% CI: -3.60 to 0.49], P=.135) and negative affect -1.08 [95% CI: -2.11 to -0.04], P=.041). The exercise intervention did not have any effect on psychological well-being. The difference between groups (exercise vs. control) was 0.23 (95% CI: -0.53 to 0.98, P=.552), with small effect sizes in all included outcomes; self-esteem (0.76 [95% CI: -0.10 to 1.62], P=.083), optimism (1.08 [95% CI: -0.34 to 2.50], P=.134), happiness (-0.67 [95% CI: -2.00 to 0.65], P=.316) and positive affect (0.36 [95% CI: -0.61 to 1.33], P=.457).
Conclusion: This exercise program seems to enhance psychological distress, including negative affect, whereas null effects are observed on psychological well-being in young paediatric cancer survivors.

Posters

Associations of physical activity with stress in children and adolescents: partial and preliminary results from the PREFIT-UP Project

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Evidence suggests that stress levels are rising among children and adolescents in the last years. High levels of stress negatively influence the mental and physical health in youth. Physical activity (PA) levels seem to be inversely related to stress levels. However, evidence supporting the association of physical activity and stress levels is scarce in youth. Therefore, the aim of this work was to analyze the relationship between PA levels and stress levels in school-age children and adolescents.
A total of 322 children and adolescents (10-14 yr., 49% girls) from the PREFIT-UP project (from the Vitoria-Gasteiz site) were included in the analysis. Stress level was assessed using the Perceived Stress Scale (PSS-10), validated in Spanish and among this population. PSS-10 Total score was used as dependent variable, indicating higher score a higher level of stress. PA was measured by accelerometry (wGT3X-BT) on the non-dominant wrist for 7 consecutive days. Raw data of accelerometry was analyzed using the GGIR package for R software. PA was classified as sedentary time (SED), light (LPA), moderate (MPA), and vigorous (VPA) according to the Hildebrand et al. (2023) cut points. Participants were classified as active/inactive according to international PA recommendations (60minMVPA/day).
There were no association between different levels of PA and stress levels ($\beta \leq 0.115$, all $p>0.005$), but SED ($\beta=0.115$, $p=0.063$) and VPA ($\beta=-0.117$, $P=0.058$) showed a trend towards significance in their association with stress levels. Additionally, active children showed significantly lower stress levels than inactive children (22±1 vs. 24±1points, respectively; $P=0.011$).
In conclusion, children and adolescents that followed PA recommendations had lower levels of stress. Promoting PA could be an effective strategy for reducing stress and improving mental health in this population.

Timing of exercise differentially impacts adipose tissue gain in male adolescent rats

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An excessive accumulation of adipose tissue during adolescence increases the risk of developing obesity and other diseases. However, it has been reported that this accumulation can be avoided by increasing physical activity and introducing a healthier diet. Previously, during the adolescence of male Sprague-Dawley rats, it was demonstrated that the gain of adipose tissue decreases with exercise. Nonetheless, the impact of the timing of exercise in the gain of adipose tissue during this period of life is unknown, and results in human and rodent adults are controversial. Our goal was to determine the effects of timing of exercise on the subcutaneous (SAT) and visceral (VAT) adipose tissue content during the adolescence of Sprague-Dawley rats. In addition, we analyzed potential changes due to exercise in the adipose tissue transcriptome, blood serum biochemistry and real-time core body temperature, considered a good marker of the endogenous circadian time of the animal. For this purpose, during the adolescence of Sprague-Dawley rats, forced exercise was performed in the early active-phase (ZT13) or the late active-phase (ZT23). Our results showed reduced SAT and VAT gain and a 2-hours delay of the core body temperature-drop of the passive-phase, only in late exercise male rats. The SAT and VAT transcriptomes pointed to an overstimulated mobilization of lipids and mitochondrial activity only in late exercise male rats. This study opens new windows for studies in humans to determine if the time-dependent mechanisms activated by exercise can be applied to decrease the gain of adipose tissue during adolescence.

Higher Cardiorespiratory Fitness is Associated with Higher Intelligence in Adolescence: Extend-ed Opportunities of Screening Efforts

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Importance: Cardiorespiratory fitness data are becoming increasingly available at scale, and it can be used to predict subsequent diseases. However, whether it also predicts non-disease phenotypes, such as intelligence, is less well-studied.
Objective: Examine the associations between adolescent cardiorespiratory fitness and intelligence.
Data: Nationwide sample of 1,070,252 Swedish men conscripted 1972-1994, at around the age of 18.
Measures: Cardiorespiratory fitness was assessed with a maximal exercise test using an electrically braked cycle-ergometer, provided participants had a normal electrocardiogram at rest. Intelligence was assessed through a battery of tests including verbal, logical, spatial, and technical reasoning, which was summarized and standardized yearly to a mean of 100 with a standard deviation of 15 for comparability with other intelligence quotient (IQ) measures. Both measures were recorded during two consecutive days of testing.
Results: Cardiorespiratory fitness was positively associated with IQ; the higher the fitness, the higher the IQ. For example, those within the highest decile of fitness were 2.3 times (RR 2.3; 95% CI: 2.3-2.4) more likely to be in the highest decile of IQ, as compared to those in the lowest decile of fitness. In absolute terms, those in the highest decile of fitness had a 9.3-units (95% CI: 9.1-9.4) higher IQ than those in the lowest decile of fitness (95.2 vs 104.5), and each 100-watt increase in fitness was associated with a 5.2-units (95% CI: 5.1-5.2) higher IQ. The associations did not change after accounting for body mass index.
Relevance: Higher cardiorespiratory fitness was associated with higher IQ in Swedish male adolescents. These findings have implications for the utility of screening of fitness, such as those within the FitBack network. We speculate, and have preliminary data showing, that these findings make it possible to use fitness to predict non-disease phenotypes, such as educational and economic success later in life.

EXECUTIVE FUNCTION AND PHYSICAL FITNESS AMONG PRESCHOOLERS: 3-YEAR LONGITUDINAL STUDY

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Introduction: Recent research has highlighted the association between physical activity, physical fitness (PF) and executive functions (EF) [1]. This study aims to evaluate the PF and EF of preschoolers and monitor their development between the ages of 3 and 5.
Methods: A longitudinal study design from the "Observatorio de Actividad Física en escolares, https://observatorioactividadfisica.es" was employed. The cohort comprised 40 preschoolers (21 boys and 19 girls) with an initial average age of 3.43 (±0.30) years from a private school in Pamplona, Spain. Anthropometric measures such as height, weight, and waist circumference were recorded. The PREFIT battery assessed PF, including tests for standing long jump, handgrip strength, speed/agility, and cardiorespiratory fitness [2]. EF was measured using Early Years Toolbox [3]: visual-spatial working memory (“Mr. Ant”), phonological working memory (“Not this”), inhibition (“Go/No-Go”) and shifting (“Card Sorting”).
Results: Repeated measures ANCOVA indicated significant improvements in EF and PF over two years ($p \leq 0.05$). There was a progressive enhancement in visual-spatial and phonological working memory throughout the follow-up period ($p < 0.001$). In contrast, improvements in inhibition and cognitive flexibility were most pronounced in the first year. Similarly, PF improvements were noted over the two years ($p < 0.001$), with handgrip strength, speed/agility, and cardiorespiratory fitness showing progressive enhancement, especially during the first year. However, the standing long jump displayed significant changes only in the first year.
Conclusion: This study reveals significant enhancements in PF and EF among preschoolers over two years. These findings highlight the importance of early interventions aimed at promoting PF and EF during early childhood.

Key words: Preschoolers, physical fitness, executive function and follow-up.

Reduced mental health in preschoolers born preterm: does physical fitness play a role?

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INTRODUCTION: Prematurity is often associated with adverse health outcomes later in life, including reduced physical fitness. While some evidence suggests a link between prematurity mental health problems, research on this topic in early childhood remains inconclusive. We aimed to compare the mental health of preschoolers born preterm with that of their term-born peers and to investigate the potential role of physical fitness.
METHODS: This prospective observational study utilized a case-control design. Preterm children aged 3-6 years (<35 gestational weeks) were recruited from a Neonatal Intensive Care Unit, while age and sex-matched controls born at term were selected from their siblings or friends. Mental health was assessed using the 25-items parent-reported version of the Strengths and Difficulties Questionnaire (SDQ). Physical fitness components were measured using the PREFIT battery. Preterm preschoolers were categorized as having high or low fitness levels based on percentiles cutoffs for each fitness component (e.g. low agility indicated performance below the 50th percentile in the 4x10m test).
RESULTS: The analysis included 98 preterm children and 74 controls. Preterm children showed higher SDQ scores than their term-born counterparts (10.9 ± 5.0 vs 9.0 ± 5, p=0.032), particularly in externalizing problems (7.0 ± 3.3 vs 5.9 ± 3.4, p=0.043); a trend was observed in hyperactivity (4.8 ± 2.4 vs 4.1 ± 2.4, p=0.078). Preterm children with high handgrip strength and agility obtained higher SDQ scores.
CONCLUSION: Our findings suggest that preschoolers born preterm have a reduced mental health compared to their term-born peers. Higher levels of strength and agility appear to be associated with more externalizing problems in this population.

Effects of the Type of Sports Practice on the Executive Functions of Schoolchildren

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Abstract: There is a close relationship between the development of complex motor skills and executive functions during childhood. This study aimed to analyze the differences in different dimensions of executive functions in children practicing an open-skill sport (handball) and a closed-skill sport (athletics) and controls who did not participate in sports activities after a 12-week intervention period. School-aged male and female subjects (n = 90; mean ± standard deviation = 11.45 ± 0.68 years) participated in a non-randomized controlled study. Data analysis was performed using the STATA V.15 statistical software. The athletics intervention promoted semantic fluency ($p = 0.007$), whereas handball increased inhibition ($p = 0.034$). Additionally, physical activity improved in both intervention groups ($p = < 0.001$), whereas sprint performance improved in the handball group following intervention ($p = 0.008$), lower body muscular power improved in athletics ($p = 0.04$), and evidence of improvement in upper body muscular strength was noted in handball ($p = 0.037$). In turn, an increase in the Physical Activity Questionnaire for older Children score showed an association with the Standard Ten scores of executive functions. In conclusion, compared to controls, both athletics and handball induced meaningful improvements in physical activity and executive functions. However, sport-specific adaptations were noted after athletics (i.e., semantic fluency and lower body muscular power) and handball (i.e., inhibition, sprint, and upper-body muscular strength).
Keywords: sport; physical activity and sport in youth; executive functions; physical fitness; human physical conditioning; muscle strength; musculoskeletal and neural physiological phenomena; physical education and training

Effect of an active breaks program "Activa-Mente" on academic task behaviour and working memory in schoolchildren

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Introduction: Physical inactivity is prevalent in childhood. Given that children spend a significant amount of time at school, this environment provides an ideal context to promote physical activity. In this sense, an emerging and current trend is active breaks (ABs) at school. The present study aimed to evaluate the effect of the ABs program "Activa-Mente", on academic task behaviour (ATB) and working memory (WM) in schoolchildren. Method: Experimental study, 53 participants (11-12 years old) were randomly divided into experimental group (EG, n=25) and control group (CG, n=28). For 6 weeks, the EG performed 6 daily ABs during the school day while CG did not performed ABs. The ATB was observed with Direct Behavior Ratings and WM with Wechsler Intelligence Scale for Children-V. Statistical analysis was carried out with the non-parametric Kruskal-Wallis test for ATB and ANOVA repeated-measure 2 × 2 (pre and post-test) for WM. The effect size (ES) was calculated using Cohen's d test. Jamovi 2.3 Software. Results: The ATB showed significant differences in Academic Engagement (pre= 67,5%± 25,6; post= 82,9± 18,8; p= .02; d= -0.6) and Disruption (pre= 15,8%± 17,2; post= 7,5%± 14,8; p= .02; d=0.5), but not in regards to Respect (pre= 84,2%± 17,4; post= 90.4%± 14; p= .21; d= -0.4). The results regarding WM do not indicate a significant interaction of time x group (F = 1.056, p = 0.309). Conclusion: The ABs program "Activa-Mente" demonstrated a significant enhancement in ATB among the EG, in contrast to the CG. Nevertheless, it did not yield significant effects on WM. These findings suggest that the program could as a viable alternative for implementation in a school setting, regarding to ATB.

Cognitive Performance in Adolescence and Atherosclerosis in Middle Age: a Cohort Study of Swedish Male Conscripts

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Importance: The link between poor cognitive performance in adolescence and higher cardiovascular mortality in later-life is well established, but little is known about the associations with atherosclerosis.
Objective: To examine the associations of cognitive performance in adolescence with coronary and carotid atherosclerosis in middle-age.
Data: Population-based cohort study of 10,472 Swedish male adolescents conscripted be-tween 1972 and 1987 (mean age,18.3 years) with data on atherosclerosis in the Swedish CArdioPulmonary bioImage Study (SCAPIS), mean follow-up, 39.2 years.
Measures: Cognitive performance was summarized as a composite score including verbal, logical, spatial, and technical reasoning domains, and subsequently standardized to Z-scores. Coronary atherosclerosis was evaluated via Coronary Computed Tomography Angiography (CCTA) stenosis and categorized as 0%, 1-49% (mild) and ≥50% (severe); while Coronary Artery Calcium (CAC) scores were categorized as 0, 1-99 (mild), and ≥100 (severe) Agatston units. Carotid atherosclerosis was evaluated through ultrasound-diagnosed carotid plaques and further categorized as no, unilateral, and bilateral plaques. Models were adjusted by site and age at conscription, as well as site and age at SCAPIS.
Results: Overall, restricted cubic splines for the association between cognitive performance and quantitative coronary atherosclerosis scores showed linear and inverse associations. In multinomial logistic adjusted models, for coronary atherosclerosis, the odds ratios (ORs) per one standard deviation (SD) increase in cognitive performance were 0.91 (95% CI 0.87, 0.95) and 0.80 (95% CI 0.74, 0.86) for mild and severe CCTA coronary stenosis, respectively; while ORs were 0.91 (95% CI 0.87, 0.96) and 0.88 (95% CI 0.83, 0.94) for mild and severe CAC scores. Similarly, for carotid atherosclerosis, the ORs per one SD increase in cognitive performance were 0.95 (95% CI 0.90, 1.00) and 0.87 (95% CI 0.83, 0.92) for unilateral and bilateral carotid plaques, respectively.
Relevance: Lower cognitive performance in male adolescents is a risk factor for atherosclerosis in middle-age.

Exercise Interventions and Intelligence in Children and Adolescents: A Systematic Review and Meta-analysis

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Context: Scarce and mixed evidence exists on whether physical exercise interventions influences intelligence measures in children and adolescents. The aim of this systematic review and meta-analysis was to determine the effect of exercise interventions on intelligence in children and adolescents.
Methods: Relevant articles were identified in the electronic databases PubMed, Web of Science, PsycINFO, and Scopus (from inception to February 22nd, 2024). Randomized controlled trials (RCTs) on the effects of exercise interventions on general intelligence (e.g., intelligence quotient [IQ]) or specific intelligence domains (i.e., crystallised and fluid intelligence) in childhood and adolescence (≤19 years) were included. A random-effects meta-analysis was performed for those intelligence measures reported in ≥3 studies. Sub-analyses were performed when possible to examine the moderating effect of different variables such as participants' intelligence quotient [IQ] at baseline, age, or exercise intervention duration.
Results: 14 RCTs with a total of 3,203 participants (age range = 5–14 years) were included. Exercise interventions significantly improved general intelligence compared to control groups (standardized mean difference [SMD] = 0.54, 95% confidence interval [CI] = 0.11–0.97, p = 0.014), which corresponded to a mean improvement in the IQ score of 4.04 points (95%CI = 1.44–6.64, p = 0.001). Significant benefits of exercise interventions were also observed for fluid intelligence (SMD = 0.20, 95%CI = 0.06–0.34, p = 0.006). Crystallized intelligence could not be meta-analyzed due to a lack of studies. Sub-analyses revealed similar benefits in participants with low/borderline versus normal IQ, children versus adolescents, and interventions with different durations.
Conclusions: Exercise interventions are overall associated with improvements in intelligence in children and adolescents, with a significant 4.04-point IQ increase. Additional RCTs are still needed to confirm these findings and to determine the most effective exercise characteristics for improving intelligence in youth.

Explaining adolescents' engagement with an mHealth intervention for healthy behaviors

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Background: Research frequently indicates that end-users of mHealth interventions promoting healthy behaviors tend to disengage with interventions after a limited time of use. This study investigates explanations for adolescents' engagement with an mHealth multiple behavior change intervention (LIFE4YOUth), targeting physical activity, diet, alcohol consumption, and cigarette smoking.

Methods: In this sequential explanatory mixed method study, usage data and focus group (n=3) data collected from Swedish adolescents (n = 377) aged 15¬–20 years participating in the LIFE4YOUth trial were analyzed with t-test, chi-squared test, qualitative content analysis, and qualitative comparative analysis.

Results: In total, 67% (n=253) of participants had low engagement with the intervention. A pattern was identified indicating that three combinations of psychosocial and behavioral conditions were relevant to explain low engagement, as 48% (n=122) of those with low engagement were described by these combinations of conditions. The combination of multiple risk-behaviors, being content with life, and considering healthy behaviors as not very important described the characteristics of 26% (n=66) of those with low engagement. Expectations of the intervention and whether participants were able to rapidly respond to prompts were also influential for their engagement with LIFE4YOUth.

Conclusion: This study provides insights into how and why adolescents engage with an mHealth multiple behavior change intervention (LIFE4YOUth). Adolescents' perceptions of the complexity of the problem they may want to address through behavior change and whether they believe that the intervention has the potential to assist them were suggested to explain low engagement. Although the findings of this study can help other researchers interpret mHealth engagement data gathered from adolescents and design future health-promoting mHealth interventions targeting adolescents, additional research on how to best encourage adolescents to overcome barriers to engagement is needed.

Motor competence, sedentary time, and academic achievement in school-aged children

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Introduction: The aim of this study was to investigate the correlations between screen-based sedentary behavior, physical activity levels, and academic achievement in preadolescents aged 10 to 12 years. By employing a structural equation modelling approach, the study intended to discern how variations in motor competence,articularly strength,may influence the relationship between sedentary screen time and academic outcomes in this age group.
Methods: This cross-sectional investigation involved a cohort of 100 children, aged 10 to 12 years, selected through convenience sampling. All participants, actively enrolled in a standard educational program, included 7 diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) and 93 without. The Bruininks-Oseretsky test of motor competence, second edition, was used to assess motor performance. Sedentary behaviour was assessed using the self-reported questionnaire YAP-S (Youth Activity Profile-Spain). Academic fluency was assessed using the Woodcock-Muñoz Performance Test Battery III assessed academic performance.
The results revealed a statistically significant inverse association between motor competence, specifically strength, and screen sedentary behavior, with a regression coefficient of -0.288 and a p-value of 0.041. No additional significant relationship were found between the variables studied.

Conclusions: The study results suggest that among the various components of physical fitness in adolescents, motor strength has a particularly strong negative correlation with screen-based sedentary behavior. In fact, our data indicate that preteens with decreased motor strength are more likely to spend prolonged periods in front of a screen. This clear relationship between muscle strength and sedentary lifestyle implies that specific physical activity programs, especially those aimed at strengthening muscle strength, could be essential to reduce screen-related sedentary tendencies. The implications of these findings highlight the potential benefits of such exercise programs on public health and support educational policies that encourage active lifestyles to improve the physical and possibly cognitive well-being of young people.

THE RELATIONSHIP BETWEEN EXECUTIVE FUNCTION AND BASIC MOTOR SKILLS ON PRESCHOOLERS

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Introduction: Basic motor skills (BMS) are essential for children's physical and cognitive development [1]. Additionally, executive functions (EF) form the cornerstone of cognitive development [2]. This study assesses the relationship between EF, as measured by the Early Years Toolbox (EYT) games, and BMS, as evaluated with the MOBAK-KG test battery, in preschoolers aged 4 to 6 years old.
Methods: This cross-sectional study encompassed 146 preschoolers (69 boys and 77 girls) with an average age of 4.97 (±0.50) years from a Health Center and two public schools in Pamplona, Spain. This study is part of the "Observatorio de Actividad Física en escolares, https://observatorioactividadfisica.es" (2022_2024). Researchers collected anthropometric data, including height, weight, BMI, and waist circumference. BMS were gauged using the MOBAK-KG battery, focusing on Object-Movement (OM) skills such as "Throwing," "Catching," "Bouncing," and "Dribbling," and Self-Movement (SM) skills such as “Balancing”, “Rolling”, “Jumping” and “Running” [3]. EF was evaluated via the EYT games, which included “Mr. Ant” for visual-spatial working memory, “Not This” for the phonological working memory, “Go-No/Go” for inhibition and “Card Sorting” for cognitive flexibility [4].
Results: Linear regression analysis indicated a significant relationship between EF and BMS ($p < 0.001$), more pronounced in the SM sub-dimension. The “Mr. Ant” game, evaluating visual-spatial working memory, showed the highest correlation, followed by the inhibition game “Go-No/Go.” In the OM sub-dimension, only “Mr. Ant” revealed strong significance. Nonetheless, this link was robust enough to positively influence the Z-Score. When comparing EF games with overall MOBAK-KG outcomes, all groups demonstrated significance, with “Mr. Ant” being the most significant predictor.
Conclusion: The study underscores the integral role of BMS in bolstering EF in preschoolers. It affirms the need for early interventions that stimulate both BMS and EF for optimal child development.
Key words: Basic motor skills, executive function, and preschoolers.

24-hour movement behaviors guidelines and their association with cognitive and academic performance in schoolchildren: A Systematic Review

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Introduction: To achieve optimal health benefits, the Canadian 24-hour movement guidelines for children and youth (aged 5 to 17) recommend attaining high levels of physical activity (≥60 minutes of moderate-to-vigorous physical activity), reducing sedentary behavior (≤2 hours of recreational screen time), and ensuring adequate sleep (9-11 hours for children or 8-10 hours for adolescents) every day.
Objective: To examine how combinations of physical activity, sedentary time, and sleep duration are related to cognitive parameters and academic performance in schoolchildren. Methodology: A systematic review was conducted following the PRISMA guidelines, using the PubMed, Web of Science, Scopus, ScienceDirect, SPORTDiscus, Embase, and Bireme databases. The search was restricted to cross-sectional or observational studies assessing the association between adherence to 24-hour movement recommendations and cognitive parameters and academic performance in schoolchildren.
Results: The search strategy yielded a total of 1225 articles. Additionally, an additional manual search was conducted, adding 9 articles, resulting in a total of 1234 studies. Subsequently, rigorous pre-established inclusion and exclusion criteria were applied, and finally, 10 studies meeting these criteria were selected for inclusion in this review.
Conclusion: The results suggest that adhering to all three components of the 24-hour movement recommendations is positively associated with cognitive parameters and academic performance. However, the heterogeneity of measures used, primarily self-report, may hinder the proper interpretation of results. Therefore, it is necessary to support these findings with future research using direct assessment methods, especially for physical activity levels, sleep duration, and cognitive parameters.
Keywords: Physical Activity, Sedentary Behavior, Sleep Duration, Executive Function, Schools

Effects of physical education interventions in school on executive function in children and adolescents: a review protocol

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Physical exercise has a constant and positive effect on executive functions throughout life, particularly in children and adolescents. Schools are an ideal environment to implement physical exercise programs that provide unique opportunities to improve specific aspects of executive functions, such as working memory, inhibition, and cognitive flexibility, specifically in the area of physical education. This review aims to explore the effects of physical education interventions on different domains of executive functions in children and adolescents in the school context. This protocol will follow the guidelines for systematic reviews and meta-analyses PRISMA 2020 and the Cochrane Collaboration Manual for systematic reviews of interventions. A systematic search will be conducted in the PubMed, Sportdiscus, Scopus, and Web of Science databases for articles published until February 28, 2024. A very detailed search strategy will be used following the PICOs strategy, and the articles must be written in English. The selection, data extraction, and assessment of study quality will be carried out by two independent researchers. To assess the methodological quality of each included study, the Cochrane Risk of Bias (RoB) tool for randomized controlled trials (RCTs) and the ROBINS-I ("Risk Of Bias In Non-randomized Studies of Interventions") tool for non-randomized trials were used. The main findings of this review could provide relevant information on how school physical education interventions tend to be effective strategies for improving aspects of executive functions such as working memory and inhibitory control, which could improve their health and cognitive and academic performance. Although future studies should also focus on higher executive functions due to the limited number of these.

The relationship between 24-hour movement behaviour and cognitive ability of adolescents

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The importance of monitoring the impact of physical activity on cognitive function is seen in the promotion of physical activity in the general population of children and adolescents. We investigated the associations between 24-hour movement behavior (physical activity, sedentary behavior, sleep) and selected cognitive abilities (attention, intelligence, memory) of Slovak adolescents. In total, 82 adolescents (55% girls) aged 16.5±1.1 participated in the study. The 24-hour movement behaviors were assessed using an ActiGraph wGT3X-BT accelerometer worn on the non-dominant wrist for a period of 7 days. Cognitive abilities were assessed using the Intellectual Potential Test, Attention Concentration Test, and Visual Memory Test. Relationships were observed between the number of errors in the Attention Test and factors such as sleep duration ($p=0.041$), sedentary behavior ($p=0.002$), low intensity physical activity ($p=0.017$), and the most active periods of 60 minutes ($p=0.017$), 30 minutes ($p=0.012$), and 5 hours ($p=0.013$). A significant correlation was also observed between the least active 5 hours and Memory scores ($p=0.040$). No relationship was noted between intelligence and the components of 24-hour movement behavior. Although the results are inconclusive, they suggest a potential positive impact of sleep and physical activity on the attention levels of adolescents. These results are part of the research grant project VEGA 1/0481/22.

ASSESSING THE INFLUENCE OF PHYSICAL FITNESS ON EXECUTIVE FUNCTION IN EARLY CHILDHOOD: A STUDY OF SPANISH PRESCHOOLERS

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ASSESSING THE INFLUENCE OF PHYSICAL FITNESS ON EXECUTIVE FUNCTION IN EARLY CHILDHOOD: A STUDY OF SPANISH PRESCHOOLERS

Introduction: Childhood physical fitness (PF) has been associated with improved academic performance and brain health [1]. This study aims to investigate the relationship between PF and executive function (EF) in Spanish preschoolers.
Methos: A longitudinal design was employed, drawing on data from the "Observatorio de Actividad Física en escolares, https://observatorioactividadfisica.es", conducted from 2019 to 2021. The sample consisted of 241 children (121 boys and 120 girls) aged 3 to 5 years, who underwent assessments for anthropometric parameters such as height, weight, BMI, and waist circumference. PF was evaluated using the PREFIT battery [2], which includes tests for handgrip strength, standing long jump, speed/agility, and cardiorespiratory fitness. EF was measured with the Early Years Toolbox (EYT)[3], assessing visual-spatial working memory (“Mr. Ant”), phonological working memory (“Not this”), inhibition (“Go/No-Go”), and cognitive flexibility (“Card Sorting”). Z-scores for each fitness and EF were calculated on the mean and standard deviation, creating a continuous score for each component, segregated by gender, with higher z-scores indicating better performance.
Results: A significant correlation between EF and PF was identified through linear regression analysis, particularly in children above the 20th PF percentile. Sex-specific analysis showed a greater impact on boys (OR: 0.183) compared to girls (OR: 0.406), suggesting a nuanced relationship between PF and EF in Spanish preschoolers. Additionally, the research examined differences based on sex, unveiling a more intricate dynamic.

Conclusions: The study found no significant PF differences between boys and girls. However, EF disparities were observed, with girls showing stronger prefrontal activation. This contrast with certain prior studies prompts further examination into how gender may affect the development of executive functions during early childhood.
Key words: Preschoolers, physical fitness, executive function, health and cognition.

The impact of Mediterranean Diet Adherence on Cognitive Performance in Community-Dwelling Adults and Older Adults: Insights from the INLIFE-AGING Project

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Background: Preventing dementia is crucial due to its societal costs. The Mediterranean diet is linked to lower dementia risk. This study examines the relationship between Mediterranean Diet adherence (MDA) and cognitive performance (CP) in an Atlantic-Mediterranean adults and older adults.
Methods: A cohort of 460 adults (61.17+/-7.49 years, 35% older adults and 59% women) from the INLIFE-AGING project* was included. MDA was assessed using the PREDIMED questionnaire. CP was evaluated using the Rey-Auditory-Verbal-Learning (RAVL), Controlled-Oral-Word-Association-Test Phonemic (COWATp) and Semantic (COWATs) Fluency, Boston-Naming-Test (BNT) and others. Multiple linear regressions by age categories and adjusting for sex, education level, body composition, mental health status, and antidepressant drug use were performed.
Results: The majority (70.87%) of participants reported low MDA, better scores in older. Adults generally had higher education levels and healthier anthropometric measures, with no significative difference in mental health status. Adults outperformed older adults in all cognitive tests (all $p<0.01$). Regression analyses showed that better MDA-score were associated with better CP in olders on RAVL-learning-through-trials (B=0.775, 95%IC [0.098,1.453], p=0.025), RAVL-long-term-memory (B=2.327, 95%CI [0.022,4.631], p=0.048), BNT (B=0.856, 95%IC [0.627,1.084], $p<0.0001$), while adults with higher MDA performed better on COWATp (B=1.243, 95%IC [0.558,1.927], $p<0.0001$) and COWATs (B=1.101, 95%IC [0.144,2.058], p=0.024). These associations remained significant after adjusting for antidepressant treatment. Notably, verbal learning (RALV) remains significant across all adjusted models in olders, while in adults only phonemic fluency (COWATp) remained significant after adjustments.
Conclusion: Despite low Mediterranean Diet adherence, individuals with higher adherence showed better CP, especially in verbal abilities and learning, across age groups. These findings highlight the cognitive benefits of adopting a Mediterranean dietary pattern, emphasizing its significance in promoting cognitive health across different age groups.
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Deep neck adipose tissue is associated with gray matter volume in cognitively normal older adults: A cross-sectional analysis from the AGUEDA trial.

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INTRODUCTION: Increased abdominal adipose tissue is negatively associated to brain gray matter volume. However, the association of regional neck adipose tissue accumulation with gray matter volume is still unknown. This study aims to examine the associations between neck adiposity and gray matter volume in cognitively normal older adults.
METHODS: Ninety-one older adults participated in AGUEDA baseline assessments. Fat fraction percentage (FF%) of deep adipose tissue (DAT) were determined via Dixon sequence and manually processed with the 3D Slicer platform at the vertebra C3. T1-weighted images were acquired using a 3.0 T Siemens Magnetom Prisma Fit scan, and gray matter volume was determined by voxel-based brain morphometric analysis (SPM12, London, UK). Associations between FF% of DAT and gray matter volume were assessed in a voxel-wise manner adjusting for age, sex, years of education and body mass index.

RESULTS: Eighty-nine participants with valid data were included in this cross-sectional analysis (57% women, 71.69 ± 3.91

years). A significant inverse relationship between higher FF% of DAT and lower gray matter volume ($p<0.001$) was found across 10 gray matter clusters, including the Right Middle Frontal Gyrus (k=4882, t=-4.93), Left Inferior Frontal Opercular (k=281, t=-3.99), Left Inferior Frontal Triangularis (k=282, t=-3,82), Left Anterior Orbital Frontal Cortex (k=370, t=-3,81), Right Inferior Temporal (k= 205, t=-3,94), Right Hippocampus extended to Right Inferior Temporal (k=1510, t=4,53), Right Hippocampus extended to Right Parahippocampal (k= 467, t=-4,1), Left Supramarginal (k=257, t=-3,67), Left part of Paracentral Lobule (k=207, t=-4,12) and Right Angular Gyrus (k=251, t=-3,49). There were no positive associations between DAT and gray matter volume.

CONCLUSIONS: Higher FF% of DAT is related to lower brain gray matter volume, emphasizing neck adipose tissue importance for brain health in aging. Further research is needed to understand mechanisms and implications for cognitive function and neurodegenerative diseases.

Physical fitness and cerebral blood flow in cognitively normal older adults: a preliminary cross-sectional analysis from the AGUEDA trial

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Introduction: Alzheimer's disease (AD), a leading cause of disability among older individuals, is rapidly increasing worldwide. Regarding neurophysiological mechanisms, a reduced cerebral blood flow (CBF) has been proposed to play an important role in accelerated cognitive decline and the onset of AD. High fitness levels have been positively related to brain health in elderly, though the association of physical fitness with CBF remains unclear. Thus, we examined the relationship between physical fitness and CBF in cognitively normal older adults.
Method: Ninety-one cognitively normal older adults participated in the AGUEDA trial, and a sub-sample of sixty-seven (53%women, aged 72.3±3.8years) was analyzed in this study. Fitness was assessed by handgrip strength (kg) test (TKK-5401 dynamometer), and 2-km walking time (min) tests. T1-weighted and pseudocontinuos arterial spin labeling (pCASL) images were acquired with a 3.0 T Siemens Magnetom Prisma Fit scanner, and global gray and white matter CBF (GM-CBF and WM-CBF respectively) were extracted with ASLPrep pipeline (v.0.6.0). Linear regressions analyses were performed to determinate the association of each fitness indicator with global GM-CBF and WM-CBF, adjusting by age, sex, years of education and body mass index.
Results: Mean GM-CBF and WM-CBF for the study sample were 40.63±12.18 and 32.64±9.77 ml/kg/min, respectively. Handgrip strength was not associated with GM-CBF (β= 0.001, p=0.998) or WM-CBF (β=-0.034, p=0.884). Similarly, the associations between 2-km walking time and GM-CBF (β=0.026, p=0.874) or WM-CBF (β= -0.013, p=0.938) were not significant.
Conclusion: Our preliminary findings showed that physical fitness is not associated to CBF in cognitively normal older adults. These analyses should be replicated in studies with larger sample size, and examining other fitness tests and specific regions of interest to elucidate the role of physical fitness on global and regional CBF at older ages.

Associations between cardiorespiratory fitness and muscular strength with hippocampal subfield volumes in cognitive normal older adults: preliminary cross-sectional analysis from the AGUEDA trial

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Introduction:High levels of cardiorespiratory fitness (CRF) have been linked to better brain health in the elderly, and emerging studies support a correlation between measures of strength and brain health as well. The hippocampus is a key brain region that undergoes several structural changes with aging. However, the associations between CRF and muscular strength with the hippocampal subfields remain unknown. Therefore, this study aimed to examine the associations between CRF and handgrip strength with hippocampal subfield volumes and surrounding regions in cognitively normal older adults.
Method: Seventy-eight participants aged 71.65±3.86 years (46 women) from the AGUEDA trial were included in this analysis. CRF was measured with the 2-km walking test (min-1). Muscular strength was assessed using the handgrip strength test with the TKK 5101 Grip dynamometer (kg). A 3.0 T Siemens Magnetom PrismaFit scanner was used to acquire T1-weighted images and high-resolution oblique coronal T2-weighted images, required for the hippocampal segmentation. The Automatic Segmentation of Hippocampal Subfields (ASHS) software was used to segment the hippocampal subfields. Nine hippocampal, parahippocampal, and entrorhinal regions were examined bilaterally (cornu ammonis-CA1,CA2,CA3; dentate gyrus-DG; subiculum-SUB; entorhinal cortex-EHC; Brodmann areas-BA35,BA36; and parahippocampal cortex-PHC). The associations between handgrip strength and hippocampal subfield volumes were assessed by individual linear regressions models adjusted by age, sex and years of education as covariates.
Results: Higher levels of CRF were associated with greater EHC volume, including both right ($p=0.041$, $\beta= 0.252$,) and left hemispheres ($p=0.024$, $\beta= 0.281$). Higher handgrip strength was associated with greater left EHC volume ($p=0.042$, $\beta= 0.43$). No other significant associations were found.
Conclusion: These results indicate a potential link of CRF and handgrip strength with hippocampal subfield in the elderly, particularly in the EHC region. This underscores the importance of exploring further the impact of physical fitness on brain health in aging populations.

Is the mode of commuting to work associated with the risk of depression and anxiety? Results from the UK Biobank study

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Objective. To explore the relationships between the mode of commuting to work and the risk of depression and anxiety.
Methods. We included 257,292 employed participants from the UK Biobank (52.6±7.0 years, 52.5% women) without depression or anxiety at baseline (2006-2010). Type of commuting to work was reported by participants and classified into four categories: (i) exclusively car, (ii) public transport (exclusively or in combination with car), (iii) walking (exclusively or in combination with other mode/s, except cycle), and (iv) cycling (exclusively or in combination with any other commuting mode/s). First record coded as F32 or F33 (ICD-10) was used to define incident depression; ICD-10 F40 or F41 was used to define anxiety incident. Cox regression models were applied to calculate Hazard Ratio (HR) and 95% Confidence Intervals (CI). All analyses were adjusted by socio-demographic variables (sex, age, ethnicity, and townsend deprivation index), lifestyle (smoking status, alcohol intake frequency, leisure-time physical activity -walking for pleasure, light and heavy do-it-yourself, sports and other exercises-, TV time, sleep time, work involving manual work, and diet -fruit and vegetables, red meat, processed meat, and oily fish intake), and health-related factors (body mass index, walking pace, multimorbidity, and medication use).
Results. During a median follow-up of 12.61 (interquartile range: 11.87-13.32), 8,642 participants developed depression and 9,384 anxiety. Those cycling to work had lower depression incidence (HR [95%CI]=0.90 [0.82, 0.99]) compared to those using car exclusively; this association was borderline for incident anxiety (0.93 [0.85, 1.01], p=0.09). Taking public transport was related to decreased incident anxiety (0.93 [0.87, 0.98]).
Conclusion. Cycling or using public transport were associated with lower risk of depression or anxiety. Future research could investigate the possible psychosocial and biological mechanisms underlying these associations.

Associations between the mode of commuting to work and incident dementia risk in the prospective UK Biobank cohort Study

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Objective. To examine the associations between the mode of commuting to work and the risk of dementia.
Methods. A total of 257,262 participants from the UK Biobank (52.6±7.0 years; 52.5% women) without dementia at baseline (2006-2010) were included. Employed participants reported the types of transport they use to get to and from work, including using a car/motor vehicle, public transport, cycling, and walking (multiple responses were allowed). Commuting to work was classified into four categories: (i) cycling, (ii) walking, (iii) public transport and (iv) car. All-cause dementia (ACD), Alzheimer's dementia (AD) and vascular dementia (VD) incidence were derived from the algorithmically-defined by UKB outcomes (Fields ID: 42018–42025). Hazard ratios (HRs) for dementia with their 95% confidence intervals (CI) were calculated, adjusting for sociodemographic, lifestyle, and health-related covariables.
Results. During a median follow-up of 12.6 years (interquartile range: 11.8-13.3), 1,247 participants developed ACD, 489 AD and 245 VD. In the model adjusted for socio-demographic factors only, we observed a lower risk of ACD in participants using a cycle versus exclusively a car as a mode of commuting to work (HR [95%CI] = 0.74 [0.57, 0.96]). However, this association was somewhat attenuated and lost statistically significance in the fully adjusted model (HR [95%CI] = 0.88 [0.67, 1.16]). No other association was found between the mode of commuting to work and the incidence of ACD, AD or VD.
Conclusion. Preliminary analyses suggest that cycling to work may be associated to lower ACD risk, though the association did not reach statistical significance. No association was found between the other modes of commuting to work and the risk of ACD, AD or VD, suggesting that other factors (e.g., diet, total physical activity, etc.) may be more important in preventing dementia.

Associations between gait variability parameters and hippocampal subfield volumes and surrounding regions in cognitive normal older adults: a preliminary cross-sectional analysis from the AGUEDA trial.

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Introduction. The role of the hippocampus in gait control is still a matter of debate. While increasing evidence indicates association among gait and brain volumes, associations between gait parameters and hippocampal subfields are not yet fully established. This study aims to examine the associations between gait variability parameters and hippocampal subfield volumes and surrounding regions in cognitively normal older adults.
Method. Ninety-one older adults participated in AGUEDA baseline assessments. Optogait system (Microgate,Italy) was used to assess gait features. Participants walked back and forth at their maximum walking pace for 5 minutes across a 5-meter track made up of two bars set 1-meter apart. The coefficients of variation(CV) of stride length(cm), step length(cm), step time(s) and gait velocity(m/s) were used as gait variability parameters. A 3.0 T Siemens Magnetom Prisma Fit scanner was used to acquire T1-weighted images and high-resolution oblique coronal T2-weighted images, required for the hippocampal segmentation. The Automatic Segmentation of Hippocampal Subfields (ASHS) software was used to segment hippocampal subfields based on the Penn Memory Center 3T ASHS atlas. Subfields were examined bilaterally for hippocampus (cornu ammonis-CA1,CA2,CA3; dentate gyrus-DG and subiculum-SUB), parahippocampal cortex-PHC, entorhinal cortex-EHC, and perirhinal cortex (brodmann areas-BA35,BA36). Associations between gait variability parameters and subfield volumes were assessed by individual linear regressions adjusted by age, sex, and years of education.
Results. Seventy-eight participants (71.66±3.87 years, 44 women) with available data were included in this analysis. Greater gait velocity variability was associated with lower right PHC volume (β=–0.239, p=0.043). Unexpectedly, greater step time variability was associated with greater left CA2 volume (β=0.288, p=0.027). No other associations were found (all p>0.05).
Conclusion. Preliminary results indicate a potential link between gait variability and selective hippocampal subfields and PHC. Understanding these associations would have implications for elucidating the underlying neurobiological mechanisms of age-related brain changes in cognitively normal older adults.

Perceived stress is associated with poorer hippocampal-dependent memory performance in late adulthood

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Background: Exercise might positively impact memory function, but the mechanisms underlying these effects are poorly understood. In this regard, exercise-induced modifications to chronic stress levels might be a possible mechanism because stress has been linked to memory and neural impairments across multiple brain regions, including the hippocampus. Here, we investigated whether perceived stress would be associated with hippocampal-dependent memory performance in cognitively healthy older adults.

Methods: Baseline data from 648 cognitively healthy older adults (mean age=69.72±3.70 years) from the IGNITE study were used. The Perceived Stress Scale (PSS) measured the frequency of situations that were considered stressful in the past month. The Relational and Item-Specific Encoding (RiSE) task measured episodic memory, dissociating between memory processes that are less hippocampal-dependent (item-specific condition) from those that are more hippocampal-dependent (relational condition). A Wald test examined the relationship between higher PSS scores and poorer memory performance and whether the association differed by condition (relational > item-specific) with a 0.05 significance level. Age, gender, years of education, and site were adjusted in the model.

Results: Higher perceived stress was associated with reduced accuracy, with a significant PSSxcondition interaction (item-specific vs relational) (Wald t-test=4.07; p=0.044). The association with PSS was significantly greater for the relational condition (β=-0.101; p=0.050) than the item-specific condition (β=-0.040; p=0.511). In addition, higher perceived stress levels were associated with slower reaction times. The PSSxcondition interaction (Wald t-test=4.11; p=0.043) revealed that the association was significantly greater for the relational memory condition (β=1.032; p=0.050) than for the item-specific condition (β=0.166; p=0.848).

Conclusions: Consistent with our predictions, higher levels of perceived stress were associated with poorer memory performance, particularly for the hippocampal-dependent memory condition, in older adults. Future research will examine whether an exercise intervention enhances hippocampal-dependent memory performance by modulating stress pathways.

Aerobic Fitness Moderates the Association of 24-Hour Time-Use with Cognitive Function: The IGNITE Study

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PURPOSE: Compositional data analysis (CoDA) has demonstrated that how time is spent in lifestyle behaviors across the day (24-hour time-use) is associated with cognitive domains of processing speed, working memory, attentional control, and visuospatial ability, driven by time in moderate-to-vigorous physical activity (MVPA). Here, we explored the relationship between 24-hour time-use and cognitive function, and whether cardiorespiratory fitness (CRF) moderated this association. METHODS: Baseline data were used from older adults recruited for a randomized trial from three sites in the United States (N = 587, Age = 69.8±2.2 years, 70% Female, 77% White, years of education = 16.3±2.2 years, BMI = 29.6±5.6 kg/m2, 73% non-APOE Ɛ4 allele carriers, VO2peak = 21.8±5.1 ml/kg/min). A confirmatory factor analysis identified five cognitive domains as latent variables. Four-part time-use compositions (sedentary behavior, sleep, light PA and MVPA, expressed as three isometric log-ratios) were created using data from wrist-worn accelerometry. CRF (VO2peak [ml/kg/min], relative to weight) was measured by a graded exercise treadmill test. Multiple linear regressions examined associations between time-use compositions and cognitive function, controlling for age, sex, race, site, education, BMI, and APOE status. Interaction terms tested moderation by CRF (time-use*CRF). Compositional isotemporal substitution analyses were performed for levels of CRF, categorized using American College of Sports Medicine age and sex-specific criteria. RESULTS: CRF moderated the association between time-use and processing speed (p = 0.004) and attentional control (p = 0.015). After decomposing these interactions, reallocating time to or from MVPA was associated with cognitive performance, but these associations were greater at lower CRF levels. CONCLUSION: The relationships of time-use with processing speed and attentional control were moderated by CRF, such that those with lower fitness levels showed larger predicted differences in cognitive outcomes. Therefore, CRF may be a key moderator that influences the relationship between time-use and cognitive function in late adulthood.

Association of self-reported physical fitness with resilience during advanced pregnancy: a longitudinal study from the GESTAFIT project.

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Background: Resilience entails the ability to adapt personally and socially, even in an unfavorable environment, to adverse circumstances. Pregnancy brings new challenges and difficulties that require resilience, especially when childbirth is near. While physical fitness has been linked to improved mental well-being, its correlation with resilience during pregnancy remains unexplored. Aims: To assess the association of self-perceived physical fitness with resilience at advanced pregnancy. Methods: 114 pregnant women from the GESTAFIT project (32.8±4.8 years old) participated. At the 34th week of gestation, physical fitness and resilience were assessed using the International Fitness Scale and the 10-item Connor-Davidson Resilience Scale, respectively. Results: After adjusting for potential confounders, women who reported greater overall fitness and cardiorespiratory fitness showed better ability to changes adaptation (both $p<0.05$), higher empowerment (both $p<0.05$), more ability to recover quickly from illness or other negative events (respectively, $p<0.05$ and $p<0.01$), and to achieve their goals (respectively, $p<0.05$ and $p<0.01$), and presented greater concentration even under pressure (both $p<0.01$). Additionally, greater overall fitness was associated with better changes adaptation and higher cardiorespiratory fitness was associated with more intention to see the funny side of things when faced with problems (both $p<0.05$). Muscular strength was positively associated with changes adaptation, empowerment, self-perception as a strong person when they face problems (all, $p<0.05$) and the ability to concentrate even under pressure ($p<0.01$). Greater speed-agility was associated with more ability to recover quickly from illness or other negative events and to achieve their goals (both, $p<0.05$). Finally, flexibility was positively correlated with changes adaptation, the intention to see the funny side of things, empowerment, to feel more ability to achieve their goals (all, $p<0.05$), and not to get discouraged after a failure ($p<0.01$). Conclusion: Greater physical fitness is associated with greater resilience during advanced pregnancy

A sex-stratified examination of changes in sex hormones following resistance training in cognitively normal older adults: preliminary findings from the AGUEDA randomized controlled trial.

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BACKGROUND: The changes in circulating sex hormones experienced with ageing can negatively impact brain health. Resistance exercise training (RT) may be an avenue to positively impact such changes in sex hormones. The aim was to examine whether RT induced changes in sex hormones in cognitively normal older women and men. METHODS: Participants (65-80 years old) were randomized to a 24-week RT program (60-minute supervised sessions, target exertion 7-8/10 on the Borg scale, 3 days/week) or a control group. At baseline and 24 weeks, blood samples were obtained in the morning whilst fasted to evaluate plasma concentrations of steroid hormones, including gonadal factors. Baseline constrained mixed models were used to test time*group interactions separately in women and men. Changes are reported as z-scores. RESULTS: A total of 90 participants (mean±standard deviation: 72±4 years old, 28.5±4.2 kg/m2, 58% women) were randomized. We obtained valid data from testosterone, estradiol, estrone, progesterone and dehydroepiandrosterone sulfate (DHEA-S). In women, both groups showed reductions in testosterone (RT: -0.81 [-0.82;-0.79], control: -0.81 [-0.83;-0.80]), progesterone (RT: -0.15 [-0.19;-0.11], control: -0.13 [-0.17;-0.09]), estradiol (RT: -0.26 [-0.37;-0.15], control: -0.24 [-0.35;-0.13], estrone (RT: -0.51 [-0.8;-0.23], control: -0.66 [-0.95;-0.37]) and DHEA-S (RT: -0.08 [-0.35;+0.20], control: -0.19 [-0.47;+0.09]) from baseline to follow-up. Conversely, in men, both groups showed increases in testosterone (RT: +1.05 [+0.83;+1.27], control: +1.01 [+0.77;+1.24]), estradiol (RT: +0.16 [+0.04;+0.29], control: +0.16 [+0.01;+0.32], estrone (RT: +0.53 [+0.17;+0.89], control: +0.80 [+0.39;+1.21]) and DHEA-S (RT: +0.01 [-0.47;+0.49], control: +0.02 [-0.48;+0.51]), yet progesterone decreased (RT: -0.10 [-0.17;-0.04], control: -0.08 [-0.15;0.00]). No significant time*group interaction effects were noted in either sex (p>0.05). CONCLUSION: These preliminary results showed that a 24-week RT program did not significantly alter the sex hormonal milieu of cognitively normal older adults compared to control. Future analyses should examine whether such changes in sex hormones in both groups are associated with brain health.

Cumulative physical activity across life and neurodegenerative blood-biomarkers in cognitive normal older adults: preliminary results from the AGUEDA trial.

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Background: Physical activity (PA) is linked to a reduced risk of Alzheimer's disease (AD). However, its impact may vary across life stages, suggesting significance during specific periods or lifelong PA engagement PA. Given that AD-related blood biomarkers occur decades before clinical symptoms, this study aims to examine the association between cumulative PA across life and neurodegenerative blood-biomarkers (p-tau181, p-tau217, Aβ42/40, glial fibrillary acidic protein (GFAP) and Neurofilament light chain (NfL)) in cognitive normal older adults, and to test the interaction of APOEε4 status in this association.
Methods: In this cross-sectional study from the AGUEDA trial (NCT05186090), 78 cognitively normal older adults (mean age =71.3±3.8y, 60.3% females, 16.7% APOEε4 carriers) participated. Self-reported PA was recorded across five age periods (10-18y, 19-30y, 31-40y, 41-50y, and 51-60y), and average cumulative PA scores (MET·h/d) were calculated for mid-life PA (ages 10-40y), late-life PA (ages 41-60y), and total PA across life. Blood biomarkers were assessed using ultrasensitive Single molecule array (Simoa) method. All blood variables were log transformed due to skewed distribution, excepted Aβ42/40. Linear regression models, adjusted for sex, age, education, and APOEε4 status were utilized, along with interaction analysis by APOEε4 status.
Results: The analysis revealed no significant associations between mid-life PA and neurodegenerative blood biomarkers (β ranging from -0.07 to 0.01, all $p > 0.05$). Similarly, late-life PA was unrelated to neurodegenerative blood biomarkers (β ranging from -0.24 to 0.61, all $p > 0.05$). Moreover, the total cumulative PA across the lifespan showed no significant relationship with these blood markers (β ranging from -0.14 to 0.04, all $p > 0.05$). Additionally, no significant interactions were observed between cumulative PA and APOEε4 status (all $p>0.10$).
Conclusion: Cumulative PA across life was not associated with neurodegenerative blood-biomarkers in cognitively normal older adults, and no interaction were found with APOEε4 status.

The effects of a resistance exercise program on mental health in cognitively normal older adults. A moderation analysis from the AGUEDA Randomized Controlled Trial.

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Title. The effects of a resistance exercise program on mental health in cognitively normal older adults. A moderation analysis from the AGUEDA Randomized Controlled Trial.
Aim. Our study aimed to examine the moderating effects of sex, age, and baseline mental health data on a 24-week resistance exercise program on mental health in cognitively normal older adults.
Methods. A total of 90 cognitively normal older adults (mean age = 71.6±4.0; 52% females) participated in the AGUEDA trial. Participants were randomly allocated to either a 24-week resistance training program with 3-weekly sessions (n = 46), or a control group (n = 44). Mental health outcomes (i.e. psychological ill-being-indicators: depression, anxiety, stress, and loneliness; and psychological well-being-indicators: satisfaction with life, self-esteem, and emotional well-being) self-reported questionnaires. Changes between groups were analyzed using a constrained longitudinal mixed model. Moderation analyses were conducted by sex (male and female), age (<=72 and >72), and baseline mental health data (lower and higher symptomatology). The intervention effects were presented as z-scores of changes.
Results. The exercise program reduced anxiety symptoms in participants with higher baseline anxiety levels (z-score=-0.48 [95%CI, -0.89 to -0.07];p=0.02) but not in those with lower values (z-score=0.06 [95%CI, -0.37 to 0.49];p=0.78); P for interaction <0.001). Age and sex interaction effects for self-esteem were not statistically significant (P for interaction>0.05), but within-group effects were stronger in females (z-score=0.48 [95%CI, 0.03 to 0.93];p=0.036) than males (z-score=0.23 [95%CI, -0.45 to 0.91];p=0.486); and in younger participants (z-score=0.51 [95%CI, 0.05 to 0.97];p=0.032) compared with older participants (z-score=-0.07 [95%CI, -0.56 to 0.41];p=0.756). No other significant interactions were found for the other variables.

Conclusion. Our 24-week resistance training program reduced anxiety symptoms in cognitively normal older adults with high baseline symptomatology. However, sex, age, or symptomatology at baseline did not moderate the effects of resistance exercise on other mental health outcomes.

Cardiovascular health and neurodegenerative blood-biomarkers in cognitively normal older adults: preliminary results from the AGUEDA trial

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INTRODUCTION. Modifiable factors linked to dementia risk overlap with the Life's Essential 8 (LE8) score suggested as a comprehensive measure of cardiovascular health and warrant further investigation. We aimed to examine (i) the association between LE8 score and blood-biomarkers of neurodegeneration (neurofilament light chain, NfL) and astrocyte reactivity (glial fibrillary acid protein, GFAP) and (ii) the moderation of sex, age education, APOEε4, and Aβ status on this association in cognitively normal older adults.
METHOD. 91 cognitively normal older adults aged 65-80 participated in the AGUEDA trial (NCT05186090). LE8 health behaviours (diet, physical activity, smoking, sleep) and factors (body mass index, non-HDL cholesterol, fasting glucose, and blood pressure) were measured. LE8 score (0-100) was computed as the average of these metrics with higher scores indicating healther cardiovascular health. NfL and GFAP were analyzed using Simoa platform (Quanterix, Billerica, MA). Linear regression models were adjusted by age, sex, education, and APOEε4. Then, interactions between LE8 score and age, sex, education, APOEε4, and Aβ status on blood-biomarkers adjusted by covariables were performed.
RESULTS. Participants averaged 71.8±3.9 years, and 57% were women. The mean LE8 score was 63.7±10.8. LE8 score was unrelated to NfL (β: -.057, p=.601) and GFAP (β: .143, p=.149). However, the interaction between LE8 score with sex and Aβ status significantly impacts NfL. LE8 score had a positive association with NfL in men (β:1.20; p=.079) and Aβ+ (β:1.27; p=.076), while this association was negative for women (β: -1.34; p=.079) or Aβ- individuals (β: -1.39; p=.076). No other interactions were found.
CONCLUSION. The LE8 score was not related to GFAP, while the association with NfL depends on sex and Aβ status; that is, higher LE8 was related to higher NfL levels in men and Aβ+. Further research is required on LE8 factors and early Alzheimer's biomarkers.

Comparison of the Effects of Synchronous Online vs. Face-to-Face Multicomponent Physical Exercise Programs on the Mental and Physical Health of Older People Living in Nursing Homes: A Pilot Study

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Research has yet to establish evidence concerning the benefits of online physical exercise for older adults living in nursing homes (NH). Thus, this pilot study aimed to compare the impacts of synchronous online (SO) versus face-to-face (F2F) physical exercise programs on the mental and physical health of NH residents. Twelve participants, aged over 70 years and meeting specific criteria such as scoring above 18 points on the MEC-35 cognitive test, above 50 points on the Barthel index, and capable of independent standing and walking for at least 10 meters, were randomly assigned to either the SO (n=6) or F2F (n=6) group. Over 12 weeks, both groups engaged in supervised, individualized, and progressive multicomponent physical exercise sessions twice a week, each lasting an hour and focusing on cardiovascular, strength, and balance exercises at moderate intensity. Cognitive function was evaluated using the MoCA test, depression levels were assessed with the Yesavage test, and physical performance was measured via the SPPB. Statistical analyses, conducted using mixed-design ANCOVA for time x group comparisons and paired t-tests for within-group comparisons, were complemented by effect size calculations. Ethical approval was obtained (M10_2022_405_IRAZUSTA ASTIAZARAN). Although improvements in MoCA test scores were observed in both groups, they did not reach statistical significance. Notably, while scores on the Yesavage test improved in both groups, significance was only achieved in the SO group, indicating a large effect size. Moreover, SPPB scores significantly increased in both groups, being the effect size large in both. No time × group effects were detected. These preliminary findings suggest that online physical exercise programs may confer similar benefits to face-to-face modalities for older NH residents. However, the confirmation of these outcomes awaits the results of an ongoing randomized controlled trial.
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Physical fitness and dynamic resting-state functional connectivity in cognitively normal older adults: preliminary cross – sectional findings from the AGUEDA trial.

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Background/Objectives: Fitness levels in elderly have been suggested to induce structural and functional changes in the brain. Dynamic resting-state functional connectivity (dFC) is a novel technique able to identify temporally correlated brain regions considering the temporal fluctuations of these functional connections. Evidence is still scarce on the relationship of fitness with dFC; therefore, the aim of this study is to investigate the relationship between fitness and local and distant brain dFC in cognitively normal older adults.
Methods: Ninety-one cognitively normal older adults (57%women, aged 72±4years) from the AGUEDA trial (NCT05186090) participated in this study. Fitness indicators included handgrip, biceps curl, squats, elbow and knee extension as muscular strength tests, and 2-km walking time as cardiorespiratory fitness (CRF) test. dFC images were acquired with a 3T Siemens Magneton Prisma Fit Scanner. Local/distant dynamic connectivity maps were processed using CONN-toolbox and MATLAB to identify brain attractors considering neighbor connections, and the connectivity outside this latest. General linear models were used to assess the association between each fitness indicator and local/distant connectivity maps, controlling for age, sex, education and body mass index. A peak-level p-value (uncorrected) ≤ 0.001 and cluster-extent threshold of k ≥ 10 voxels were applied to all statistical parametric maps generated for each contrast.
Results: No associations were found between muscular strength indicators and either local (all k<10) or distant (all k<10) dFC attractors in any of the contrasts among cognitively normal older adults. Similarly, no associations were found for CRF with either local or distant (all k<10) dFC attractors in any of the contrasts.
Conclusions: These preliminary findings suggest that fitness levels were not related to local or distant dFC attractors in

cognitively normal older adults. The future research should examine potential moderators underlying the relationship between fitness and dFC in the brain.

A multicomponent mHealth-based randomized controlled trial on the prevention of perinatal mental disorders (e-Perinatal project): Rationale and design of the physical activity module

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Perinatal mental disorders are common in women, and consequences are multifaceted. Physical activity (PA) promotes mental health during the perinatal period, but few women meet the PA recommendations due to physical symptoms, practical limitations, lack of social support and insufficient knowledge. Despite efforts, prevalence rates have not decreased in the last decades. Several studies underlie the need for personalized prevention integrated into existing maternal and child healthcare policies. In this project, a multicomponent (psychotherapy, PA, healthy habits) mHealth intervention for preventing perinatal mental disorders will be implemented as normalized routine practice in healthcare. The mHealth intervention is characterized by i) coordination with the Andalusian Healthcare System to synchronize the app with usual care visits; ii) weekly content suggestions considering the perinatal stage; iii) content recommendation system based on machine-learning; iv) repository with restricted access considering the perinatal stage; v) community features.
The physical activity module has been designed to promote physical literacy and will be delivered considering the stage of the perinatal period. It comprises 40 educational contents in text or infographic format (22 during pregnancy and 18 during postpartum period) and 104 exercise sessions in video format. Exercise types include aerobics, strength, mobility, and mind-body. Each session lasts 20-35 minutes, structured as warm up, main part and cool down. Exercise intensity is expected to be at a rate of perceived exertion ranging from 3 to 5. All contents are in accordance with evidence-based recommendations for PA during pregnancy and postpartum and are approved by experts in PA during the perinatal period. To enhance adherence, the evidence-based quality of the contents is emphasized, exercise sessions are accessible, and involvement of important others is stimulated.
This project will contribute to the field of mHealth interventions for the promotion of mental health in the perinatal period throughout promoting PA among other components.

EFFECT OF e-HEALTH INTERVENTIONS ON STEP INCREASE IN OLDER PEOPLE: A SYSTEMATIC REVIEW

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Introduction: As the population ages, sedentary behaviours are on the rise, increasing the risk of negative health outcomes. eHealth interventions have the potential to encourage changes in health behaviour in these groups; older adults can benefit physically and mentally from regular physical activity, especially walking.
Aim: Therefore, the aim of our study was to analyse the effect of home e-Health interventions on the increase in the number of steps in older people.
Method: A literature search was conducted until March 2024. Study characteristics were summarised in a table including: (1) study characteristics (author, year of publication, country); (2) sample characteristics (sample size, mean age); (3) intervention characteristics (intervention duration, intervention classification); and (4) outcome measurement (number of steps per day). We included randomised clinical trials applying different therapies: wearable devices, web-based, physical activity monitoring app and phone-based. Risk of bias was assessed using the Cochrane Collaboration's risk of bias assessment tool (RoB2) for randomised clinical trials.
Results: A total of 5 studies were included in this systematic review reporting data from a total of 617 patients without chronic pathology; 363 in 7 intervention groups and 253 in 5 control groups. Overall, the mean age of the patients was 61.1 to 71.7 years and the studies included 38.9% to 85% women. The duration of the interventions ranged from 6-52 weeks and the measuring instrument was the pedometer.
After the application of the e-Health intervention it was observed that the intervention groups had a significant increase in step count compared to the non-intervention group.
Conclusion: Our results conclude that e-Health interventions using electronic activity monitors, tablets and telephone counselling are potentially effective tools for increasing physical activity and decreasing sedentary behaviour in older people. Furthermore, such interventions show promise as a scalable and cost-effective method for targeting changes in physical activity behaviour.

Feasibility and Acceptability of a Synchronous Online Multicomponent Physical Exercise Program for Older Adults Living in Nursing Homes: A Pilot Study

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The evidence surrounding the effects of online physical exercise has significantly expanded, yet, to our knowledge, no study has specifically targeted older individuals residing in nursing homes (NH). Given the varying capabilities of NH residents, engaging in online physical exercise could pose challenges. This study aimed to evaluate the feasibility of an Online Multicomponent Physical Exercise (OMPE) intervention supervised synchronously for older NH residents. Six older adults (>70 years) residing in NH, capable of standing up and walking, participated. Participants exhibited a wide range of physical (SPPB 1-12) and cognitive (MEC 18-32) characteristics. The OMPE program, conducted at moderate intensity over 12 weeks, was individualized, progressive, and supervised synchronously, involving two 1-hour sessions of cardiovascular, strength, and balance exercises per week. For logistical and safety reasons, a non-specialized individual attended sessions. Adherence to the program was assessed based on attendance, dropouts, and completion rates (intensity, volume). Satisfaction with the program and any adverse technical or health-related events were recorded. Ethical approval was obtained (M10_2022_405_IRAZUSTA ASTIAZARAN). All participants completed the intervention and attended, on average, 90% of sessions. Six minor physical adverse events (mild dizziness or pain) occurred, while minor technical issues did not disrupt any sessions. The average perceived exertion rated 5.29 and 6.03 out of 10 on the OMNI scale for strength and cardiovascular exercise, respectively. Exercise volume was reduced in 9 cases (7.9%). Overall satisfaction with the program scored 7.83 out of 10. This synchronous OMPE program, aimed at improving mental and physical health, was found to be feasible and well-received among older NH residents with diverse cognitive and physical abilities.
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Plasma levels of omega-6 oxylipins are associated with poorer cognitive performance in middle-aged adults

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Background: Ageing is a natural biological process characterized by cognitive decline and inflammation. Recently, endocannabinoids and oxylipins (i.e., pro-inflammatory omega-6 oxylipins and anti-inflammatory omega-3) have emerged as surrogate biomarkers of systemic inflammation. These lipids play key roles in brain physiological processes, including plasticity, neuronal integrity, and/or inflammation, all of which are involved in cognitive function. Despite the potential impact of polyunsaturated fatty acids on cognitive decline, the connection between endocannabinoids and oxylipins with this brain dimension remains unexplored. Thus, this study aims to investigate the relationship between plasma levels of endocannabinoids and oxylipins (omega-6 and omega-3), and cognitive performance in middle-aged adults.
Methods: We included 61 middle-aged adults (54±5 years old; 56% female) from the FIT-AGEING study. Plasma levels of endocannabinoids and oxylipins derived from omega-6 and omega-3 polyunsaturated fatty acids were determined by liquid chromatography-tandem mass spectrometry. We assessed cognitive performance through simple and multiple reaction times using the Vienna Test System, and episodic verbal memory was measured using the Wechsler Memory Scale-III. We conducted Spearman's partial correlation analyses to examine the relationship between plasma levels of oxylipins and cognitive performance parameters adjusting for age.
Results: We found that higher levels of omega-6 oxylipins (33%; 18 out of 54) were associated with poorer performance on the multiple reaction time task (all $r \geq 0.263$; $P<0.05$). A similar panel of omega-6 oxylipins (28%; 15 out of 54) was also related to poorer episodic memory (all $r \leq -0.251$; $P<0.05$). However, plasma endocannabinoids and omega-3 oxylipins were not linked to cognitive performance outcomes (all $P \geq 0.05$). All analyses were adjusted for age.
Conclusion: Pro-inflammatory omega-6 oxylipins, but not endocannabinoids or anti-inflammatory omega-3 oxylipins, were related to poorer cognitive performance. These findings suggest that these compounds might serve as promising biomarkers for the early detection of cognitive decline in adults in their middle age.

Association of movement behaviors with hippocampal amyloid beta accumulation: a compositional data analysis from the Agueda trial.

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INTRODUCTION: Hippocampal amyloid beta (Aβ) accumulation can provide early detection of neuronal degeneration in cognitively normal older adults. Movement behaviors (Physical activity (PA), sedentary behavior (SB), and sleep) are identified as modifiable lifestyle factors linked to dementia prevention, but their role in hippocampal Aβ accumulation needs further exploration. This study investigates (i) the association between movement behaviors and hippocampal Aβ accumulation in cognitively normal older adults and (ii) the moderation of sex in this association.
METHODS: We utilized baseline data from 86 cognitively normal older adults (56.98% female; mean age = 71.51 ± 3.87 years), participating in the AGUEDA trial (NCT05186090) in Granada, Spain. Hippocampal Aβ accumulation was measured using FBB-PET/CT on a Biograph VisionTM V-600 and determined via Standardized Uptake Value Ratio (SUVR). Movement behaviors were assessed using a wrist-worn accelerometer (ActiGraph GT3X+), with raw accelerations processed with GGIR R package. Linear regression models, using a compositional data analysis, explored the association of moderate-to-vigorous PA (MVPA), light PA (LPA), SB, and sleep with hippocampal Aβ accumulation.
RESULTS: Average daily minutes of MVPA (27.54), LPA (258.10), SB (700.09), and sleep (454.27) were not associated with hippocampal Aβ accumulation (mean = 0.89 ± 0.06 SUVR) in the whole sample (all $p > 0.05$). There were interactions between sex and movement behaviors in relation to hippocampal Aβ accumulation (all $p < 0.1$). Segmented models showed that MVPA was negatively associated with hippocampal Aβ accumulation in males ($\beta = -0.032$; $p = 0.013$) but not in females ($\beta = 0.006$; $p = 0.585$). No significant associations were found between remaining movement behaviors and hippocampal Aβ accumulation in females (all $p > 0.05$) or males (all $p > 0.05$).
CONCLUSIONS: Results demonstrated a significant association between MVPA and hippocampal Aβ accumulation in males, but not in females. The moderating role of sex in this association needs further confirmation in future studies.

Physical activity, depression, and all-cause mortality risk in the Seniors-ENRICA cohorts

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Aim: To analyse the cross-sectional relationship of physical activity (PA) with depression, as well as to determine the association between PA and all-cause mortality risk in older adults with and without depression at baseline. Methods: We included 2060 and 3263 older adults (71.85±5.30 years; 2800 women) from the Seniors-ENRICA 1 (2013) and 2 (2016/2017) cohorts, respectively. Time in walking, gardening, do-it-yourself (DIY), housework, cycling, and sports, was self-reported using the EPIC questionnaire. Light (LPA; walking+housework), moderate (MPA; gardening+DIY), and vigorous PA (VPA; cycling+sports) were calculated. Depression was ascertained using the Geriatric Depression Scale (GDS-10). Information on mortality was derived from the Spanish National Death Index (censored date: 31/1/2024). Regression models and Cox regression models were applied to estimate the association between PA, depression, and all-cause mortality, as appropriate. Results: Associations were observed between all types of PA and depression score (β ranged from -0.04 to -0.13; except for cycling) and depression prevalence (OR ranged from 0.88 and 0.98) at baseline. During a median follow-up of 7.71 years, 649 and 204 participants without and with depression died. Participants with depression had a higher risk of mortality than those without depression (HR[95%CI])=1.95[1.65,2.30]). Time in walking, total PA, LPA, and moderate-to-vigorous PA (MVPA) were related to reduced mortality in people without depression. Among those with depression, time in housework, sports, total PA, LPA and VPA were associated with lower mortality. Meeting MVPA recommendations was related with 20.7% and 33.3% lower mortality risk in people without and with depression, respectively. Older adults with depression and non-meeting MVPA recommendations have a higher mortality risk (HR[95%CI]=2.47[1.99,3.05]) than those without depression and meeting MVPA recommendations. Conclusion: Significant relationships were found between PA, depression, and mortality. Although older people with depression showed an increased risk of death, PA could exert beneficial effects against mortality also in this population.

Physical activity, sedentary behaviour, and cognitive function among older adults: A bibliometric analysis from 2004 to 2024

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Considering population aging, the prevalence of cognitive decline and dementia will increase globally, accompanied by a substantial burden on healthcare systems. Previous evidence syntheses have identified physical activity and sedentary behaviour as modifiable lifestyle behaviours that are associated with cognitive decline. However, bibliometric analysis can uniquely provide a broader synthesis of 'what is being researched' in a research field. Therefore, the aim of this bibliometric analysis is to provide insight into the knowledge structure of physical activity, sedentary behaviour and cognitive function among older adults from 2004 to 2024, and to predict emerging research trends. A total of 1,290 publications were retrieved from the Web of Science Core Collection. CiteSpace and VOSviewer were used to conduct performance analysis, science mapping, and enrichment. T. Liu-Ambrose was the most prolific author (39 publications), and the University of British Columbia was the most prolific institution (48 publications). The USA, China, and Canada were the three most productive countries. Two research trends revealed the evolution of the knowledge structure. The first trend shows a shift from exploring the effects of physical activity on cognitive function to its effects on other health-related outcomes among patients with cognitive impairment. The second trend illustrates a shift in research focus from Tai Chi and nursing home to sedentary behaviour and healthy ageing. Current studies focus on 'sleep', 'sedentary behaviour', and 'virtual reality'. Based on this, we identified that exploring the relationship between 24-hour movement behaviour and cognitive function in older adults with different health statuses, as well as combining behaviour change techniques with innovative technologies to enhance cognitive function, are potential future research trends in this field. Collectively, this bibliometric analysis provides a one-step overview of the knowledge structure in this field for researchers and other stakeholders, as well as a reference for future research.

Physical function characteristics of older adults at high risk of dementia and their association with cognition by sex: the CITA GO-ON trial

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INTRODUCTION. Physical function characteristics of cognitively-unimpaired (CU) older adults at high risk of dementia are not comprehensively described. Sex may have a role in the effect of physical performance on cognition. This study aims to describe the sociodemographic and clinical characteristics of CU older adults at risk of dementia, and to explore potential disparities in the association between physical performance and cognition by sex.
METHODS. Cross-sectional data (recruitment period, 2021-2022) from the CITA GO-ON study, an ongoing FINGER-methodology trial. Community-dwelling older adults (60-85 years) at high risk of dementia (CAIDE dementia risk score ≥6 points) were enrolled and only CU participants were considered Physical performance was measured by gait speed, handgrip strength, leg-press strength (1RM) and maximal power. The association between physical function and global cognition (Mini-Mental State Examination [MMSE]) was examined using generalized linear models, while accounting for confounding factors present on the CAIDE scale.
RESULTS. A total of 431 participants aged 68.9(5.6) were included(50% women). The mean CAIDE score was 7.49(1.37), and was lower in women (MD:-0.45, p= 0.001). Women showed higher education (MD:0.33, p=0.035) and higher total cholesterol (MD: 33.0, p=0.001), reflected in a higher prevalence of hypercholesterolemia (33%) compared to men (14%). Adjusting for age, education, blood preassure, body mass index, total cholesterol and sleep time, generalized linear models showed no association between physical function and MMSE score in men. Conversely, handgrip strength (B=0.10, p=0.01) and muscle power (B=0.01, p=0,001) significantly impacted global cognition in women.
CONCLUSIONS. Women exhibited slightly higher education and a higher burden of dyslipemia. Education was the main factor influencing cognition in both sexes, while age, subjective sleep assessment and physical function also exerted an impact in women. These findings underscore the need for tailored preventive interventions to address the different dementia-related risk factors that may manifest in each sex.

Impact of a 12-Week Supervised Exercise Program and Motivational Strategies on Cognitive Outcomes in Older Adults: Preliminary Insights from the PRO-Training study

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INTRODUCTION: Exercise seems to improve brain health in older adults. Motivational strategies may enhance cognitive outcomes [1], but their effectiveness to maximize exercise benefits remains unclear. We aimed to assess the effects of a supervised exercise program on cognitive function in older adults, and whether motivational strategies influence these effects.
METHODS: This research is part of the PRO-Training study (NCT05619250). 72 participants (69 ±4 years) were randomly assigned to 3 groups: 1-Control, 2-Supervised exercise without motivational intervention (SUP), 3- Supervised exercise with motivational intervention (SUP+). Supervised groups participated in a multicomponent exercise program 3 times per week for 12 weeks, while participants in the control group maintained their usual lifestyle. Motivational strategies were based on the self-determination theory, including telephone calls, interactive workshops, motivational messages, etc. Cognitive outcomes, assessed with the digital symbol substitution test (DSST) and the trail making test (TMT), were measured at baseline and after 12-weeks. Statistical analyses included multivariate analysis of variance and Tukey post-hoc tests (parametric variables), and Kruskal-Wallis (nonparametric variables). Results are presented as mean ± SD change from baseline.
RESULTS: Significant benefits in the DSST were observed for SUP (5.6 ± 9.6 symbols, p=0.016, Cohen's d=0.743) compared to the control group (-9.6 ± 27.4 symbols) but not between SUP+ (3.7 ± 8.0 symbols, p=0.459) and SUP. A trend towards statistical significance was observed between SUP+ and control group (p=0.080) for the DSST. However, no significant differences between groups were found in the TMT A (p=0.668) or B (p=0.823) scores.
CONCLUSION: A 12-week supervised training program seems to moderately improve processing speed measured by the DSST test in older individuals. However, the incorporation of motivational strategies does not appear to maximize these benefits. Additional research involving larger samples is necessary to confirm these findings.
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Understanding cerebral blood Flow dynamics for Alzheimer's Disease prevention through acute exercise (flADex). Protocol for a randomized controlled trial with crossover design

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INTRODUCTION. Dementia is one of the leading causes of disability worldwide. Underlying biological mechanisms are crucial in preclinical stages of Alzheimer's disease (AD). Alterations in cerebral blood flow (CBF) and their relationship with AD blood-based biomarkers may be fundamental at early stages of the pathology. Notably, physical exercise is one of the most promising non-pharmacological interventions to delay the onset of dementia and slow down the progression of cognitive decline. Therefore, flADex aims to examine the acute effects of different types of exercise on CBF, AD blood-based

biomarkers, and its cognitive implications in cognitively normal older adults. This protocol provides the description and rationale of the flADex trial.
METHODS. FlADex is a counterbalanced crossover trial that will include 20 adults aged 68 to 83 with negative brain amyloid status (<12 centiloid) and APOE e4 noncarriers. Each participant will be included in all study conditions in a randomized order: (i) moderate aerobic exercise (between 40-60% of Heart Rate of Reserve); (ii); resistance exercise and (iii) resting condition. Each condition, lasting 30 minutes, will be performed once. CBF will be assessed by magnetic resonance imaging using pseudo-continuous arterial spin labeling at pre- and at 3 consecutive times post-condition (at 10, 16,22). AD blood-based biomarkers (Aβ42, Aβ40, p-tau217, p-tau181, GFAP, NfL) will be measured pre-condition and post-condition (at 0, 40, 60 min), via the SIMOA platform (Quanterix, Billerica, MA) Cognitive outcomes (flanker test and picture sequence memory test) and mood status (POMS questionnaire) will be measured pre and post condition.
CONCLUSIONS. FlADex trial will shed light on the acute effects of different types of exercises on CBF and AD blood-based biomarkers before the beta-amyloid accumulation. We expect that aerobic and resistance exercise will have different effects on CBF dynamics and AD blood biomarker levels over time in cognitively normal older adults.

Scoping review of the impact and perceptions of standing desk interventions on mental health, cognition, and academic outcomes in university students

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Background: The use of standing desks (SD) may reduce sedentary behaviours and in turn, improve other mental health and academic outcomes, such as cognition, attention, and academic achievement. However, in university students' evidence is sparse.
Objectives: The aim of this scoping review was to identify and map the evidence of the effects and perceptions of SD interventions on mental health, cognition, and academic outcomes, in university students.
Methods: A scoping review following JBI and PRISMA guidance was performed. A systematic search of qualitative and quantitative studies in electronic databases (PubMed, Web of Science, Scopus, PsycINFO, PubPsych) from the inception to December 2023 was conducted.
Results: Eleven studies were selected. From them, three studies explored psychological health, reductions in stress, anxiety and improvements on mood were reported. Ten studies explored academic and classroom outcomes, most of them reported higher attention, alert, fucus, engagement and less fatigue, restless, and boredom. Only two studies measured cognition, neither found statistically significant differences between sitting and standing conditions. Additionally, most of students reported that students that SD may improve their academic performance and attention in the classroom.
Conclusions: This study suggest that SD may improve various cognitive processes during the classroom, such as attention, focus, and engagement. However, more long-term studies with validated measures of cognition are needed to confirm these results.

Associations of physical activity with Alzheimer's disease-related mortality in US adults with memory problems.

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AIMS. The aim of this study was to study the association between physical activity and Alzheimer's disease (AD)-related mortality in US adults from 1998 to 2018 with limitations due to remembering difficulties (LRD).
METHODS. We used pooled data from the 1998 to 2018 US National Health Interview Survey (NHIS). Light-moderate (MPA) and vigorous physical activity (VPA) were self-reported. Participants also reported whether they felt limited in doing activities that are normal for most people their age due to difficulty remembering or experiencing periods of confusion. Hazard Ratios (HR) and 95% confidence intervals (CI) were calculated by Cox proportional regression models to compare AD-related mortality risk according to PA level, in people with LRD.
RESULTS. From a total of 598,885 participants, 23,778 (3.97%) reported LRD. Limited adults had a higher AD-related mortality risk than those without LRD (HR: 3.77, 95% CI 3.27-4.35). Among adults with LRD, performing 75 to 150 minutes/week of VPA was related to a lower AD-related mortality risk (HR: 0.27, 95% CI, 0.09-0.76) compared to those who did not do any VPA. Values were 0.87 (95% CI, 0.38-1.99) and 1.03 (95% CI, 0.61-1.75) for those who performed <75 minutes and >150 minutes of VPA, respectively. No significant differences in mortality risk were found for MPA and MVPA levels.
CONCLUSION. Among adults with LRD, those doing 75 to 150 min/week of VPA had a lower AD-related mortality risk than those who do not perform any VPA.

The effects of a real-life cognitively enriched walking program for healthy older adults on cognitive functioning and physical activity

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Research has shown the cognitive benefits of combining cognitive activity (CA) with physical activity (PA), but these findings have predominantly been observed in controlled settings. Bridging the gap between research and real-life, we developed a cognitively enriched walking program for older adults and evaluated the effects on cognitive functioning (CF) and moderate-to-vigorous PA (MVPA) in a randomized controlled trial.
A total of 148 cognitively healthy adults aged 65+ years were randomly assigned to a: 1) cognitively enriched walking program (WALK+, n = 52); 2) walking program (WALK-only, n = 49); or 3)passive control condition (CONT, n = 47). Both walking programs lasted six months, with twice-weekly supervised 60-minute group-based walking sessions. CF (short-term memory (STM), long-term memory, executive functioning and processing speed) was assessed at baseline (T0), 3 months (T1), 6 months (T2) and 12 months (T3) using the Cambridge Neuropsychological Test Automated Battery (CANTAB). MVPA was assessed at all time points using Actigraph GT3X+ accelerometers.
At baseline, participants had a mean age of 69.9 (4.2) years. For STM, a significant difference in change between T2 and T3 was found between WALK+ and WALK-only. Although not significant, WALK+ showed an increase in STM, while WALK-only showed a slight decrease. Regarding MVPA, differences in change were observed between T0 and T1, T2, and T3, when comparing WALK+ and WALK-only. Additionally, a difference in change between T0 and T2 was found between WALK+ and CONT. WALK+ significantly decreased in minutes MVPA/day from T0 to T3 (Δ = -13.38 min), while WALK-only significantly increased from T0 to T2 (Δ = +12.22 min), and CONT significantly increased from T1 to T2 (Δ = +15.79 min).
In summary, the real-life cognitively enriched walking program did not yield benefits for CF or MVPA in the participating sample of older adults aged 65+ years.

Protocol of the MOVI-ageing randomized controlled trial

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Objective: To describe the protocol of the MOVI-ageing randomized controlled trial, a home-based eHealth intervention of cognitive-demanding exercise for older adults, in improving global cognitive function and basic cognitive functions, cardiorespiratory fitness, and muscle fitness.
Methods: This randomized controlled trial will include participants identified in the social centers of Cuenca and Talavera de la Reina who agree to participate and provide informed consent. Adults aged 60–80 years of both genders retired regardless of the reason for retirement, who do not meet frailty criteria according to Fried criteria, and without cognitive impairment will be invited to participate. This study will be developed in two phases: (i) a 12-week randomized efficacy/ feasibility trial and (ii) a large-scale implementation randomized trial phase with a 12-week follow-up following similar procedures. In addition, a qualitative study on barriers to and facilitators of the implementation of the physical exercise intervention using eHealth for older people will be conducted. Participants will have access to a platform including videos of cognitively demanding physical exercise. The participants will be remotely and off-line guided through the physical exercise intervention, and the research team will be able to check the degree of compliance with the program and its correct execution. The participants will receive feedback on their compliance with the routines and reinforcement messages.
Implications: The implementations of the findings and their inclusion in guidelines may directly impact in older people's life, and relatives, through the prevention of morbidity and the reduction of years lost to disability. These benefits may be reflected in the reduction of economic expenditure by reducing the demand for social and health care services.
Ethics: The Clinical Research Ethics Committee of the 'Virgen de la Luz' Hospital in Cuenca approved the study protocol (registration number: 2022/PI3222). In addition, this protocol was previously registered in Clinicaltrials.gov (Number: NCT05928078).

Using Event-Related Potentials to Study the Effects of Cardiorespiratory Fitness on Cognitive Control in Younger and Older Adults

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Understanding the factors shaping cognitive aging is crucial for maintaining the independence and well-being of older adults (OA). There is a growing focus on how cardiorespiratory fitness (CRF) contributes to a resilient cognitive trajectory, countering age-related declines. This study investigated the influence of CRF on cognitive control and its associated neural activity (P3 and N2 components) in OA and younger adults (YA). Forty-seven OA (65.96% female; Mage = 70.57, SD = 7.40) and 67 YA (62.69% female; Mage = 22.15, SD = 3.73) completed physical assessments and EEG recordings during a cognitive control task manipulating proactive interference (PI). Using Cluster analyses, the sample was divided into four subgroups according to age and CRF. Results revealed significant age effects on P3 and N2 amplitudes, indicating neural response differences between YA and OA regardless of CRF. However, OA with high CRF presented similar P3 amplitudes at frontal and parietal sites, an effect not observed in the other groups. Besides that, OA with high CRF showed reaction times for incorrect responses comparable to YA with high CRF and shorter than those of OA with low CRF. Interestingly, accuracy did not differ between older groups. These results underscored age-related cognitive processing differences, particularly compromised cognitive control abilities in OA. Further, the results suggest a role for CRF in modulating neural responses in OA, potentially triggering (unsuccessful) compensatory brain mechanisms. In conclusion, the results of this study offer valuable insights into the interplay among CRF, cognitive performance, and neural correlates of cognitive control at different ages, highlighting the possible association of CRF to compensatory brain activity mechanisms in OA. Further, current results offer preliminary evidence informing the potential benefits of physical activity interventions to promote cognitive and brain health across the lifespan, especially at older age when the susceptibility to age-related declines is increased.

Physical Exercise on Women's Affective and Physical HeAlth. The Exer-WAPA Project

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Morbidity rates for affective disorders like anxiety and depression are higher in women than in men globally, making them a significant public health concern and leading cause of disability for adult women. Research is needed to determine if physical exercise can effectively prevent and treat these disorders in adult women. Thus, the main aim of the Exer-WAPA project is to examine the effects of a supervised group-based exercise program on the affective health of middle-aged women with distress and mild-moderate symptoms of anxiety/depression in the short (16-weeks) and medium-term (12-months). A total of 136 middle-aged women will be randomly assignment to the experimental group (GEx), which will receive a 16-week group-based exercise intervention based on music-synchronized exercise training (3-time/week/60-min/session, intensity >70-85% RHR), or to the wait-list control group (GC) which will receive the usual primary care. Participants will be evaluated pre-intervention, post-intervention, and follow-up (12 months). The main variable of the study is emotional well-being assessed by PANAS (Positive and Negative Affective Scale). Furthermore, different variables grouped into four dimensions will be evaluated: 1) Mental Health, incorporating Mental health risk (GHQ-12), psychiatric assessment of anxiety (BAI) and depression (MADRS-S), Self-esteem (Rosenberg Scale), Cognitive State (Montreal Cognitive Assessment), and stress-related biomarkers (PCR and cortisol); 2) Physical Health: Physical fitness, metabolic blood panel, arterial tension, and body composition; 3) Lifestyle: Habits related to physical activity, commuting, sedentarism, nutrition, and sleep; 4) Socio-Economic impact: i.e., personal, work-related, and healthcare costs. It is believed that the 16-week exercise program of the Exer-WAPA project could reduce initial anxiety/depression symptoms. and improve physical health in middle-aged women with initial affective disorders compared to standard primary care treatment, potentially preventing the development of serious affective disorders in this population. The relationship between affective health in middle-aged women and the other evaluated dimensions will also be explored.

Examining the long-term relationship between objective physical activity patterns and sedentary behavior with subjective well-being in children and adolescents diagnosed with type 1 diabetes

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Aim: This study aimed to elucidate the association between different physical activity patterns (PA) with subjective well-being in children and adolescent with type 1 diabetes mellitus.
Methods: Eighty-three participants aged 6 to 18 years (45 % girls) with type 1 diabetes Mellitus from the Diactive-1 Cohort Study participated in this study. PA patterns including, light PA (LIPA), vigorous PA (VPA), moderate-to-vigorous PA (MVPA), total PA (TPA) and sedentary time (ST) was assessed with accelerometry. Questionnaires were used to evaluate cognitive (life satisfaction) and affective (positive emotions and negative emotions) aspects of subjective well-being (SWB). A mixed model analysis was employed in Rstudio to analyze the corresponding associations, considering the random effect of participants and the time intervals between the three years of measurement. Additionally, all analyses were adjusted for peak height velocity, disease duration, and percentage of glycosylated hemoglobin.
Results: The analysis indicates that MVPA levels are not associated with higher levels of SWB ($p=0.128$); instead, higher levels of LIPA are linked to higher levels of SWB ($p=0.076$). However, when combining these two values, the results show that higher levels of TPA are associated with higher levels of SWB ($p=0.040$). Finally, ST is not associated with higher levels of SWB ($p=0.331$). On the other hand, ST was associated with better positive emotions ($p=0.048$), as well as LIPA ($p=0.006$) and TPA ($p=0.003$), respectively. Finally, LIPA was associated with better life satisfaction ($p=0.025$), as well as TPA ($p=0.028$).
Conclusion: This highlights the importance of incorporating various types of PA into the daily routine of these individuals, as not only vigorous exercise but also lower-intensity activities can significantly contribute to their emotional well-being, positive emotions and life satisfaction.

Could attendance to exercise interventions be related to changes in general cognition among patients with coronary artery disease? A preliminary analysis of the Heart-Brain trial

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Introduction. Patients with coronary artery disease (CAD) have higher risk of developing cognitive impairment. Increasing physical activity levels may attenuate this accelerated process. However, attendance rates for patients with CAD in exercise programs are often low. The objective of this study was to describe and examine the association between the attendance to Heart-Brain trial exercise program and changes in general cognitive performance in patients with CAD.
Methods

Forty-six adults with CAD aged 61.66±7.10 years old (15% women) were evaluated. The study involves two different supervised 12-week exercise interventions: one based on high intensity interval training (HIIT) and the other based on HIIT plus resistance exercise. Percentage of attendance was defined as the number of sessions attended by the participants divided by the actual number of sessions offered. General cognition was assessed by the MOCA (Montreal Cognitive Assessment) test (Post results – Pre results). Linear regression models were performed to test the associations of attendance with changes on the MOCA test adjusting by baseline-MOCA, sex, age and education.

Results. This study had a high attendance rate, with 85% (n=39) of the participants attending greater than 80% of the sessions (mean of attendance=87.50±14.80). No significant associations between percentage of attendance and MOCA changes (β= -0.08; p>0.05) were found. Similar results were obtained after adjustment for covariates (β= -0.03; p>0.05).

Conclusion. Our results show that attendance to the exercise program was not related to changes in general cognition. The low variability in the exposure (i.e. mostly high attendance levels) within the sample and a ceiling effect (a sizable percentage of the sample attending all sessions) might have impacted the findings. Future studies with larger variation in attendance, should be conducted to further evaluate this question.

Do muscle strength and cardiorespiratory fitness correlate with greater subjective well-being among children and adolescents with type 1 diabetes mellitus? A 3-year longitudinal analysis of the Diactive-1 Cohort Study.

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Aim: To evaluate the longitudinal relationship between muscle strength, peak oxygen consumption (VO2peak), and variables associated with subjective well-being in children and adolescents diagnosed with type 1 diabetes.
Methods: Eighty-three children and adolescents (aged 6 to 18 years; 45% girls) with type 1 diabetes from the Diactive-1 Cohort Study were involved in this study. Physical fitness was assessed using spirometry on a cycloergometer (i.e., VO2peak) and dynamometry (i.e., handgrip strength). Cognitive (Life Satisfaction) and affective (positive emotions and negative emotions), components of subjective well-being score (SWB), was assessed by questionnaires. We also calculated global fitness and SWB scores based on the parameters. Mixed model analyses were run in RStudio to analyse the respective associations considering the random effects of the participants, and the time elapsed between the three years of measurement. In addition, all analyses were adjusted for the peak height velocity, disease duration and percentage of glycosylated haemoglobin.
Results: Regardless of the passage of time, overall fitness level showed significant associations with both positive (B = 0.042, 95% CI 0.098 to 0.754) and negative emotions (B = 0.042, 95% CI 0.098 to 0.754), as well as with global SWB (B = 1.203, 95% CI 0.053 to 2.366). In addition, VO2peak showed associations with life satisfaction (B = 0.183, 95% CI 0.033 to 0.333), positive emotions (B = 0.064, 95% CI 0.001 to 0.129) and negative emotions (B = 0.064, 95% CI 0.001 to 0.129). However, this relationship was no longer significant when global SWB was considered. Similarly, handgrip strength did not show a significant association with any of the SWB variables.
Conclusion/Interpretation: These findings underscore the significance of incorporating regular physical activity into the management of type 1 diabetes in youth. Doing so can enhance muscle strength, VO2peak, and consequently, subjective well-being.

The association between cardiorespiratory fitness and general cognition in patients with coronary artery disease: a cross-sectional study from the Heart-Brain trial

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OBJECTIVES: To explore the association between cardiorespiratory fitness and general cognition in patients with coronary artery disease.
METHODS: Physically inactive patients, 50-75 years old, with coronary artery disease and no psychiatric or neurological

disorders, were included in this cross-sectional study of the Heart-Brain trial (NCT06214624). All participants performed an incremental treadmill cardiopulmonary exercise test to volitional exhaustion, with registration of (i) time to exhaustion (TTE, sec), (ii) peak oxygen uptake (VO2peak, mL/kg/min), and (iii) ventilatory threshold (VT, mL/kg/min). General cognitive function was evaluated with the Montreal Cognitive Assessment tool (MoCA, total score). Associations between cardiorespiratory fitness and cognition were evaluated with linear regression analysis (standardized β coefficient), adjusting for age, sex, education, and BMI (TTE only).

RESULTS: In total, 105 participants were included (22% female; 61.9±6.7 years old; body mass index 29.1±3.9 kg/m2; 40% higher education). VO2peak was 25.9±5.1 mL/kg/min (males 26.8±4.9 and females 22.6±4.4 mL/kg/min, p<0.001), and median MoCA score was 25 (interquartile range 23-27, no difference between sexes [p=0.27]). VO2peak was positively associated with MoCA score (β=0.26, p=0.011), with attenuation after adjustment for covariates (βadj=0.15, p=0.12). No significant association was found between TTE or VT and MoCA score (both p>0.05). There was an interaction effect of sex and VO2peak and TTE on MoCA score (both p<0.05). In females, both VO2peak and TTE were positively associated with MoCA score (βadj=0.49, p=0.009, and βadj=0.47, p=0.016, respectively), while VT was not (p>0.05). In males, there were no significant associations between neither VO2peak, TTE, or VT and MoCA score (all p>0.05).

CONCLUSION: Peak exercise capacity was positively associated with general cognition in patients with coronary artery disease, especially females. Interventional studies are needed to investigate the effects of exercise on fitness and cognition in this population, and whether there is a sex interaction in the response to exercise.

Effects of a Motor and Cognitive Training Program on Executive Function and Different Biomarkers Related to Muscle-brain Crosstalk in Breast Cancer Survivors: 3-Arm Randomized Controlled BRAINonFIT study protocol.

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Physical exercise (PE) has emerged as a promising strategy for cancer-related cognitive impairment (CRCI); however, the insights relative to its efficacy are still unknown. CRCI is a significant but often neglected issue for breast cancer survivors, affecting both cognitive functions as well as psychosocial aspects. We have developed a new EP strategy to gain a good understanding of this impact through a randomised, controlled, longitudinal (20 weeks) three-arm parallel study with a 12-week follow-up phase. In this study, we will investigate how a motor-cognitive program (high-intensity aerobic and resistance with cognitive stimulation; dual-tasks) can improve executive functions and emotional symptomatology; providing a deep understanding of biomarkers related to muscle-brain crosstalk (new insight into endocrine functions of myokines released by muscle activation). Our approach will consider many limitations observed in this field of knowledge. Initially, the main benefits of PE on CRCI have been shown by self-reported questionnaires. However, perceived cognition coexists with psychosocial symptomatology, factors that PE can improve. Hence, a key question arises: Does PE directly enhance cognitive domains, or does it indirectly enhance cognitive domains by influencing these symptoms? Secondly, the lack of consistency in objective assessments raises interesting questions: Did previous studies use specific neurocognitive tests, or did previous studies carry out training characteristics that didn't obtain expected results? Our results not only will help to consider the practice of PE as an effective therapy in the recovery of women with breast cancer but could also provide a deep explanation of the role of muscle markers in the cognitive function of these and other women and men.

Can attendance to exercise interventions predict changes in depression and anxiety in patients with coronary artery disease? A preliminary work of the Heart-Brain trial

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Introduction. More than 200 million people live with coronary artery disease (CAD) worldwide. The prevalence of depression and anxiety in CAD patients is 4 times higher (20%) than in the general population (5%). In this context, exercise is a potential tool to improve mental health. Nevertheless, participation in exercise programs remains low in these patients. Therefore, this work aims to analyze attendance at the exercise interventions of the Heart-Brain randomized control trial and its association with changes in depressive and anxiety symptoms in CAD patients.
Methods. Fifty-two CAD patients (15% women) aged between 50 and 75 years have been evaluated. Participants completed a 12-week exercise intervention with 3 sessions per week, either high-intensity interval training (HIIT) or HIIT plus resistance training. Attendance is defined as the percentage of sessions attended by the participants divided by the actual number of sessions offered. Depressive and anxiety symptoms were assessed at pre and post-condition using the 14-item questionnaire Hospital Anxiety and Depression Scale (HADS). High scores indicate a higher level of anxiety or depression. Linear regressions, adjusted for baseline scores in HADS, sex, age and education level, were calculated to show the associations between attendance and changes in depression and anxiety.
Results. Descriptive characteristics of the study sample were (mean±SD): changes in depression symptoms, -0.29±3.77 pts and changes in anxiety symptoms, -0.37±2.86 pts. A total of 82.7% of the participants attended ≥80% of the sessions offered. No significant associations between attendance and changes in depression (β= 0.054, p=.629) nor anxiety symptoms (β=

-0.169, p=.215) were found.
Conclusion. Any significant association of attendance rate to the Heart-Brain exercise program with changes in depression or anxiety symptoms in CAD patients was found. Intervention studies with larger variability in attendance, larger sample size or longer duration will provide new insights on this topic.

Perceived benefits of people with schizophrenia taking part in a combined exercise program: CORTEX-SP study

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Although recent studies on people diagnosed with schizophrenia (SZ) have demonstrated the benefits of exercise on quality of life, it is important to explore the actual experiences of this population by analyzing their subjective perceptions of participating in exercise programs. Therefore, this study aimed to investigate the perceived benefits of people diagnosed with SZ in a combined exercise program.

Participants diagnosed with SZ (n= 35, 41.6±10.3 years) from two locations (a psychiatric hospital and a mental health community support group) received a combined exercise program (i.e., aerobic interval plus resistance training within the same session) for a five-month duration, three times a week, at out-of-hospital facilities. Qualitative data was collected via individual, semi-structured interviews, organized, and analyzed with thematic analysis using NVivo software.

Participants perceived general improvements in their quality of life from taking part. On the one hand, regarding physical health, participants felt more agile as the exercise program progressed, with greater coordination and mobility. On the other hand, as for mental and social health, the exercise program helped them socialize more with people and take time away from their negative thoughts, indicating that they felt a reduction in disease symptoms, thereby improving their quality of life. However, failure to continue the exercise program after the end of the intervention led participants to report that some of the perceived improvements had since been lost, and anxiety levels increased.

In summary, the participants agreed that exercise was necessary to improve their quality of life by maintaining physical, mental, and social health.

Engagement of people diagnosed with treatment-resistant major depression in a supervised combined exercise program: TRACE-RMD study

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It has been shown that exercise programs could be an interesting non-pharmacological treatment in the prevention and treatment of mental disorders. Still, different factors hinder participation, resulting in low rates. The relationship between exercise and its role in mental health is widely documented in a quantitative way, which has led to its inclusion in treatment programs for people with treatment-resistant major depressive disorder (RMD). However, there is a lack of analysis from a qualitative perspective. Therefore, the study aimed to explore the engagement of people diagnosed with RMD in a supervised exercise program.

Fifteen participants diagnosed with RMD (18-75 years, 66.7% women) were enrolled in the Basque Country (Spain) Mental Health Network. It included hospital inpatients, people living in foster care, and people living in their own homes. Qualitative data was collected using semi-structured interviews; these were recorded and transcribed verbatim. A socio-ecological framework has been considered, a multidimensional approach that interrelates individual, social, and environmental factors that influence people's (non-) participation in exercise. The data was subsequently analyzed using thematic analysis. Three themes were identified from the analysis: 1) intrapersonal factors (pharmacotherapy and clinical factors of the RMD),2) interpersonal factors (family and friends, health professionals, exercise professionals, and relationships with people that participate), and 3) environmental factors (exercise program organization, location, and participants' perception regarding the program).

In conclusion, the RMD symptoms and pharmacological treatments for the illness were perceived to be the principal barriers to exercise participation. Participants gave great importance to interpersonal factors; they perceived the group atmosphere and the program environment as fundamental axes of the program. The presence of healthcare and exercise professionals and support from family and friends were also perceived to facilitate engagement in the exercise program.

Effects of combined exercise training in adults with treatment-resistant depression: a pilot study from the TRACE-RMD project

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People whose depressive disorder does not respond satisfactorily to adequate pharmacological treatment have harder-to-treat depression, generally referred to as treatment-resistant major depression (RMD). Unhealthy lifestyles, including physical inactivity and sedentarism, are often associated with this disease. Thus, combined exercise training (i.e., a combination of aerobic and resistance exercise in the same session) could be an efficient non-pharmacological treatment strategy for improving physical and mental health. Therefore, this study aimed to determine changes in cardiorespiratory fitness (CRF) and clinical symptom variables following 12 weeks of combined exercise training in adults with RMD.
All included participants (n=13, 69.2% women, 57.3±13.7 years old) were assessed pre- and post-intervention. For the CRF assessment, a peak, ramped, and symptom-limited cardiopulmonary exercise test on a cycle ergometer was performed to evaluate the peak oxygen uptake (V̇O2peak). The depression and gravity illness were assessed through the Montgomery Depression Rating Scale (MDRS) and Clinical Global Impression (CGI-G). The exercise program was carried out twice weekly, including individualized low-volume and low-intensity interval training (LV-LIIT) plus resistance training in every session.
Following the intervention, although not significant (P>0.05), a decrease (-0.09%) in body mass and an increase (7.4%) in V̇O2peak (mL·kg.1·min-1) were observed. However, in psychopathological variables, participants improved, showing lower values, MDRS (Δ=-27.21%, P=0.02) and CGI-G (Δ=-25.32%, P=0.01) scales.
In conclusion, the present study demonstrated that a supervised combined exercise program, including LV-LIIT + resistance training, in people with RMD induced positive and beneficial clinical changes. Exercise should be considered a co-adjuvant program in treating a population with RMD.

Nonpharmacological interventions over global cognition in older adults with dementia: a network meta-analysis

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Dementia is one of the diseases that has the greatest functional impact on affected people, bringing with it a potential risk to disability. Nonpharmacological interventions are used to reduce cognitive decline or the functional impairment associated with dementia. Although, non-consensus exists about their effect on cognition and what kind of treatment is better. We propose this network meta-analysis to compare the efficacy of nonpharmacological interventions over global cognition in dementia.

The network meta-analysis included pairwise and indirect comparisons of results in the assessments of global cognition for thirteen types of interventions: aerobic exercise, strength exercise, multicomponent physical exercise, other physical exercises, Tai Chi, other mind-body exercises, traditional cognitive rehabilitation, computed-based cognitive rehabilitation, occupational therapy, music therapy, physical-cognitive rehabilitation, reminiscence therapy and usual care. Moreover, we estimated the probability of each intervention of being the most effective for global cognition in older adults with dementia.

We included 48 studies with a total of 3770 patients. Indirect comparisons showing the highest effect size were physical-cognitive exercise (1.80; 95% CI: 0.06, 1.80) and computerized cognitive training (0.94; 95% CI: 0.06, 1.80) versus usual care groups. The probability of being the best treatment for global cognition was for physical-cognitive exercise, followed by computerized cognitive training and cognitive training.

Then, we found that physical-cognitive rehabilitation, means the rehabilitation that includes cognitive and physical exercise in the same intervention protocol both simultaneously or sequentially, was the most effective nonpharmacological intervention to improve global cognition in dementia. These results manifest the relevance of including a dual approach for the management of dementia considering the cognitive and physical rehabilitation as part of the same intervention. Both exercises have a synergically effect on the improvement of global cognition in older adults with dementia. Future studies are needed to define the most effective physical-cognitive interventions in the treatment of dementia.

Relationship between the Incremental Shuttle Walk Test and an incremental cycloergometer test in people with Severe Mental Illness.

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Introduction. People with Severe Mental Illness (SMI) have poor general health, but have poor cardiopulmonary fitness. Cardiorespiratory fitness is a good predictor of health and functioning. Mental health centres often have few resources available to assess cardiorespiratory fitness. The aim of this research is to present the Incremental Shuttle Walking Test (ISWT) as a reliable and affordable alternative to assess cardiorespiratory fitness in people with SMI.
Method. 63 people with SMI undertook the ISWT and the incremental cycloergometer test to find out the relationship between the two tests. Both tests were performed with sufficient rest in between. Personal data, heart rate, distance travelled or watts achieved and rate of perceived exertion (RPE) were recorded.
Results. There is a relationship between the ISWT and an incremental cycloergometer test, being possible through a formula, generated in this same research, to estimate the result of the cycloergometer test through the distance obtained in the ISWT.
Conclusions. The ISWT can be used as a substitute for an incremental cycloergometer test to assess cardiorespiratory fitness in people with SMI, being a simpler and more affordable test for health centres that do not have the resources to perform a stress test with a cycloergometer, in the ISWT only cones and a loudspeaker are needed.
It is necessary to investigate the relationship between the VO2 max values obtained in both tests to find out whether similar VO2 max values are actually obtained or whether they are related.

Effects of a non-linear physical exercise prescription on neurotoxicity prevention during chemotherapy for breast cancer

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Introduction: Neurotoxicity is a common side effect of breast cancer (BC) and its treatments, especially chemotherapy, and cancer-related cognitive impairment (CRCI), sleep disturbance and anxiety and depression are some of the most commonly neurotoxicity-related symptoms. Physical exercise (PE) has been suggested as one of the non-pharmacological interventions for managing this problem, however, focus is currently on prevention. As moderate-intense PE could pose a risk to these patients during treatments, we propose a non-linear PE prescription to adapt the intensity to the patients' recovery.
Aim: To test the effects of a non-linear PE program on attention, working memory, processing speed, sleep quality and psychological wellbeing during chemotherapy for BC.
Methods: A pre-post study was conducted in 23 women undergoing chemotherapy for BC. They completed a non-lineal prescription PE program based on daily measurement of heart rate variability and clinimetric measures through the ATOPE+ mobile app. Women were evaluated at diagnosis and after 3 months of chemotherapy beginning. Assessment included neuropsychological tests (Trail Making Test, and working memory and processing speed tasks of the WAIS-IV) and patient-reported outcome measures about sleep quality, anxiety and depression (Pittsburgh Sleep Quality Index and Hospital Anxiety and Depression Scale).
Results: Women had a mean age of 49.96+-10.94 years. There were no significant differences in pre-post analysis, however, changes in the anxiety results after the PE program reached the minimal clinically significant difference of 1.7 established for chronic diseases (MD: 1.93+-3.62; p=.068).
Discussion/Conclusion: Our results suggest that neurotoxicity-related symptoms such as CRCI, sleep disturbance, anxiety and depression could be prevented or, for anxiety, even improved, through a non-lineal prescription PE program during chemotherapy for BC. Follow-up assessments would also be needed to evaluate the long-term effects of the program on cognitive function.

Weight loss and lifestyle intervention for cardiorespiratory fitness in obstructive sleep apnea: The INTERAPNEA trial

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Introduction: Although recent trials have shown benefits of weight loss and lifestyle interventions on obstructive sleep apnea (OSA) severity and comorbidities, the effect of these interventions on cardiorespiratory fitness (CRF) remains unknown. This study aimed to investigate the effects of an interdisciplinary weight loss and lifestyle intervention on CRF and self-reported physical fitness in adults with OSA.
Methods: Eighty-nine men aged 18–65 years with moderate-to-severe OSA and a body mass index ≥25 kg/m2 were randomly assigned to a usual-care group or an 8-week interdisciplinary weight loss and lifestyle intervention. CRF was assessed through the 2-km walking test, and the International Fitness Scale (IFIS) was used to assess self-reported physical fitness.
Results: As compared with usual-care, the intervention group had greater improvements at intervention endpoint in objective CRF (6% reduction in 2-km walking test total time, mean between-group difference, −1.7 min; 95% confidence interval, −2.3 to −1.1), and self-reported overall physical fitness (18% increase in IFIS total score, mean between-group difference, 2.3; 95% CI 1.2 to 3.3). At 6 months after intervention, the intervention group also had greater improvements in both 2-km walking test total time (10% reduction) and IFIS total score (22% increase), with mean between-group differences of −2.5 (CI 95%, −3.1 to −1.8) and 3.0 (CI 95%, 1.8 to 4.1), respectively.
Conclusions: An 8-week interdisciplinary weight loss and lifestyle intervention resulted in significant and sustainable improvements in CRF and self-reported physical fitness in men with overweight/obesity and moderate-to-severe OSA.

What is known and what needs to be researched about chemotherapy-related cognitive impairment (CRCI) and physical exercise

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Chemotherapy-related cognitive impairment (CRCI) is a mild impairment of cognitive functions affecting cancer patients, because of both the disease itself and chemotherapy and radiotherapy. There is evidence that physical exercise can have a positive impact on these patients. However, the studies are heterogeneous and scarce, so it's necessary to evaluate the current published information.

The aim of this work is to present results of a preliminary narrative review of the evidence documented in the literature on the effects of physical exercise on CRCI. A review of the bibliography in the Pubmed search engine has been carried out, through the following keywords: "CRCI", "physical exercise and chemobrain", "physical activity and CRCI".

50 valuable articles were identified, of which 23 were narrative reviews, 11 systematic reviews and 16 clinical studies. They showed research is heterogeneous in terms of the type of cognitive measurement, type of exercise and duration of the exercise program, although studies of aerobic exercise for 20-40 minutes in 12-week programs predominate.

Physical exercise seems to be an effective tool to combat CRCI, with the most studied modalities being aerobic, resistance, coordination, and body/mind exercises. Physical exercise can improve several impaired cognitive domains, especially executive functions, by inducing neurogenesis, increasing hippocampal volume, or improving hippocampus-dependent cognitive function. The hypotheses indicate that it may improve the production of brain-derived neurotrophic factor, increase cerebral oxygenation through blood flow, and decrease the action of pro-inflammatory cytokines. The multi-component exercise programs are recommended, lasting 12 weeks and with a moderate/vigorous progressive intensity.

As an emerging line of research, case-control studies with larger and homogeneous samples are recommended, allowing differentiation of criteria based on the type of cancer and the phase of the disease. More homogeneity is needed in the types of cognitive tests performed and on the effects of various types of physical exercise.

Short-term exercise effects on cardiovascular health, muscle function and cognition in patients with severe mental illness: A randomized controlled trial.

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People with mental illness often have worse physical and cognitive health, increasing risk of premature mortality. Physical exercise improving physical and cognitive function. Objective: To investigate the effects of a physical exercise intervention on cardiovascular health, muscle performance and cognition in adults with severe mental illness. Methods: Patients admitted to the Mental Health Rehabilitation Center (Navarre) were randomly divided into the intervention group (IG) or the control group (CG). The CG received standard medical care, with cognitive-behavioral therapy. The IG, participated in a 6-week, 2 sessions/week multicomponent physical exercise program. The percentage of body fat and body mass index (BMI), muscle performance with maximal strength (1RM), and power for leg-press and knee extension exercises were measured. The SCIP and PANSS scales were used to assess changes in cognition and symptomatology. Results: 41 patients were included in the study, 21 in IG and 20 in CG. Participants were predominantly male (63.41%) with a mean age of 42.5 (11) years. The diagnosis of the study population was psychotic disorders (76.1%), with no significant differences between groups in terms of clinical-cognitive symptomatology. In IG, significant improvements were observed in muscle power output during leg press exercises (Δ 101.3w vs 0.90w; p=0.004) and knee extension exercises (Δ 106.41W vs. -6.47W; p<0.001). Additionally, IG demonstrated greater improvements in muscle strength, increasing weight lifted during the 1RM leg press (Δ 47.78kg vs. 1.29kg; p<0.002) and knee extension exercises (Δ 16.17kg vs. –1.88kg; p<0.001). These improvements were not observed in CG. Furthermore, the IG experienced a significant reduction in body fat compared to the CG (Δ -0.66% vs. 0.78%; p<0.004). No significant BMI differences were found between the groups. Conclusion: Short-term exercise program appears to be effective in improving muscle function and body composition in those patients. The study didn´t reveal additional benefits for cognition and symptomatology.

"Who are the attenders? An analysis on determinants of high attendance in an exercise-based randomized controlled trial in coronary heart disease patients"

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INTRODUCTION: Coronary artery disease (CAD) stands as a leading cause of morbidity and mortality worldwide. Exercise programs play a significant role in managing CAD, offering supervised exercise, guidance and support to enhance quality of life and reduce cardiovascular risk. However, low participation in cardiac rehabilitation programs including exercise training persists. The aim of this research is to identify key characteristics associated with high/low attendance to training sessions in the Heart-Brain program.
METHODS: A total of 67 participants with coronary heart disease aged between 50 and 75 years were assessed for this study. Participants completed a 12-week training program attending 3 training sessions per week lasting 45 minutes each. One group underwent high-intensity interval training (HIIT) while the other group received the HIIT modificated and resistance training. The control group was excluded from these analyses.
To calculate the attendance percentage of each participant, the number of sessions attended during the program was divided by the number of sessions offered, and multiply by 100. A correlation model was used in R software.
RESULTS: The correlation analysis indicated that the majority of relationships between high attendance at the training program and sociodemographic and anthropometric variables were not statistically significant. We observed weak correlations between attendance and BMI ($r=0.154$, $p=0.213$), body fat percentage ($r=0.171$, $p=0.167$), and depression ($r=0.092$, $p=0.460$). Correlations with age, years of education, anxiety and gender proved to be non-significant ($p>0.6$).
CONCLUSIONS: In summary, this study did not find conclusive evidence of a significant relationship between attendance percentage and the sociodemographic and anthropometric variables considered. Further research is needed to better understand the factors influencing participation in clinical studies.

Effects of Multicomponent Training on the Health and Quality of Life of People with Severe Mental Disorders. PowerONyou and The PsychiActive Project.

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Severe mental disorders, such as schizophrenia, depression, and bipolar disorder, are among the leading causes of death and disability worldwide. People with SMDs live an average of 20 years less compared to the estimated life expectancy for those without these illnesses.

The main reason for this is their reduced health-related quality of life, including poor physical condition. In response to the needs of this population to improve their physical condition, innovative methods such as implementing exercise programs have emerged in recent years.

The aim of this study is to analyse the effects of a multicomponent training programme on various health variables, physical condition, body composition, lifestyle, and psychological symptoms.

Over 12 weeks, two sessions of 45-50 minutes each were conducted weekly. The training structure was divided into three blocks: aerobic exercise, strength training, and inspiratory muscle training. The aim was to directly train those deteriorated health variables through specific exercises.

The results of the programme are currently being analysed but show promise in proposing new strategies for the comprehensive care of this much-needed population.

The population with SMDs needs to improve their health and quality of life, and physical exercise appears to emerge as a solution to deteriorated health variables and a complement to other treatments for this condition. Evaluating this population is vital to identify their health weaknesses and provide targeted, quality solutions, focusing on the target.

Redefining stroke rehabilitation: the RESET study protocol for evaluating the efficacy of a gamified, fully immersive, and stroke-specific virtual reality software on disability and quality of life.

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Stroke, the primary cause of disability and the second leading cause of death worldwide, implies significant burdens on survivors which frequently results in a diminished quality of life (QoL). The increasing prevalence of stroke emphasizes the need to redefine stroke rehabilitation strategies. Virtual reality (VR) has emerged as a promising tool for enhancing post-stroke prognosis. A VR software integrating gamification, full immersion and stroke-specificity features could

substantially improve disability and QoL, despite lacking prior development and testing. The RESET randomised controlled trial will assess the effects of an early 10-week intervention using gamified, fully immersive, and stroke-specific VR intervention (i.e., starting at week 3 post-stroke) on disability and QoL in stroke patients. Ninety-four individuals aged ≥18 years with either ischemic or haemorrhagic stroke will be randomised, following medical screening, into one of the following three groups: (i) usual care (UC), (ii) commercial VR (CVR), or (iii) gamified, fully immersive, and stroke-specific VR (RESET). All groups will receive UC, consisting of three 90-minute sessions/week of standard rehabilitation. Additionally, the VR groups will perform three 30-minute VR sessions per week. The CVR group will use the Nintendo Switch gaming system, featuring sport package games. The RESET group will engage in activities set in diverse environments using the META QUEST 3 glasses, which incorporate a personalised feedback system and individual progression (NeuroRehab, Dynamics VR Rehab, Sevilla, España). Outcomes assessments will be conducted at baseline (week 2 post-stroke), week 13 (approximately 90 days posts-event) and week 26 (approximately 6 months post-event). The primary outcome is disability, evaluated using the Barthel Index. Secondary outcomes include QoL, upper- and lower-extremity motor function, gross manual dexterity, handgrip strength, and cognitive function. Implementation of a comprehensive, individualised, and motivational stroke rehabilitation software could enhance patient adherence and potential for autonomous progress.

The glial fibrillary acidic protein exhibits differential changes based on amyloid status following 24 weeks of resistance exercise in cognitively normal older adults: Preliminary findings from the AGUEDA randomized controlled trial

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Background: Physical exercise has the potential to modify cognitive trajectories but the biological mechanisms remain unclear. studies investigating the effect of exercise on novel neuroinflammation and neurodegeneration blood biomarkers, such as glial fibrillary acidic protein (GFAP) and Neurofilament light chain (NfL) are scarce. We aimed to 1) explore the impact of a 24-week resistance exercise program on GFAP and NfL in cognitively normal older adults and 2) examine the interaction effects of baseline characteristics.
Methods: Ninety cognitively normal older adults (age 71.7±3.9, 57.8% females) were randomly assigned to either a 24-week resistance exercise program (3 times/week) (n = 46) or a control group (n = 44) as part of the AGUEDA trial (NCT05186090). Participants underwent amyloid-PET scans and blood-drawn at baseline and after the 24-week follow-up. GFAP and NfL were determined with the ultrasensitive Single molecule array (Simoa) method. Standardized change-from-baseline differences between groups were analyzed using baseline constrained linear mixed model with an intention-to-treat approach. NfL was log-transformed due to skewed distribution. Interactions by sex, education, APOEe4 genotype and amyloid (Aβ+ Vs Aβ-) status were estimated.
Results: After 24 weeks, there were no differences between groups for GFAP (0.12±0.13 standard error (SE), p=0.35) or NfL (0.12±0.18 SE, p=0.52). Baseline amyloid status had a significant interaction on GFAP changes (p=0.002), whereas no further interactions were found. Subgroup analyses showed significant differences in GFAP changes for Aβ+ (n=19) individuals (0.68±0.21 SE, p=0.01), but not for Aβ- individuals (-0.09±0.14, p=0.52).

Conclusions: In general, the 24-week resistance exercise program did not exert an impact on blood biomarkers of neuroinflammation and neurodegeneration. However, changes in GFAP were evident among participants with Aβ+. Further exploration into the cognitive implications of these novel biomarkers post-exercise interventions represents a key area for future research.

Inhibitory Control as a Moderator of Perceived Anxiety and Performance in a Basketball Multi-Task.

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Background: In sports, understanding and managing anxiety is crucial to optimising cognitive and motor performance. Executive functions, or cognitive control, play an essential role in emotional self-regulation. This study investigates whether athletes with superior cognitive control can better manage anxiety and improve their performance. Our hypothesis suggests that elevated levels of anxiety may impair cognitive and motor performance, but effective inhibitory control may attenuate these effects.
Methods: This study involved 39 federated basketball players, 26 males and 13 females, with an average age of 14.87 years (±1.32), height of 173.53 cm (±10.66), weight of 59.55 kg (±8.78), and 7.51 years of sporting experience (±1.96). An intrasubject repeated measures design was used to assess the impact of manipulating experienced anxiety on cognitive (inhibitory control) and motor (number of throws converted) performance in three different sessions. For this purpose, basketball-throwing multitasking varied in the executive demands required and the consequences of hits and misses.
Results: Regression analysis showed that the higher the anxiety, the worse the results in the percentage of converted shots ($p = 0.018$) and the last block of shots ($p = 0.05$). However, mixed effects analysis showed that individuals with better inhibitory control have superior sporting performance compared to those with less effective inhibitory control ($p = 0.01$). This suggests that, with similar levels of anxiety, individuals with better inhibitory control can maintain higher performance under these conditions.
Conclusions: The study findings reveal that increased anxiety, induced by multitasking conditions in basketball, correlates with decreased shooting accuracy, highlighting the importance of inhibitory control as a moderator of outcomes. These findings are essential for coaches and sports educators, who can use this information to design interventions to improve anxiety management and optimise athlete performance.

Effects of Exercise with or without Motivational Strategies on Anxiety Levels in Older Adults: Preliminary Results from the PRO-Training Project

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INTRODUCTION: Anxiety disorders are one of the most common mental health conditions. Growing evidence suggests that exercise training can improve anxiety, but the effects of including motivational strategies within training programs remains uncertain. We aimed to determine the effects of a supervised exercise program, with or without motivational strategies, on anxiety levels in older adults.
METHODS: This study was part of the PRO-Training project (NCT05619250). 72 subjects (mean age 69 ± 4.2 years; 47 women) were randomly assigned into 3 groups: supervised training without motivational strategies (SUP), supervised training plus motivational strategies (SUP+) and control group (CON). Motivational strategies included among others were telephone calls, infographics, workshops and motivational messages. SUP and SUP+ participated on a 24-week supervised exercise program three times per week. Anxiety levels were determined using the Zung Anxiety Self-Assessment Scale (1) at baseline, after the intervention, and 6 months later (follow-up). Statistical tests were reported as means ± SD change from baseline to post-intervention and to follow-up. A one-way analysis of variance (ANOVA) and Bonferroni post-hoc tests were conducted.
RESULTS: No significant between-group differences were found when comparing changes in anxiety levels from baseline to post-intervention ($p=0.230$). However, a significantly lower increase in anxiety levels from baseline to the end of the follow-up was observed in SUP compared to CON (-0.83 ± 9.44 vs 6.90 ±7.65, respectively ($p=0.004$, Cohen's $d=0.9$); with no significant differences between SUP+ and CON ($p=0.180$) or between SUP+ and SUP ($p=0.217$).
CONCLUSION: Supervised exercise might exert long-term benefits on anxiety levels. However, the inclusion of motivational strategies does not appear to maximize these effects. Further research is required to establish the benefit of these type of interventions.
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Effects of a 24-week resistance exercise program on memory in cognitively normal older adults: preliminary results of the AGUEDA Randomized Control Trial.

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Background: Aerobic exercise benefits memory in older adults, but research on resistance exercise (RE) effects in memory sub-domains is limited. This study aimed to investigate RE's impact on memory performance in cognitively normal older adults.
Method: Ninety cognitively normal older adults (72±4 years, 58% female) participated in the AGUEDA Trial (NCT05186090), randomly assigned to either a 24-week (3 sessions/week) RE group (n=46) or a control group (CG, n=44). Memory tasks, including the Rey Auditory Verbal Learning Test (RAVLT) for verbal episodic memory (Immediate memory), and the Rey-Osterrieth Complex Figure (ROF) for visuospatial episodic memory (Immediate and 3-minute delay recall), were administered at baseline and after the 24-week intervention. Changes in memory between groups were analyzed using a constrained longitudinal mixed model on an intention-to-treat and per-protocol (Attendance rate ≥80%) basis. Higher scores on RAVLT and ROF variables indicated better performance.
Results: In intention-to-treat analyses the RE group, RAVLT showed a z-score change of 0.54 (95% CI: 0.23;0.84), whereas the CG showed a z-score change of 0.32 (95% CI: -0.01;0.64) with no significant differences in the change over time between the groups (p = 0.27) Regarding the ROF test, the RE group immediate recall z-scores were 0.27 (95% CI: 0.01;0.54), compared to 0.55 (95% CI: 0.27;0.82) in the CG, resulting in a non-significant difference between groups after intervention (p = 0.09). For delayed recall, the RE group exhibited a z-score change of 0.20 (95% CI: -0.07;0.47), while the CG showed a change of 0.34 (95% CI: 0.05;0.63), resulting in a non-significant difference of change (p = 0.43). Per-protocol analyses yielded consistent results.
Conclusion: The 24-week resistance exercise program had no effects on verbal or visuospatial episodic memory, in cognitively normal older adults. Further research is needed to explore how RE interventions and exercise parameters could be improved to impact memory.

The influence of motor competence on academic achievement: the mediating role of fitness and cognition in boys and girls

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Introduction. The established link between motor competence and academic achievement in schoolchildren lacks a clear understanding of the underlying mechanisms. While it is recognized that executive functions and fitness may play a mediating role, their relative influence, especially concerning sex differences, remains unexplored. Hence, this study aims to investigate how fitness and executive function mediate the relationship between motor competence and academic achievement, with a specific focus on sex disparities.
Methods. A cross-sectional study was conducted involving 562 schoolchildren aged 9-11 years (293 girls) from Cuenca, Spain. Various assessments were conducted, including sociodemographic factors, anthropometric measurements, gross motor competence (using the MABC-2 battery), executive function (using the NIH Toolbox cognition battery), fitness variables (using the ALPHA-fitness battery), and academic achievement (grades in language and mathematics). Mediation models were developed to explore the mediating role of different fitness components (cardiorespiratory fitness, speed/agility, upper body strength, and lower body strength) and executive function in the relationship between gross motor competence and academic achievement, considering sex differences.
Results. Both executive function and fitness components were found to mediate the relationship between gross motor competence and academic achievement. However, notable differences were observed based on sex. Specifically, executive function was identified as the sole mediator in boys, whereas fitness variables, particularly cardiorespiratory fitness and speed/agility, emerged as the primary mediators in girls.
Conclusions. The findings suggest that interventions aimed at enhancing motor competence could potentially improve academic achievement, with executive function and fitness playing significant mediating roles. Furthermore, the study emphasizes the importance of adopting sex-sensitive approaches in educational and developmental interventions. Tailoring physical activity programs to address gender differences is crucial, with boys benefiting from cognitively demanding activities like structured games, while girls may gain more from activities focusing on improving physical fitness.

Mental Load and Physical Training: Enhancing Prefrontal Cortex Structures in University Students

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Introduction: Physical activity (PA) is known to benefit both physical and brain health. While previous studies have focused on the brain volume of subcortical regions, there is growing interest in the effects of PA on specific cortical regions, such as the prefrontal cortex (PFC), which is vital for executive tasks. This study analyze four PFC regions of interest (ROIs): the dorsolateral (DLPFC), ventrolateral (VLPFC), medial (MPFC), and orbitofrontal (OFC) cortices. Notably, PA with cognitive engagement, such as dynamic team sports that require attention and decision-making in uncertain environments, may particularly influence these areas due to the additional mental load involved.
Methods: Eighty-one university students with low PA habits were recruited, and 50 completed a 4-month training program. They were divided into three groups: a basketball group (BAS), a concurrent training group combining aerobic and resistance exercises (AER+R), and a control group (CON) with low PA levels.
Results and discussion: Both PA groups showed significant increases in all ROIs except the OFC. Between-group analysis revealed significant improvements in the MPFC and DLPFC for both PA groups compared to CON, with BAS showing significant improvements in VLPFC ($p = 0.020$), involved in the inhibitory motor control. The findings suggest that cognitively engaging PA in uncertain environments, like basketball, can enhance specific PFC areas.
Conclusion: A 4-month PA program can increase cortical structures in the PFC among university students with low PA habits. Cognitively stimulating PA in uncertain and attentionally enriched environments, such as basketball, appears to improve the VLPFC.

Sexual dimorphism and time of day impact on the acute effect of moderate-intensity aerobic exercise on lactate-phenylalanine

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The brain is the primary organ responsible for the control of food intake and body weight regulation. Recent findings have shown that lactate-phenylalanine (Lac-Phe), one of the top exercise-regulated metabolites in humans, is able to suppress food intake and obesity. As interest grows in developing more precise exercise interventions, the time of day in which exercise is performed emerges as a potential factor to manipulate. Using a randomized crossover design, this study investigated the impact of morning vs. evening acute moderate-intensity aerobic exercise on Lac-Phe in men and women. Under standardized and controlled activity and diet conditions, samples of skeletal muscle before and after exercise were collected to examine the transcriptional expression of the cytosolic enzyme catalysing Lac-Phe synthesis (i.e., CNDP2). Healthy men (n = 6) and women (n = 8) participated in the study and data was analysed separately by sex. The expression of CNDP2 was only induced by exercise in the evening in women. Our results underscore the potential of considering time of day and sex for designing precise exercise interventions focused on regulate food intake.

The effects of a 24-week resistance exercise program on cortical signatures of Alzheimer's disease in cognitively normal older adults: Preliminary results of the AGUEDA trial

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Introduction: Brain cortical thinning and amyloid-β (Aβ) plaques are predictive biomarkers of early signs of Alzheimer's Disease (AD) progression. However, the impact of exercise on AD-associated cortical thickness remains unexplored. This study investigates the effects of a resistance exercise (RE) program on AD-signature (ADsig) cortical thickness in cognitively normal older adults, assessing its interaction with Aβ burden, hypothesizing that RE will attenuate cortical thinning, particularly in Aβ-positive participants.

Methods: Ninety participants (mean age: 72±4 years, 58% female) were randomly assigned to a 24-week RE group (3 sessions/week, 60 min/session, n=46) or a wait-list control group (CG, n=44). T1-weighted brain scans were processed with Freesurfer 7.4.1. ADsig was derived by averaging thickness across nine specifics regions of interest (Dickerson et al., 2009), later z-scored. Statistical analysis utilized constrained longitudinal mixed models for intention-to-treat and per-protocol analyses (≥80% session attendance). The interaction effect of Aβ burden (positive, using centiloid method > 12 as cut-off, quantified by [18F]Forbetaben amyloid-PET scan), was examined.

Results: Intention-to-treat analysis revealed a significant group×time effect, indicating reduced ADsig in the RE group compared to CG (estimated difference z-score= -0.24 [-0.44; -0.04], p=0.020). Per-protocol analyses yielded consistent results (p=0.020). Aβ burden interacted in both intention-to-treat (p=0.010) and per-protocol analyses (p=0.013). In Aβ-negative participants (RE, n=38; CG, n=33), no group×time effect was found (estimated difference z-score= -0.1 [-0.32;0.11], p=0.335); while in Aβ-positive participants (RE, n=8; CG, n=11), ADsig decreased in the RE group compared to CG (estimated difference z-score= -0.81 [-1.34;-0.28], p=0.005).

Conclusion: The RE program show a differential effect on ADsig according to amyloid status, showing a reduction in Aβ-positive participants. Future research should confirm our results and examine the clinical implications of these findings in

Aβ-positive participants on cognitive function and brain aging to achieve a more comprehensive understanding of the impact of RE.

Association of self-reported physical fitness with emotional intelligence during pregnancy: a longitudinal study from the GESTAFIT project.

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Physical fitness and emotional intelligence are both important aspects of overall health and well-being, and their interplay may have significant implications, particularly during the transformative period of pregnancy.
We aimed to explore the association of self-reported physical fitness (PF) with emotional intelligence along gestation (at the 16th and 34th gestational weeks [g.w.]).
One hundred fifty-five pregnant women (32.9±4.7 years old) participated in this study. Self-reported PF was assessed with the International Fitness Scale, which comprises five Likert-scale questions about the participants perceived overall PF, cardiorespiratory fitness (CRF), muscular strength, speed-agility and flexibility. Emotional intelligence was evaluated with the Trait Meta-Mood Scale–24 (TMMS-24), consisting of three subscales: attention, clarity and emotional repair.
The results indicate that, at the 16th g.w, greater overall PF, cardiorespiratory fitness and flexibility were associated with a higher clarity dimension score ($r=0.237$, $r=0.224$, and $r=0.239$, respectively; all $p<0.05$). At the 34th g.w. greater overall PF was also associated with a higher clarity dimension score ($r=0.239$, $p<0.05$).
At the 16th g.w, greater overall PF, cardiorespiratory fitness and flexibility were associated with a higher repair dimension score ($r=0.202$, $r=0.182$, and $r=0.187$, respectively; all $p<0.05$). At the 34th g.w. greater overall PF and flexibility were also associated with a higher repair dimension score ($r=0.207$, and $r=0.209$, respectively; both $p<0.05$). No significant associations were found regarding the attention dimension score.
These findings suggest that PF may play a role in emotional clarity and repair during pregnancy, highlighting the potential importance of maintaining adequate PF during this period. Further research is needed to explore these relationships in more detail and to better understand the underlying mechanisms.

Unveiling the landscape of Alzheimer's disease blood-based biomarkers in a cognitively healthy cohort: a cross-sectional analysis from the AGUEDA trial.

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Background. Amyloid beta (Aβ) deposition in the brain is the main pathological hallmark of Alzheimer's disease (AD). AD plasma biomarkers are simpler, more cost-effective, and easier-to-implement alternatives to cerebrospinal fluid and neuroimaging biomarkers. Thus, we aimed to examine the association of AD plasma biomarkers with Aβ deposition and memory performance in cognitively healthy older adults.
Methods. 91 cognitively healthy older adults aged 65 to 80 years from the AGUEDA trial (NCT05186090) were included in this cross-sectional analysis. Aβ deposition was assessed by PET/CT scanner. Aβ peptides (Aβ42, Aβ40 and Aβ42/40 ratio) were determined with IP-MS and SIMOA. P-tau217, p-tau181, GFAP and NfL were also measured using the SIMOA platform. Visuospatial memory was assessed with the ROF test and verbal memory with RAVLT test. Multiple linear regression models adjusted by sex, age and APOEe4 carriership were performed.
Results. P-tau217 ($\beta = 0.379$; $p < 0.001$) and p-tau181 ($\beta = 0.236$; $p = 0.028$) were positively associated with brain Aβ deposition, while Aβ42/40 ratio from SIMOA was negatively associated with brain Aβ deposition ($\beta = -0.247$; $p = 0.025$). No associations were found between the others AD plasma biomarkers and brain Aβ deposition (all $p > 0.05$). AD plasma biomarkers were not related to memory performance (all $p > 0.05$), with the exception of a negative association between Aβ40 from SIMOA and visuospatial memory ($p = 0.032$; $\beta = -0.222$).
Conclusions. These preliminary findings show the relationship between AD plasma biomarkers with brain Aβ deposition and memory. Specifically, we observed significant associations of plasma p-tau217, p-tau181 and Aβ42/40 ratio with Aβ deposition. Additionally, a link between plasma Aβ40 levels and memory performance was found, but not for the others AD plasma biomarkers. These results support the value of AD plasma biomarkers for early disease detection and monitorization.

Whether or not to adjust for baseline values in RCTs examining brain health outcomes; what is the right approach?

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Background. Randomized controlled trials (RCT) are the best way to assess treatment effects. Nevertheless, there is debate whether adjustment for baseline values of the outcome is necessary to estimate 'true' treatment effects. Regression-to-the-mean, the main reason for baseline adjustment, is the tendency that the average value will go down in the group with highest average and will go up in the group with the lowest average. Without baseline adjustment, treatment effects might be related to baseline values and not necessarily to the treatment.
Aim. Examining the effect of baseline adjustments (i.e. regression-to-the-mean) on treatments effects in RCTs.
Methods. For this methodological study, ActiveBrains RCT data is reused. ActiveBrains included 109 children (41.3% girls) aged 8 to 11 years with overweight or obesity. Participants were randomized to the exercise (i.e. 3 supervised 90-minute exercise sessions per week) or control group (i.e. usual routines). Fluid intelligence was used as outcome. Per-protocol linear mixed models estimated the treatment effect, in which one model adjusted for baseline values and the other did not.
Results. The per-protocol analyses included 90 participants, who had ≥70% attendance and a postintervention assessment. The baseline fluid intelligence was 95.8±14.3 in the intervention group and 99.3±11.6 in the control group. Without baseline adjustment, the standardized change-from-baseline difference was 0.34 (95%CI -0.07; 0.75) for the exercise compared to the control group (p-interaction=0.11). With baseline adjustment, the standardized change-from-baseline difference was 0.22 (95%CI -0.16; 0.59 with p-interaction=0.25).
Conclusion. Both models (with versus without baseline adjustments) resulted in a non-significant intervention effect. However, in this real example, not adjusting for baseline would have resulted in 55% larger effect estimate compared to with baseline adjustment, an overestimation of the effect just due to baseline differences. Therefore, regression-to-the-means is a serious problem, and authors are strongly recommended to consider baseline adjustments for the outcome variable.

An umbrella review of sleep strategies for optimised physical and mental recovery in athletes

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Purpose: This umbrella review assesses the effectiveness of sleep in optimising physiological and mental recovery in elite athletes, examining both scientific and clinical validity. Its objective is to provide evidence-based recommendations for coaches and athletes by critically evaluating various sleep strategies, such as total sleep time, naps, jet lag management, and sleep banking, in relation to performance, cognition, and mental health.
Methods: A systematic literature review was conducted, focusing on recent meta-analyses and review articles from PubMed, to investigate the impact of sleep on physiological and mental recovery in athletes including insights into their practical application.
Results: The study analysed multiple sleep strategies, including extended sleep time, naps, and sleep banking, revealing a general scarcity of high-quality studies and a lack of control for placebo effects. A key finding underscores the pivotal role of sleep quality in the recovery process including cognitive function and memory consolidation, emphasizing the necessity for personalized sleep plans tailored to the athlete's and sport's specific demands. The effectiveness of sleep strategies varied, with some showing significant benefits in certain contexts (e.g., improved sleep hygiene and naps), while others (e.g., extended sleep time and sleep banking) lacked robust evidence of their efficacy as recovery methods.
Conclusion: This paper provides recommendations for optimising recovery strategies in sports through sleep, with a focus on the unique demands of elite athletes. It offers a framework for athletes and coaches seeking to enhance physiological and mental recovery and attain optimal athletic performance.

Influence of Core Executive Functions on Academic Performance in Adolescents: The MOVESCHOOL Study

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Background: Core executive functions are high-level cognitive skills of interest to health and education policies. The aim of the study was to examine the association between core executive functions and academic performance in adolescents, considering potential differences by gender.
Methods: A total of 385 boys and 307 girls enrolled in 7th and 8th grades from 11 schools in the Spanish provinces of Caceres and Cadiz participated in the study. Executive functions of inhibition, cognitive flexibility, and working memory were assessed using the NIH Examiner program through the Flanker task, Shifting task, and N-Back protocols, respectively. Academic performance was evaluated based on grades in mathematics, native language, first foreign language, and geography and history provided by the schools in official evaluations.
Results: In boys, only working memory showed a positive association with academic performance across all four subjects evaluated ($p<0.01$ in all cases). Working memory also positively correlated with academic performance in native language ($p<0.05$) and first foreign language ($p<0.01$) for girls. In girls, the other two core executive functions did show a positive influence on academic performance in mathematics ($p<0.05$ for both inhibitory control and cognitive flexibility) and native language (both core executive functions $p<0.01$). Cognitive flexibility additionally showed a positive association with performance in the first foreign language in girls ($p>0.05$).
Conclusions: Working memory is positively associated with academic performance in boys and in some subjects in girls. Inhibitory control and cognitive flexibility are positively associated with performance in some academic subjects in girls, but not in boys.

Cross-sectional and longitudinal associations between fitness, executive function and Mathematical fluency in adolescents: The ACTIVECLASS Study

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Introduction: The benefits of high levels of fitness in preventing the risk of cardiorespiratory diseases in later life have been widely demonstrated. However, the effect on cognitive indicators is less clear. The main objective of this study is to evaluate cross-sectional and longitudinal associations between fitness, executive function and mathematical fluency in adolescents.
Method: Participants were 268 adolescents aged between 12 and 15 years old (Mean = 12.76; SD = 0.64), belonged to the ACTIVECLASS Study. As fitness indicators, cardiorespiratory fitness (CRF) was estimated from the 20 m shuttle run, upper body strength by dynamometry and lower body strength by the standing long jump test. Executive functions (i.e., inhibition, working memory, and cognitive flexibility) were evaluated with the NIH Examiner software. Mathematical fluency test was assessed with the test 6 of the Batería III Woodcock-Muñoz™. Cross-Lagged models were with MPLUS software as statistical analysis.
Results: At cross-sectional level, fitness, executive function, and mathematical fluency were positively and significantly associated ($p < 0.05$). At longitudinal fashion, higher fitness, executive function, and mathematical fluency at baseline was associated with higher scores in these indicators at follow-up. Furthermore, executive function had a positive longitudinal association with future mathematical fluency (= 0.198 ; $p < 0.05$).
Conclusion: Executive function showed potential to explain current and future performance on tests of mathematical fluency. However, although fitness was a positive correlate of executive function and mathematical fluency at a cross-sectional level, it was not a longitudinal predictor.

Adherence to the Southern European Atlantic diet and cognitive function in older adults: a preliminary prospective analysis in the Seniors-ENRICA-2 cohort.

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Objectives: The Southern European Atlantic Diet (SEAD), the traditional diet of Northern Portugal and Northwestern Spain, has been associated with lower risk of cardiovascular disease and mortality in older adults, but relationship with brain health has been under-explored. We examined the prospective association between adherence to the SEAD and cognitive function in older people.
Methodology: 1603 Spanish older adults (72.42± 4.24 years, 49.8% women) from the Seniors-ENRICA-2 cohort. The SEAD score (0-9) was calculated based on 9 food components: cod, other fresh fish, red meat and pork products, dairy, legumes and vegetables, vegetable soup, potatoes, whole-grain bread, and moderate wine consumption. General cognition was assessed by the Mini-Mental State Examination, and motor programming by the Luria's three-step test. Episodic, semantic, and visuospatial memory were measured with the 7 Minute Screen: Free and Cued Recall, Verbal Fluency, and Clock Drawing. Executive function sub-domains were evaluated by the Trail Making Test for cognitive flexibility, the Go/no-go task for cognitive inhibition, and the Forward Digit Span Test for working memory. We conducted prospective linear regression analyses between SEAD score at baseline (2015-2017) and cognitive performance at follow-up (2018-2019), adjusting for sociodemographic, lifestyle, and morbidity covariates and the baseline value of the corresponding cognitive test.
Results: Higher score in the SEAD was related to better cognitive flexibility (B = 2.480; 95%CI: 0.348, 4.613); association with episodic memory was borderline (B = 0.057; 95%CI: -0.005, 0.119; p=0.071). Adherence to the SEAD was not associated with general cognition, motor programming, inhibition, or semantic, working, or visuospatial memory (all p>0.05).
Conclusions: These preliminary findings showed higher adherence to the SEAD may not influence most of the cognitive function domains but could exert specific benefits on cognitive flexibility in older adults. However, future studies should examine the long-term influence of SEAD on cognitive function in the elderly.

Comparison of Cognitive Performance in Flanker Task and Multiple Object Tracking Between Healthy and Rehabilitated ACL Athletes

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Anterior cruciate ligament (ACL) injury often occurs in interaction sports where the ability to readjust and direct attention to relevant environmental information is critical to sports performance (Krüger & Hermsdörfer, 2019). It has been observed that low-order executive functions can predict the risk of musculoskeletal injury (Wilke & Groneberg, 2022). However, few studies have assessed the relationship between executive functions and ACL injury. This study aims to evaluate and compare cognitive performance, focusing on interference control, between healthy and rehabilitated ACL injury athletes. Fifty-five interaction sports athletes were recruited: 30 healthy and 25 ACL rehabilitated athletes. Interference control was assessed through the Flanker task and visual attention through the Multiple Object Tracking task (MOT). It was found that rehabilitated ACL athletes had longer reaction times than healthy athletes in the Flanker task ($p = 0.048$). In the case of the MOT, rehabilitated athletes performed worse 3-ball tracking at the 9.3 deg/s speed ($p = 0.040$), but there were no differences for all other speeds. Cognitive control seems to be key in the management of information and the execution of motor responses adjusted to the needs of the game. When the athlete cannot make these adjustments because of the excessive temporal demands, mechanisms related to the increased risk of ACL injury may be enhanced.

Comparison of neural sources of evoked potentials associated with error processing in a go-no go task between healthy athletes and rehabilitated athletes after anterior cruciate ligament reconstruction

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The anterior cruciate ligament (ACL) injury is one of the injuries that has the most significant impact on sporting life. This injury usually occurs in sports where unpredictable situations predominate and where decision making determines sporting success (Agel & Klossner, 2014). Traditionally, research has focused on biomechanical factors linked to the injury, but in recent years, the role of neurocognition in ACL injury has been studied (Gokeler et al., 2021). The present study aims to evaluate and compare performance on a cognitive go-no go task (Vocat et al., 2008) and the ability to predict error through error-related negativity (ERN/Ne) in EEG between healthy and rehabilitated ACL injury athletes. This ability to predict errors may prove key in goal-directed behaviors such as those that occur during interaction sports, which rely on the neural structures of the frontal lobe (Koechlin, 2016). Fifty-five interaction sports athletes were recruited: 30 healthy and 25 rehabilitated ACL athletes. In the go-nogo task, rehabilitated athletes had a higher TR ($p = 0.003$) and fewer hits ($p = 0.027$) than the healthy group. The healthy athletes had better cognitive control than rehabilitated athletes, with a more negative peak ERN than the rehabilitated athletes ($p = 0.006$). Likewise, this peak ERN appeared earlier in healthy athletes than in ACL-rehabilitated athletes ($p = 0.016$), suggesting a greater sensitivity to error recognition. Despite completing the rehabilitation process, the rehabilitated athletes presented worse cognitive control and ability to detect errors. Therefore, it could be key to stimulate cognitively the injured while performing motor tasks.

Impact of the cognitive load task on perceived mental workload and executive functions in semi-elite football players

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Background: Football, characterized as an open-situational sport, exposes players to dynamic and changing environmental conditions, requiring continuous adaptation and optimal decision-making to achieve effective outcomes. This constant exposure challenges players cognitively, forcing them to process and respond quickly to complex information, which intensifies the demand on their executive functions to coordinate effective actions and strategies in real time. This study aimed to investigate the direct impact of cognitive load on three executive functions in semi-professional football players, paying special attention to the effect of tasks that combine physical and cognitive demands.

Methods: Twenty-eight semi-professional male football players with extensive competitive experience (mean age: 20.07 ± 0.23 years) participated. An intrasubject design was employed to experimentally manipulate participants' cognitive load using tasks involving different levels of cognitive load, high and low. Cognitive performance was assessed to measure participants' inhibition, working memory and cognitive flexibility abilities. In addition, experienced mental workload was quantified using the NASA-TLX questionnaire.

Results: The high executive load condition produced a significant increase in experienced mental workload ($p < 0.001$). This session also produced improvements in cognitive flexibility ($p = 0.021$) and working memory ($p < 0.001$).

Conclusions: The immediate improvements in cognitive flexibility and working memory observed during sport-specific tasks with non-specific cognitive stimuli in football players are consistent with previous studies pointing to an improvement of cognitive abilities through non-specific cognitive stimulation in open ability sports. This study provides valuable insights for coaches and sport training professionals, highlighting how the implementation of dual task paradigms can be beneficial, thus optimising cognitive training of athletes.

Reducing social inequalities in internalizing symptoms by hypothetical physical activity and screen time interventions

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Aim:To estimate the change in social inequalities in internalizing symptoms at age 13 years that would result from hypothetical interventions on physical activity and screen time at age 10 years using a sequential G estimation model.
Methods: We used the Generation R Study data, a prospective population-based cohort conducted in Rotterdam, the Netherlands. The current study used data from 9901 children 2 times at 10 and 13 years old. Social inequality variables included sex, parental education, and migration background. Primary caregivers filled out the validated Child Behavior Checklist to report on children's internalizing symptoms at the age of 13. The hypothetical interventions (i.e., outdoor play, sports participation, and screen time) were assessed at the age of 10. We used sequential G-estimation to estimate the inequality with and without the hypothetical intervention. Multiple imputations were performed to replace the missing values.
Results: As compared to boys without a migration background, boys with a migration background had a 0.019 standard deviation of more internalizing symptoms (95% CI=-0.031, 0.069) and girls with or without a migration background had a 0.374 to 0.402 standard deviation of higher internalizing symptoms score. Similarly, as compared to boys with a higher-educated mother, boys with a lower-educated mother had a 0.095 standard deviation higher internalizing symptoms score (95% CI=0.045, 0.145), and girls with a higher or lower-educated mother had 0.399 to 0.457 standard deviation higher internalizing symptoms score. Hypothetically intervening by increasing outdoor play, and sports participation or reducing screen time did not significantly reduce these inequalities in internalizing symptoms.
Conclusion:Hypothetical physical activity and screen time interventions did not reduce the social inequalities observed between boys and girls with and without migration backgrounds and higher and lower-educated mothers.

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