

Exercise in Older Adults With Dementia

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Canadian Study of Health & Aging: Protective Factors

■ Alzheimer's Disease

- ◆ Nonsteroidal anti-inflammatory drug intake
- ◆ Wine & coffee consumption
- ◆
- ◆ Past exposure to vaccines

■ Vascular Dementia

- ◆ Eating shellfish
- ◆

Lindsay et al. (2004). Canadian Journal of Psychiatry, 49(2), 83-91.

Adult Changes in Thought Study

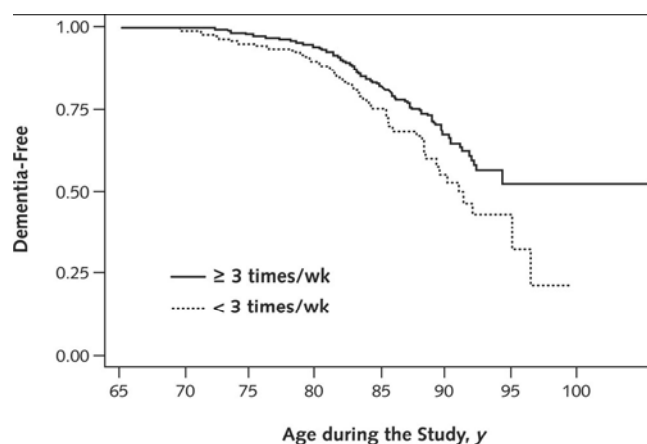
Subjects 1740 persons older than 65

Objective Determine whether regular exercise is associated with a reduced risk for dementia & Alzheimer disease

Results Incidence rate of dementia was 13.0 per 1000 person-years for participants who exercised 3+ times per week compared with 19.7 per 1000 person-years for those who exercised < 3 times per week

Larson et al. (2006). Annals of Internal Medicine, 144, 73-81.

Kaplan-Meier survival estimates for the probabilities of being dementia-free



Larson et al. (2006). Annals of Internal Medicine, 144, 73-81.

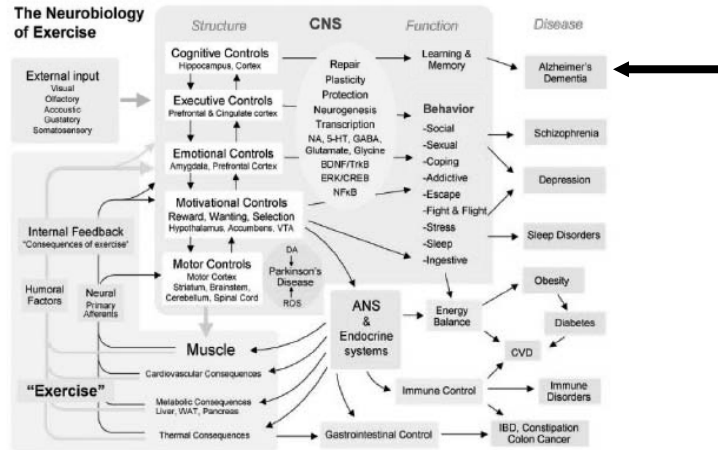


Figure 1: A heuristic diagram for understanding the neurobiology of exercise and physical activity. ANS, autonomic nervous system; BDNF, brain-derived neurotrophic factor; CNS, central nervous system; CREB, cyclic adenosine monophosphate response element-binding protein; CVD, cardiovascular disease; DA, dopamine; ERK, extracellular signal-regulated kinase; 5-HT, 5-hydroxytryptamine; GABA, gamma amino butyric acid; IBD, inflammatory bowel disease; NA, noradrenaline; NFkB, nuclear factor of kappaB; ROS, reactive oxygen species; TrkB, tyrosine residue kinase receptor-type 2; VTA, ventral tegmental area; WAT, white adipose tissue.

Dishman et al. (2006). *Obesity*, 14(3), 345-356.

Meta Analysis of Exercise

■ Objective:

- ◆ To determine whether physical exercises are beneficial for people with dementia

■ Data Sources:

- ◆ Published & nonpublished manuscripts from 1970 to 2003 using electronic & manual searches

Heyn, Abreu & Ottenbacher. (2004). *Archives of Physical Medicine Rehabilitation*, 85, 1694-1704.

Key Search Words

- Exercise
- Rehabilitation
- Activities of daily living
- Dementia
- Alzheimer's disease
- Aged
- Geriatrics

Heyn, Abreu & Ottenbacher. (2004). Archives of Physical Medicine & Rehabilitation, 85, 1694-1704.

Study Selection

- Randomized trials evaluating exercise in persons \pm 65 years with cognitive impairment
- Studies with quantitative results:
 - ◆ Means
 - ◆ Standard deviations
 - ◆ T tests
 - ◆ F tests

Heyn, Abreu & Ottenbacher. (2004). Archives of Physical Medicine & Rehabilitation, 85, 1694-1704.

Data Extraction & Rating

- One reviewer extracted data on study characteristics
- Two raters evaluated selected articles for methodological quality

Heyn, Abreu & Ottenbacher. (2004). Archives of Physical Medicine & Rehabilitation, 85, 1694-1704.

Data Synthesis

- 2020 subjects participated in 30 trials meeting inclusion criteria
- Summary effects were computed using a fixed effects (Hedge's g_i) model
- Overall mean effect size between exercise & nonexercise groups for all outcomes was .62 (95% confidence interval [CI], .55-.70)

Heyn, Abreu & Ottenbacher. (2004). Archives of Physical Medicine & Rehabilitation, 85, 1694-1704.

Domains

- Physical fitness
- Physical functioning
- Cognition
- Behavior outcomes

Heyn, Abreu & Ottenbacher. (2004). Archives of Physical Medicine & Rehabilitation, 85, 1694-1704.

Summary of Specific Effect Sizes

- Strength (ES=.75; 95% CI, .58-.92)
- Physical fitness (ES=.69; 95% CI, .58-.80)
- Functional performance (ES=.59; 95% CI, .43-.76)
- Cognitive performance (ES=.57; 95% CI (.43-1.17)
- Behavior (ES=.54; 95% CI, .36-.72)

Heyn, Abreu & Ottenbacher. (2004). Archives of Physical Medicine & Rehabilitation, 85, 1694-1704.

Physical Fitness

Neuromuscular Strength

Subjects	28 (moderate to severe dementia)
Group	Subjects served as own controls
Intervention	Moderate-intensity progressive resistance training with Theraband up to 3 days weekly over 6 weeks
Findings	Subjects completed 11.4 exercise sessions with improvements & declines

Thomas & Hageman. (2003). Journal of Gerontology: Medical Sciences, 58A,8, 746-751.

High-Intensity Exercise

Subjects	91 (no to severe dementia)
Groups	Randomly assigned to treatment or control
Intervention	29 exercise sessions over 13 weeks
Findings	76% median attendance; lower-limb strength exercises were performed a median of 53% & balance exercises 73% of time

Littbrand et al. (2006). Physical Therapy, 86(4), 489-498.

Physical Training

Subjects	20 (mild to severe dementia)
Groups	Randomly assigned to treatment or control
Intervention	2 supervised 1-hour exercise sessions per week for 16 weeks
Findings	Walking, mobility, flexibility & static balance significantly improved in the treatment group ($p < .05$) but not in the control group

Toulotte et al. (2003). Age and Ageing, 32, 67-73.

Physical Functioning

Exercise Plus Behavior Management

Subjects	153 (mild to severe dementia)
Groups	Randomly assigned to treatment or control
Intervention	Exercise & behavior management
Findings	Groups differed for physical role function at post treatment ($p < .001$) & 24-month follow-up ($p = .003$) & depression at post-treatment ($p = .02$)

Teri et al. (2003). Journal of American Medical Association, 290(15), 2015-2022.

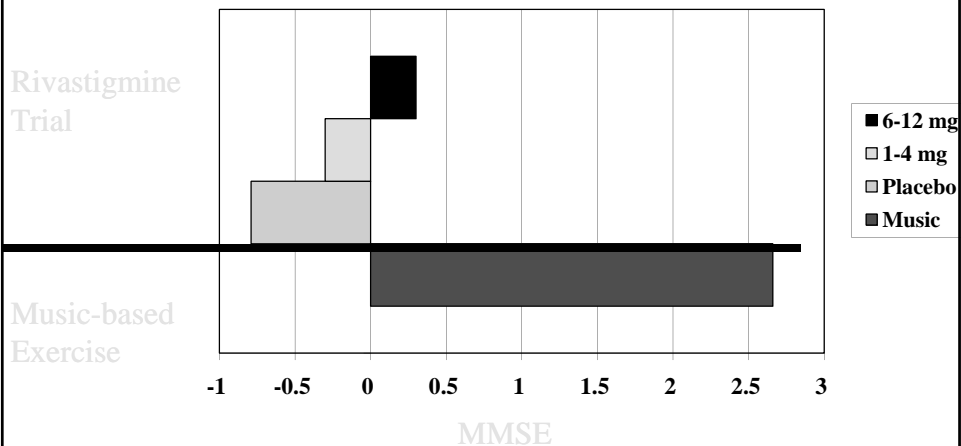
Cognitive Performance

Music-based Exercise

Subjects	25 (moderate to severe dementia)
Groups	Treatment & control
Intervention	30 minutes of daily physical exercises supported by music in 1 group for 3 months
Findings	Improved MMSE ($p < .01$) in treatment compared with control

Van de Winckel et al. (2004). Clinical Rehabilitation, 18, 253-260.

Rivastigmine vs. Music-based Exercise



Rivastigmine: Corey-Bloom et al. (1998). *International Journal of Geriatric Psychopharmacology*, 1, 55-65.

Music-based exercise. Van de Winckel et al. (2004). *Clinical Rehabilitation*, 18, 253-260.

Integrated Treatment Approach

Subjects	35 (mild dementia & depression)
Design	Battery of neuropsychological tests at baseline & 6, 12 & 24 months
Interventions	Stress management, mind/body exercises, physical exercises & diet recommendations
Findings	MMSE ↑ from 26.31 to 27.46 (p<.033). Reaction time ↓ from 594.74 ms to 401.36 ms (p<.001)

Bragin et al. (2005). *American Journal of Alzheimer's Disease & Other Dementias*, 20(1), 21-26.

Speed Feedback Therapy

Subjects	27 (mild to moderate dementia)
Groups	17 in treatment & 10 in control day care centers
Intervention	Both groups pedaled bicycle ergometers 5 min a day, 3 times a week for 6 weeks; treatment group followed path on computer screen
Findings	MMSE scores and attention improved in treatment but not control group

Ootani, Nara, Kaneko & Okamura. (2005). Dementia & Geriatric Cognitive Disorders, 20, 105-111.

Speed Feedback Equipment



Ootani, Nara, Kaneko & Okamura. (2005). Dementia and Geriatric Cognitive Disorders, 20, 105-111.

Activity & Executive Function

Subjects	43 (mild cognitive impairment)
Groups	Randomized into 2 treatment groups & 1 control group
Intervention	Walking, hand/face exercise, or control on individual basis 30 min a day, 3 times a week for 6 weeks
Findings	Near significant improvement in tasks of executive function

Scherder et al. (2005). Aging & Mental Health, 9(3), 272-280.

Behavior

Sleep & Exercise

Subjects ~150 (mild to severe dementia)
randomized to a group

Groups 3 treatment & 1 control

Interventions Progressive resistance muscle
strength training; individualized
social activity; combined strength
training & social activity; & usual
care control

*Richards et al. (ongoing study) Funding Source: RO1NR/AG07771 Effect of
Activities and Exercise on Sleep in Dementia*



