



UNIVERSITY OF THESSALY
School of Physical Education and Sports
Laboratory of sport psychology and quality of life



Alzheimer and dementia, Physical activity interventions

Yannis Theodorakis
theodorakis@pe.uth.gr

1

ProPEDeAMCI
Stay Active. Stay You.

"Promoting the Effects of Physical Exercise (PE) on Cognitive, Behavioral, Physical, and Functional Symptoms of People Diagnosed with Mild Cognitive Impairment (MCI), Alzheimer's Disease (AD), or other Dementias,"

Christos Mouzakis¹, Vasiliki Garopoulou¹, Eleni Poptsi¹, Stavros Zafeiropoulos¹, Magdalini Tzotaki¹, Mary Hassandra¹, Yannis Theodorakis¹, Eleni Sakellariou², Alexandros Oikonomou³, Raquel Simões de Almeida⁴, Maria João Trigueiro⁴, Paula Portugal⁴, António Marques⁵, Teresa Puentes⁶, Laura Sanchez⁷, Gustavo Martin⁸, Laura Mazzoli⁹, Miriam Gavioli⁹, Claudia Bellini⁹, Luca Boccaletti⁹, Rita Seneca⁹, Eleonora Kikoniou⁹, Eleni Athanassiou⁹, Andreas Agapinos⁹, Špela Glisović Krivec⁹, David Krivec⁹, Jan Drobny⁹, Franka Meiland⁹

¹ Hellenic Association of Alzheimer's Disease and Related Disorders (Alzheimer Hellas), Thessaloniki, Greece
² University of Thessaly, Trikala, Greece
³ European Network of Active Living for Mental Health (ENALMH), Brussels, Belgium
⁴ Instituto Politécnico do Porto, Porto, Portugal
⁵ Fundación INTRAS, Valladolid, Spain
⁶ Andiani e Non Solo Società Cooperativa Sociale (ANS), Carpi, Italy
⁷ European University Cyprus, Nicosia, Cyprus
⁸ Zavod Vesorte, Izobraževanje o Naravi in Zdravju (VSTE), Ljubljana, Slovenia
⁹ SK pro duševni Zdraví z.s. (SkpDZ), Prague, Czechia
¹⁰ Amsterdam UMC, Amsterdam, Netherlands

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Education and Culture Executive Agency (EACEA). Neither the European Union nor the granting authority can be held responsible for them.

2

- The project provides for the exchange of good practices between partners,
- the development of guidelines for the creation of specialised physical activity programmes adapted to the different stages of the disease;
- the creation of online platforms for the dissemination of information-updates and the training of health professionals to implement effective and safe interventions.
- Physical exercise remains an untapped resource, despite scientific evidence demonstrating its benefits in slowing functional decline, improving overall well-being, and supporting emotional and social aspects of life.

3

Physical inactivity

- Physical inactivity is one of the leading risk factors for noncommunicable diseases mortality.
- People who are insufficiently active have a 20% to 30% increased risk of death compared to people who are sufficiently active (WHO, 2024a).
- One third (31%) of adults worldwide, approximately 1.8 billion people, did not meet the recommended levels of physical activity in 2022.
- Physical inactivity among adults, has increased by about 5 percentage points between 2010 and 2022 (WHO, 2024b).
- Regular physical activity cuts the risk of many types of cancer by 8–28%; heart disease and stroke by 19%; diabetes by 17%, **depression and dementia by 28–32%**, according to the WHO.
- A lack of physical activity will lead to nearly 500 million new cases of preventable major non-communicable diseases (NCDs) and premature deaths between now and 2030.

WHO, 2024a. Physical activity <https://www.who.int/news-room/factsheets/detail/physical-activity>

4

Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases

B. K. Pedersen¹, B. Sattin¹

¹The Center of Epidemiology and Medicine and The Center for Physical Activity Research, Biopsychiatry, University of Copenhagen, Copenhagen, Denmark; ²The Copenhagen Muscle Research Centre, Biopsychiatry, University of Copenhagen, Copenhagen, Denmark

Corresponding author: Bente Klarlund Pedersen, Biopsychiatry Section (B01), Blegdamsvej 5, DK-2200, Copenhagen, Denmark. Tel.: +45 33 43 77 97, Fax: +45 33 43 78 44, E-mail: Bkp@rshb.dk

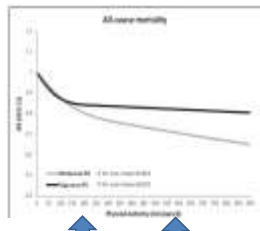
Accepted for publication 14 September 2015

This review provides the reader with the up-to-date evidence base for prescribing exercise as medicine in the treatment of 26 different diseases: psychiatric disorders (depression, anxiety, stress, schizophrenia), neurological diseases (dementia, Parkinson's disease, multiple sclerosis, traumatic brain injury), metabolic diseases (obesity, hyperlipidemia, metabolic syndrome, polycystic ovary syndrome, type 2 diabetes, type 1 diabetes), cardiovascular diseases (hypertension, coronary heart disease, heart failure, cerebral apoplexy), and classification (chronic obstructive pulmonary disease, chronic obstructive pulmonary disease, asthma, cystic fibrosis), musculoskeletal disorders (osteoarthritis, osteoporosis, back pain, rheumatoid arthritis), and cancer. The effect of exercise therapy on disease pathogenesis and symptoms are given and the possible mechanisms of action are discussed. We have interpreted the scientific literature and for each disease, we provide the reader with our best advice regarding the optimal type and dose for prescription of exercise.

5

Association between long-term leisure-time physical activity intensity and all-cause and cause-specific mortality. (Circulation 2022)

- A total of 116 221 adults
- The nearly maximum association with lower mortality was achieved by performing **≈150 to 300 min/wk of long-term leisure-time VPA, 300 to 600 min/wk of long-term leisure-time MPA**, or an equivalent combination of both.



Long-Term Leisure-Time Physical Activity Intensity and All-Cause and Cause-Specific Mortality: A Prospective Cohort Study of 116,221 Adults. *Circulation*. 2022;145(12):e122222. doi:10.1161/CIRCULATION.122.122222

6

Participation in physical activities and exercise programs

- Increases life expectancy by 2 to 4 years.
- Increasing moderate- or vigorous-intensity physical activity from 10 to 20 or 30 minutes per day is associated with a reduction in mortality of 6.9%, 13.0%, and 16.9%, respectively (Saint-Maurice et al., 2022).
- Research conducted on a large sample of adults recorded lower mortality rates among individuals who exercised **between 150 and 300 minutes per week**. Those who exercised between 300 and 600 minutes of moderate- or vigorous-intensity activity achieved the best outcomes (Lee et al., 2022).

7

Our study in progress

Physical activity and dementia.

Review of reviews

- Method. A systematic literature overview was implemented to review systematic reviews examining the effects of PA on cognitive function as a primary or secondary outcome in people with dementia.
- The search engines of PubMed and EBSCHost were employed. The latter included the APA PayInfo, SPORTDiscus, Academic Search Ultimate, Education Resource Information Centre, MEDLINE, and the Open Dissertations database.
- Key words and MESH terms were “exercise”, physical activity” “cognitive impairment”, “dementia”, “Alzheimer”, “systematic review”, and “meta-analysis”.

8

Participants, Interventions, Comparisons, Outcomes.

- Studies with additional primary outcomes to cognitive function or studies with secondary outcomes other than cognitive function were also coded and analyzed provided that outcomes involved physical, functional, psychological and quality of life measures.
- A total of 27 systematic reviews, showing beneficial effects for PA on cognitive function, across various dementia samples, PA interventions and experimental comparisons.

9

Authors, year and review methodology	N studies included in review	Population and setting	Types of Intervention	Primary outcome measures	Secondary outcome measures	Tools used for measures of PA & Dementia/AD	Summary of findings
(2) Andare et al 2021 Umbrella Review of Systematic Reviews and Meta-Analyses	21 (reviews)	People with AD (all ages and disease severity) who engaged in exercise. All settings were included. Community based, residential care, and hospital based	Interventions with supervised exercise, unsupervised exercise, or a combination of the two. Resistance exercise, aerobic exercise, aquatic exercise, stretching exercise, balance exercise, and games. The length of interventions: 2 weeks to 24 months. The weekly frequency: 1-7 sessions. Duration: 10-40 minutes with diverse intensities ranging from low to vigorous.	Cognitive function (13/21 reviews)	Physical and psychological function	Timed Up and Go test, Berg Balance Scale, 6-min walk distance, not reported for cognitive function	For cognitive function there was a statistically significant large to very large effect of exercise with moderate to high heterogeneity. Multiple exercises was the intervention with the largest effect size in cognitive function. For physical function there was a statistically significant moderate to large effect of exercise with moderate heterogeneity. For neuropsychiatric symptoms, the effect size ranged from small to large, as the effect size of 12 eligible reviews wasn't statistically significant.

10

Results

- Most studies report positive effects of physical activity (PA) on cognitive functioning, along with improvements in physical and functional outcomes.
- Most of the reviewed studies employed moderate- to high-intensity exercise.
- A substantial number of studies reported session durations ranging from 90 to 120 minutes, often incorporating multicomponent characteristics and social activities.
- Approximately half of the studies implemented exercise programs with a frequency of 2–3 sessions per week, while a similar proportion reported frequencies ranging from 2 to 7 sessions per week.

11

Results

- The majority of interventions included **aerobic, resistance, and multicomponent physical activity**.
- A few studies used alternative forms of exercise like **tai chi, qigong, yoga, dance, breathing exercise and mental concentration**.
- These interventions commonly involved multicomponent or **dual-task training**, aerobic or resistance exercise, as well as exercise conducted in virtual environments.
- Regarding program duration, most interventions lasted between 12 and 14 months.
- Overall, the available evidence converges to suggest that exercise programs produce clear psychological and physiological health benefits.

12

Results

- The characteristics of these programs are generally consistent with WHO guidelines, recommending at least 150 minutes of physical activity per week, with volumes reaching up to 300 minutes.
- However, an emerging trend is the inclusion of extended single sessions lasting up to 120 minutes, which are not solely based on physical exercise but combine physical activity with cognitive tasks.
- In general, the findings support positive evaluations of physical activity for improving cognitive functioning, and behavioral and mental symptoms in individuals with dementia.

13

WHO PA recommendation 2020

- Benefits among older people Physical activity can:**
- help manage conditions such as hypertension and type 2 diabetes; reduce symptoms of depression and anxiety,**
- enhance cognitive function;**
- delay the onset of dementia;**
- help maintain independent mobility and living by improving physical function and preventing falls; improve bone health and thus prevent osteoporosis**

Γιάννης Θεοδωράκης, Πανεπιστήμιο Θεσσαλίας

14

Promoting physical activity for older people: A toolkit for action, Geneva: World Health Organization, 2019



15

Exercise dementia and Alzheimer

- Exercise plays a vital role on health, physical functioning and quality of life, and in the prevention and rehabilitation of many diseases such as dementia.
- People suffering from dementia number 46.8 million worldwide, while 7.7 million new cases of dementia are recorded each year.
- In Greece, patients suffering from one of the categories of dementia, the Alzheimer disease, have been calculated to be around 200,000 and that they will reach 500,000 by 2050.
- Inactivity alone, constitutes the cause of 3.8% of all dementia cases worldwide.**
- Recently, exercise has been recognized to benefit these patient populations both as a mechanism for the amelioration of their health and the prevention of dementia as well as a mechanism for the improvement of their cognitive functioning and memory

16

Exercise, dementia and Alzheimer

- Physical exercise can help older individuals with dementia to improve their health and well-being.
- Help relieve or delay declines in activities of daily living (ADL) functioning for dementia patients who have mild to moderate conditions.
- Help with cognitive improvement and overall functioning of the brain and its structures.
- Help improve balance, motor sequences, stride length and performance of activities of daily living, which are severely affected by Alzheimer's disease.

17

Some detailed examples

- The exercise intervention was divided into two parts: a supervised component (4 months) and an unsupervised component lasting an additional 8 months. The supervised component comprised a pre-exercise assessment and twice-weekly exercise supervision by trained physiotherapists and exercise assistants of 60–90 min duration for 4 months with a target of at least 50 min of unsupervised activity at moderate intensity, to achieve a total of 150 min per week. The exercises classes involved a combined aerobic and resistance training schedule at moderate to hard intensity, delivered in groups of up to eight participants.

Waters et al., Sports Medicine and Exercise, 2019, 21(1), 1-10. DOI: 10.1007/s00402-018-0300-0

18

Graessel et al. BMC Medicine 2011, 9:129
http://www.biomedcentral.com/1741-7015/9/12

- Each daily session began with this introduction, which lasted approximately 10 minutes and was designed to help the dementia patients feel part of the group.
- This was followed by about 30 minutes of motor exercises, such as bowling, croquet, or balancing a tennis ball on a frisbee and passing it to one's neighbor.
- After a 10 minute break, the patients spent approximately 30 minutes completing a variety of cognitive tasks, ranging from paper and pencil exercises, such as solving word jumbles or matching symbols into pairs, to picture puzzles projected digitally onto a large screen to be solved by the group. MAKs was designed to promote activity that takes place at an individual's performance limit. Therefore, therapists matched all participants into three homogenous groups according to the individual performance levels (operationalized with MMSE-score) and assigned the cognitive tasks from one of three difficulty levels to the appropriate group. This was followed by about 40 minutes during which patients carried out ADL (such as preparing a snack), engaged in creative tasks (such as working with wood, paper, or other natural materials), or did simple gardening work.

19

- A typical day might involve 60 minutes of "Tai Chi" or chair yoga, followed by a 90-minute "Reminiscence Therapy" or "Cognitive Stimulation" session.
- Aguirre et al. (2013), "Cognitive stimulation therapy (CST) for people with dementia."

20

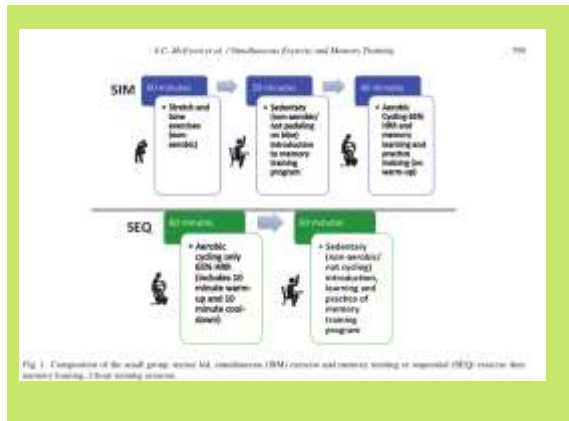
Simultaneous Aerobic Exercise and Memory Training Program in Older Adults with Subjective Memory Impairments

The aim of this study was to determine the relative effectiveness of simultaneous performance of memory training and aerobic exercise to a sequential performance intervention on memory functioning in older adults.

Methods: 55 older adults (aged 60–75) with subjective memory impairments (non-demented and non-MCI) completed the intervention that consisted of 90-minute small group classes held twice weekly.

Participants were randomized to either 4 weeks of supervised strategy-based memory training done simultaneously while stationary cycling (SIM) or sequentially after the stationary cycling (SEQ). Standardized neurocognitive measures of memory, executive functioning, speed of processing, attention, and cognitive flexibility were assessed at baseline and post-intervention.

Conclusion: These findings indicate that a 4-week simultaneous memory training and aerobic exercise program is sufficient to improve memory, attention, and reasoning abilities in older adults



22



Fig. 2 Simultaneous (SIM) exercise and memory training outcome set-up. After completing 1 hour of aerobic and low (low aerobic) warm-up, participants would complete their combined aerobic and memory training. Participants would complete their combined aerobic and memory training while using a tablet for memory training. Then they would start pedaling on the stationary bike for 45 minutes of stationary aerobic cycling (low aerobic) while holding the stationary memory training and practicing the memory skills while presented by the screen on top of the bike. After the aerobic cycling, they would be followed by 5 minutes of cool-down on the bike.

23

Relevant studies- exercise through Virtual reality environment

An innovative project.

Participants showed a significant preference for the VR condition as well as high acceptance scores for intended future use, attitude toward VR training, and enjoyment. VRADA training system acts as a non-pharmacological dual intervention to alleviate symptoms of the pathophysiology of Mild Cognitive Impairment.

The inflammatory factors IL-1 β and TNF- α .

A series of linear regression models revealed that the VRADA group showed improvement or no deterioration in cognitive decline in global cognitive function (MMSE), verbal memory (Rey Auditory Verbal Learning Test and WAIS forward test), and executive functions, mental flexibility (Trail Making Test B).

The VRADA system improves the cognitive function of elders with MCI.



Figure 3 Effects of Virtual Reality Physical and Cognitive Training Intervention On Cognitive Abilities of Elders with Mild Cognitive Impairment. J Alzheimer Dis Rep. 2023;16(1):1475-1484. doi: 10.3233/JAD-230404

24

Studies on Virtual reality, VIDEO

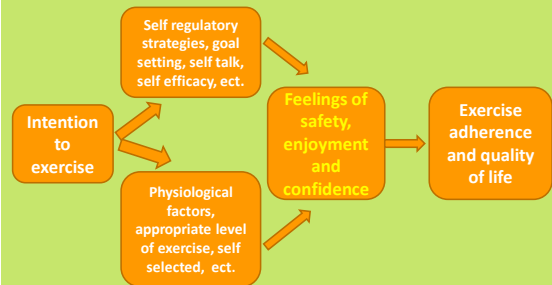
<https://drive.google.com/file/d/1s2sL7GvxgHvgAJMOoJwKrrQgxubRsVQp/view>

<http://psych.pe.uth.gr/index.php/el/projects/vrada>

- Theodorakis, Y., Morres, I., Hassandra, M., Goudas, M., Tsolaki, M. & Mouzakis, C. (Eds.) (2021). Recommendations on EU Guidelines for the use of Physical Activity on Mental Health. Interactive Living for Mental Health Project. ISBN 978-960-89923-5-1. DOI: 10.13140/RG.2.2.34494.59207
- Beldimeti E, Mouzakis C, Karathanasi EM, Verykaki E, Hassandra M, Galanis E, Hatzigeorgiadis A, Goudas M, Zikas P, Evangelou G, Papagiannakis G, Bellis G, Kokkoti C, Tsanalis T, Giakas G, Theodorakis Y, Tsolaki M. (2022). Effects of Virtual Reality Physical and Cognitive Training Intervention on Cognitive Abilities of Elders with Mild Cognitive Impairment. J Alzheimers Dis Rep. 2023 Dec 29;7(1):1478-1490. doi: 10.3233/JADR-230099. PMID: 38225966. PMCID: PMC10709285.
- Hassandra, M., Galanis, E., Hatzigeorgiadis, A., Goudas, M., Mouzakis, M., Karathanasi, E., Petridou, N., Tsolaki, M., Zikas, P., Evangelou, G., Papagiannakis, G., Bellis, G., Kokkoti, C., Panagiotopoulos, SP, Giakas, G., Theodorakis, Y. (2021). A Virtual Reality App for Physical and Cognitive Training of Older People With Mild Cognitive Impairment: Mixed Methods Feasibility Study. JMIR Serious Games, 24(9):e244179. doi:10.2196/244179
- Slavou, V.T., Vavougos, G.D., Kalogiannis, P., ...Theodorakis, Y., Gourgoulakis, K.I. (2023). Breathlessness and exercise with virtual reality system in long-post-coronavirus disease 2019 patients. Frontiers in Public Health, 2023, 11, 1115393.
- Tsoufod, E., Hassandra, M., Galanis, E., Goudas, M., Theodorakis, Y. (2022). Applicability of an Immersive Virtual Reality Exercise Training System for Office Workers during Working Hours. Sports, 10, 104.https://doi.org/10.3390/sports10070104.

25

From exercise to quality of life



26

Recommendations for practice

- Promoting physical activity in the community should involve unsupervised activity opportunities as well as supervised classes
- Walking offers the simplest and most accessible mode of physical activity for the majority of the sedentary population**
- All promotion should include cognitive behavioural principles of behaviour change**
- Primary care teams should consider training of staff in physical activity promotion.

27

Recommendations

- 1. Multicomponent, physical activity and dual tasks
- 2. Snacktivity
- 3. Active movement
- 4. Walking, daily steps, inside and outside of the home.

28

Snacktivity

- A novel „whole day“ approach that could motivate the public to be more physically active is termed **Snacktivity™**. **Consistent with guidance, the Snacktivity™ approach encourages the public to accumulate ≥150 minutes of physical activity in short 2–5-minute „activity snacks“ of moderate-vigorous intensity physical activity throughout the day/week. Snacktivity™ also promotes muscle-strengthening activity twice per week.**
- The Snacktivity intervention involves access to technology support (mobile phone app called the SnackApp, linked to a Fitbit activity device (Versa 4)) that through behavioural change techniques promote self-monitoring of physical activity, habit formation, action planning and feedback on the number of activity snacks completed each day.
- Secondary outcomes include accelerometer-assessed average minutes per day of light, moderate, and vigorous intensity physical activity, time sedentary, weight and psychological health outcomes, at 12 month follow-up.

1. Bailey, A., Griffin, B., Sanders, L. et al. The effectiveness and cost effectiveness of **Snacktivity™** as an intervention to promote physical activity and health outcomes: a study protocol for a multi-centre randomised controlled trial. *Trials* 2020, 21:1412. <https://doi.org/10.1186/s13063-020-05093-8>

29

Deaths potentially averted by small changes in physical activity and sedentary time: an individual participant data meta-analysis of prospective cohort studies

- Implications of all the available evidence
- If the least active 80% of participants had increased MVPA by 5 min/day or
- reduced sedentary time by 30 min/day, 10% and 7% of all deaths, respectively, might have been avoided during the follow-up period.

1. Deaths potentially averted by small changes in physical activity and sedentary time: an individual participant data meta-analysis of prospective cohort studies. *Health, Life and the Lancet*, Volume 467, Issue 10526, 529–540

30

Practical implication

- **GPS and Pedometers are cheap and accurate tools for measuring step counts but can they motivate people to walk more**

31

A relaxation technique

- Choose to breath in and out slowly whenever you need to relax or before you perform
- Choose to let go of any unnecessary stress, doubts, or worries. Let them flow away like water flowing gently down a stream.

32

Interventions targeting sitting in the workplace

- The interventions included physical workplace changes, such as providing height-adjustable desks to enable sitting or standing at work, pedalling workstations and treadmill desks, policy changes, information provision, counselling and computer prompts.
- Providing height-adjustable desks was the most frequently implemented intervention and was reported as the most promising for reducing sitting time at work, leading to reductions of 100 minutes per workday in the short term (up to 3 months) and 57 minutes per workday in the medium term (3–12 months).

- Although positive findings were observed, the quality of the evidence was deemed to be very low to low because of a lack of non-biased cluster randomised controlled trials (RCTs), small sample sizes (the majority had 20–50 participants) and a lack of longer-term follow-up.

33

- <https://www.youtube.com/watch?v=3v4n5CJZMvc>
- <http://ergoworksltd.com/product/deskrite-100-sit-stand-workstation-black/>

34

Multi-component or dual-task training

- Stand up straight, spread your legs, and find your balance.
- Stretch the five fingers of one hand out in front of your face, then another one, and another, and another. How many are there?
- Raise both hands above your head. How many fingers are there?
- Bring the five fingers in front of your face. Close your eyes and take a deep breath. Imagine them.
- Open your arms wide. How many fingers do you see? Count them.

35



36

Dual task training, and other daily activities



37

Dual task training



38

What we need to decide?
Instruments to measure cognitive and physical functions.
How to include more cognitive tasks relevant to each physical activity task.
How to add some criteria to be personalized

Weekly activity log: collaborations with caregivers

Weekly activity log	Monday	Wednesday	Friday	Total score
Gym Duration: (or "Total Gym Minutes")				
Stairs Climbed				
Steps from House to Gym				
Cognitive Training Duration				
Dual-Task Training				
"Snackivity" Minutes				
Other relevant activities				

39



Studies included in quantitative synthesis
(n=45)

40

- Exercise interventions Significantly improved global cognition, with SMDs, for MMSE, for MoCA.
- ADAS-Cog showed a small, non-significant effect
- Executive function and memory did not improve significantly.
- Quality of life improved significantly, measured using tools such as QOL-AD and Qualidem.
- Conclusion: Evidence suggests that structured, multimodal exercise programs—combining aerobic (= 150 min/ week), resistance (2–3 times/week), and balance training (2–3 times/week) for at least 12 weeks with individualized intensity—may improve global cognition and quality of life in Alzheimer's disease patients.**

41



42

Exercise in green environment

- The practice of forest bathing, defined as conscious sensory immersion in forest environments, alongside other nature-based interventions (NBIs), has been shown to be a powerful non-pharmacological strategy to mitigate the challenges associated with aging and cognitive decline.
- These interventions work multidimensionally, offering essential support for the management of behavioral and psychological symptoms of Dementia and improving the quality of life for both people living with the disease and their caregivers.
- In the psychological field, there is a steady improvement in well-being, with significant reductions in anxiety, depression, fatigue and mental confusion. For dementia patients, this emotional recovery is crucial for managing states of agitation and irritability. At the physiological level, exposure to nature promotes the formation of the autonomic nervous system, increasing parasympathetic activity and lowering blood pressure, which especially benefits elderly people with hypertension.

43

Nature-Based Interventions in Dementia: Psychophysiological Effects and Therapeutic Strategies

- Forest air strengthens the immune system.
- In the cognitive field, nature offers an environment of "soft charm" that allows for the recovery of attention fatigue, improvement of executive functions such as working memory and attention control. The success of these interventions in dementia is sensory engagement and the promotion of identity and autonomy, enabling individuals to maintain functional skills through activities such as gardening. Finally, these practices extend to the caregiver, reducing the feeling of heaviness and strengthening emotional bonds through shared experiences in physical settings.

44

Exercise is Medicine. Physical Activity Vital Sign Questionnaire.

2021.

- <https://exerciseismedicine.org/wp-content/uploads/2021/04/EIM-Physical-Activity-Vital-Sign.pdf>



45

- Exercise in MCI
- Primary Goals
- Slow cognitive decline
- Enhance neuroplasticity
- Reduce risk of progression to Alzheimer's disease
- Maintain independence
- Program Characteristics
- Moderate to vigorous intensity (if medically appropriate)
- Aerobic training (30–45 min, 3–5x/week)
- Resistance training (2–3x/week)
- Dual-task training (motor + cognitive tasks simultaneously)
- Greater complexity and progression
- Can follow multi-step instructions
- Often suitable for group/community settings
- Participants are generally independent and can tolerate structured, progressive training

46

- Exercise in Dementia
- Primary Goals
- Maintain functional ability
- Reduce fall risk
- Preserve mobility
- Support behavioral and psychological symptoms
- Improve quality of life
- Program Characteristics
- Low to moderate intensity
- Simple, repetitive movements
- Emphasis on:
 - Balance
 - Gait training
 - Functional tasks (sit-to-stand, reaching)
- Short, clear instructions
- Demonstration-based teaching
- Close supervision
- Structured routine (same time/place)
- As dementia progresses, supervision and individual tailoring become essential.

47

Key Differences at a Glance

Factor	MCI	Dementia
Intensity	Moderate–high	Low–moderate
Complexity	Higher	Simplified
Supervision	Limited	Close/continuous
Dual-task	Common	Limited
Main Aim	Prevention/slowing decline	Function maintenance

48