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Spital Wallis

Je cours…
après mon âge
et ma forme!

Dr Martial Coutaz
Département de Médecine Interne-Gériatrie

Sommaire

- **Bénéfices de l'activité physique**
- **Activité physique et fragilité**
- **Activité physique et performance cognitive**
- **Prescrire l'activité physique au senior**

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Sommaire

- **Bénéfices de l'activité physique**
- **Activité physique et fragilité**
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- **Prescrire l'activité physique au senior**

Benefits of increasing physical activity for older adults

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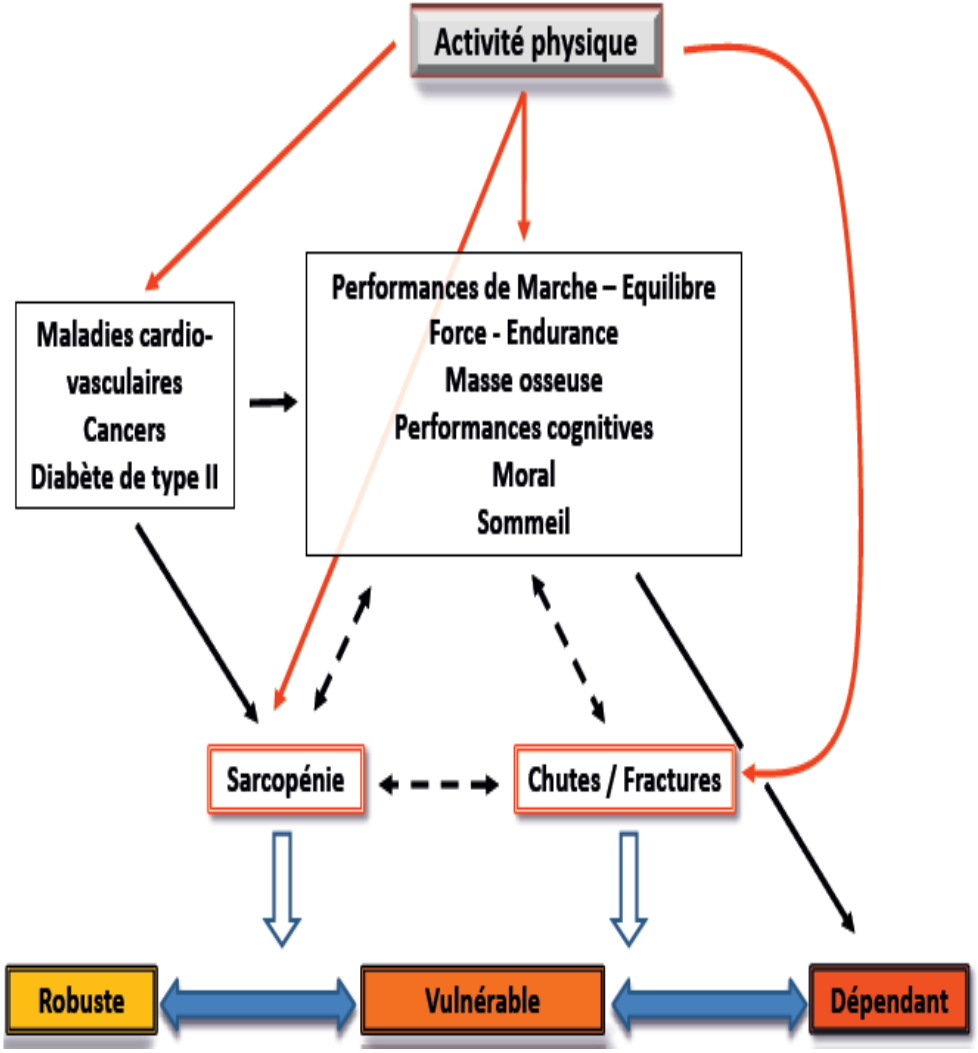
Improved mobility and reduced onset of mobility-related disability

Reduced risk of cardiovascular disease, thromboembolic stroke, hypertension, type 2 diabetes mellitus, osteoporosis, obesity, colon cancer, breast cancer, anxiety, depression, and cognitive decline

Reduced likelihood of falls and fall-related injuries

Possible decreased incidence and severity of functional limitations

Improved patient outcomes in several chronic conditions, including mood disorders, chronic pain, congestive heart failure, stroke, constipation, and sleep disorders



www. UPTODATE 2016, accessed March 10, 2016

Seematter-Bagnoud L, et al. Rev Med Suisse 2012

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Effets du vieillissement sur l'activité physique

- **Diminution progressive de la VO2max:**
  - 5-10 % par décennie de façon non-linéaire, avec accélération après 70 ans (20-25 %/10 ans après 70 ans)
- **Diminution de la masse et de la force musculaire**
  - 1-2% /an dès âge de 35 ans, 3 %/an dès 60 ans
- **Diminution de la souplesse et de l'amplitude du mouvement**
- **Diminution des taux d'hormones de croissance, ho anaboliques (testo) et DHEA**

Vogel T, Lang O. Info@geriatrie, 2015

Physical activity, function, and longevity among the very old

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Table 1. Baseline Characteristics at Ages 70, 78, and 85 Years[a]

Variable	Phase I, Age 70 y (1990-1991) (n=457)		Phase II, Age 78 y (1997-1998) (n=894)		Phase III, Age 85 y (2005-2006) (n=1172)	
	PA	Sedentary	PA	Sedentary	PA	Sedentary
Total	244 (53.4)	213 (46.6)	688 (76.9)	206 (23.0)	750 (64.0)	422 (36.0)
Sex						
Men	140 (57.4)	110 (51.6)	384 (55.8)	57 (27.7)	376 (50.1)	152 (36.0)
Women	104 (42.6)	103 (48.4)	304 (44.2)	149 (72.3)	374 (50.0)	270 (64.0)
Ashkenazi	204 (82.9)	148 (69.5)	535 (77.8)	120 (58.2)	577 (78.0)	247 (60.1)
Educational level, mean (SD), y	13.2 (5)	11.4 (6)	12.2 (6)	8.5 (6)	12.3 (6)	9.4 (6)
Financial difficulties	68 (28.2)	90 (43.3)	203 (31.6)	88 (50.3)	186 (24.9)	184 (45.2)
Lonely	84 (35.2)	78 (37.9)	224 (34.6)	100 (60.6)	279 (37.4)	216 (56.1)
Depressed	23 (10.3)	42 (22.6)	97 (18.4)	34 (37.0)	211 (28.6)	194 (52.4)
Poor self-rated health status	32 (13.2)	95 (45.2)	231 (34.5)	142 (71.7)	192 (25.9)	207 (53.9)
MMSE score, mean (SD)	29 (3)	28.5 (3)	28.7 (2)	27.5 (3)	27.8 (3)	24.5 (7)
ADLs (Dependence)	4 (1.7)	19 (9.2)	28 (4.5)	69 (36.5)	137 (18.5)	296 (72.9)
ADLs (Difficulty)	66 (28.2)	103 (49.8)	267 (41.5)	140 (74.1)	607 (81.9)	381 (93.8)
BMI,[b] mean (SD)	26.8 (4)	27.6 (4)	27.3 (4)	29.3 (6)	27.2 (4)	27.5 (5)
Smoking pack-years, mean (SD)	14 (22)	16.4 (24)	19.6 (28)	14.5 (27)	10.8 (23)	6 (17)
Fracture in last 7 y[c]	55 (22.5)	40 (19.0)	71 (20.3)	41 (34.8)	67 (35.5)	62 (44.9)
Fall in last year	67 (27.5)	61 (28.8)	174 (26.2)	74 (39.6)	291 (39.0)	230 (55.6)
Chronic back/joint pain	143 (58.6)	132 (61.9)	503 (73.1)	169 (82.0)	387 (51.6)	266 (63.0)
Medication for hypertension	88 (35.8)	117 (54.9)	366 (53.0)	137 (66.5)	561 (74.8)	339 (80.3)
Medication for diabetes mellitus	12 (4.9)	22 (10.3)	67 (9.7)	27 (13.1)	94 (12.5)	101 (23.9)
Hypertension	74 (30.3)	105 (49.3)	352 (51.2)	134 (65.5)	533 (71.1)	308 (73.2)
Diabetes mellitus	33 (13.5)	39 (18.3)	120 (17.4)	45 (21.8)	131 (17.5)	119 (28.3)
Ischemic heart disease	57 (23.4)	61 (28.6)	226 (32.9)	78 (37.9)	281 (37.4)	156 (37.0)
Renal disease	1 (0.4)	3 (1.4)	12 (1.7)	5 (2.4)	59 (7.9)	47 (11.2)

Stessman J, et al. Arch Intern Med 2009 ;169: 1476-83

Physical activity, function, and longevity among the very old

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*** Initiating or continuing PA (≥ 4h/w) among the very old is associated with better survival and function**

Table 2. Mortality From Any Cause According to PA

Age at Which PA Was Measured, y	Follow-up Period, Age Range, y	Hazard Ratio[a] (95% Confidence Interval)	
		Unadjusted	Adjusted
70	70-78	0.50 (0.30-0.76)	0.61 (0.38-0.96)
78	78-85	0.57 (0.44-0.74)	0.69 (0.48-0.98)
85	85-88	0.25 (0.18-0.35)	0.42 (0.25-0.68)
70-85[b]	70-88	0.48 (0.37-0.64)	0.66 (0.46-0.95)

*** The PA level at age 78 is associated with remaining independent while performing activities of daily living at age 85 !**
(Odds ratio, 1.92 , CI, 1.11-1.33)

Stessman J, et al. Arch Intern Med 2009 ;169: 1476-83

Low-dose of moderate-to-vigorous physical activity in adults aged ≥ 60 years

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- **Background:**
  - ° Current guidelines recommendations to gain substantial health benefits:
    ≥ 150' weekly of moderate-intensity physical activity,
    or 75' weekly of vigorous-intensity physical activity
  - ° Dose not reached in older (to high?)

- **Meta-analysis of 9 cohort studies, with the objectives to assess the effects of lower-dose moderate-to-vigorous physical activity (MVPA) on all-cause mortality in 122 000 older adults (age ≥ 60; mean age, 73)**

- **Follow-up 10 years, 18 0000 participants (15 %) died**

- **Weekly physical activity measured in Metabolic Equivalent of Task (MET) minutes**

Hupin D, et al. Br J Sports Med 2015; 0:1-8.

Table 1 | Definitions of sedentary behaviour and differing intensities of physical activity

Intensity	Examples	Energy expenditure (METs)	Accelerometer threshold (counts/min)[15]
Sedentary time	Sitting, lying down	1.0-1.5	<100
Light intensity	Standing, self care, household activities	1.6-2.9	100-1951
Moderate intensity	Brisk walking and equivalent	3.0-5.9	1952-5724
Vigorous intensity	Jogging, hard physical labour	≥ 6	≥5725

METs=metabolic equivalents (multiples of resting energy expenditure).

Sparling PB, et al. BMJ 2015;350:H100

Echelles d'intensité physique

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Difficulté ressentie (score de l'échelle de Borg)	Intensités repères	Signes physiques repères	Dépense énergétique repère (en MET ou cal/kg/h)	Pourcentage de la fréquence cardiaque de réserve (FCmax-FCrepos)	Exemples d'activités
6-7 Aucun effort à extrêmement facile **8-9** Effort très léger **10-11** Effort léger	Légère	• Chaleur • Transpiration	3	< 40%	Marche, golf, patinage lent, pêche, baignade, jeu de quilles, danses sociales, ménage, voile, jouer d'un instrument de musique
12-13 Effort moyennement facile	Modérée	• Chaleur • Transpiration • Battements cardiaques accélérés • Essoufflement modéré	3-6 Les activités deviennent sportives à partir de 4,5	40-60%	Tonte du gazon, nettoyage des tapis, golf, jogging lent, natation, aérobic, ski alpin, vélo
14-15 Effort difficile **16-17** Effort très pénible **18-20** Effort extrêmement pénible à exténuant	Intense à très intense	• Chaleur • Transpiration • Battements cardiaques accélérés • Essoufflement progressivement intense	6 et > 6	60-85% et > 85%	Pelletage, porter des charges lourdes, course à pied, ski de fond, football, hockey, basketball

Sittarame f, Golay A. Rev Med Suisse, 2013

Low-dose of moderate-to-vigorous physical activity in adults aged ≥ 60 years

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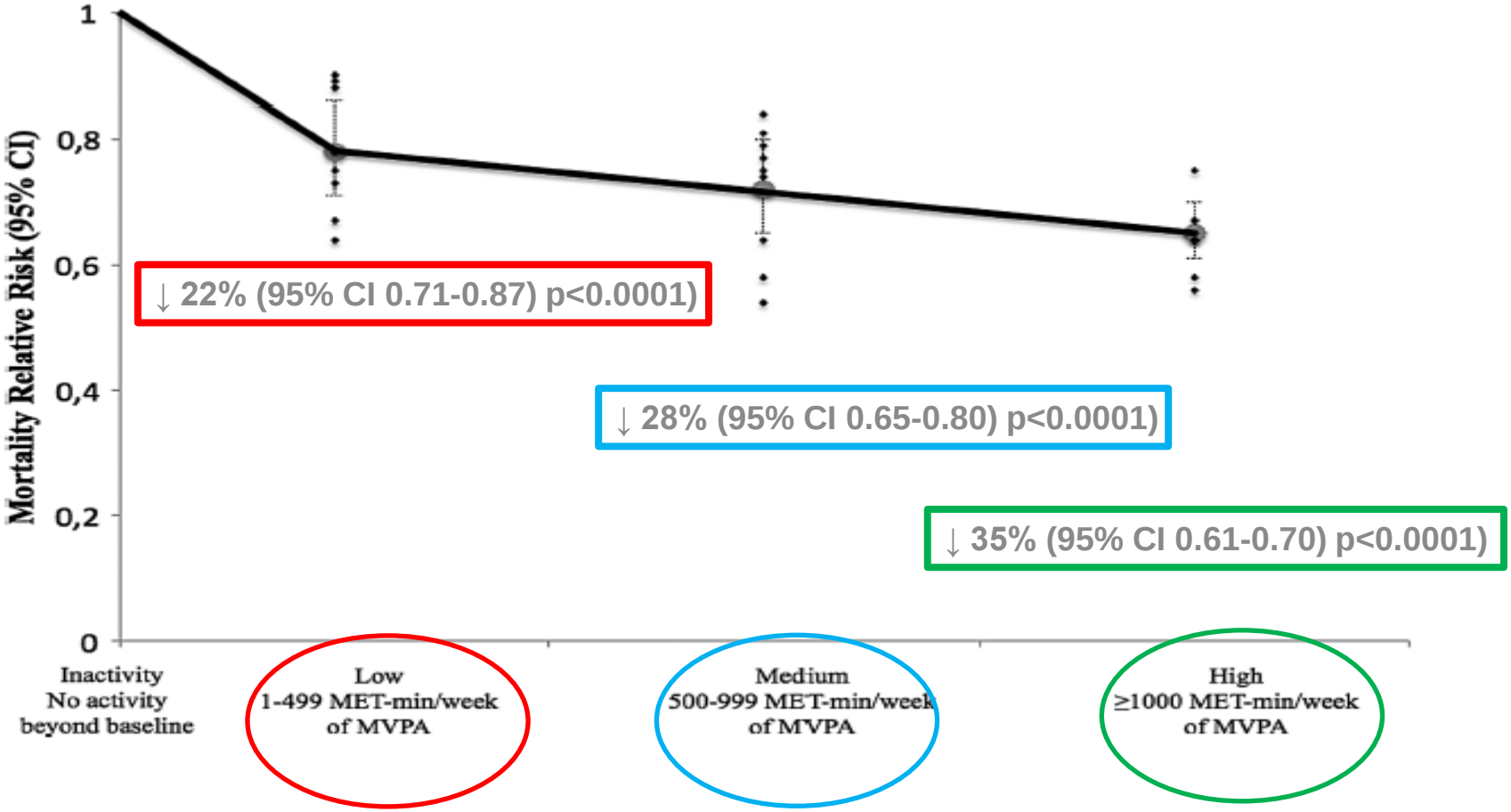

Hupin D, et al. Br J Sports Med 2015; 0:1-8.

Low-dose of moderate-to-vigorous physical activity in adults aged ≥ 60 years

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- **The greatest reduction in risk of mortality (22 %) is seen in those who change from doing no PA to some MVPA (1-499 MET-min/week)**
- **15'/day of MVPA could be reasonable target dose for olders adults**
- **Any exercice is better than none**

Hupin D, et al. Br J Sports Med 2015; 0:1-8.

Midlife fitness and the development of chronic conditions in later life

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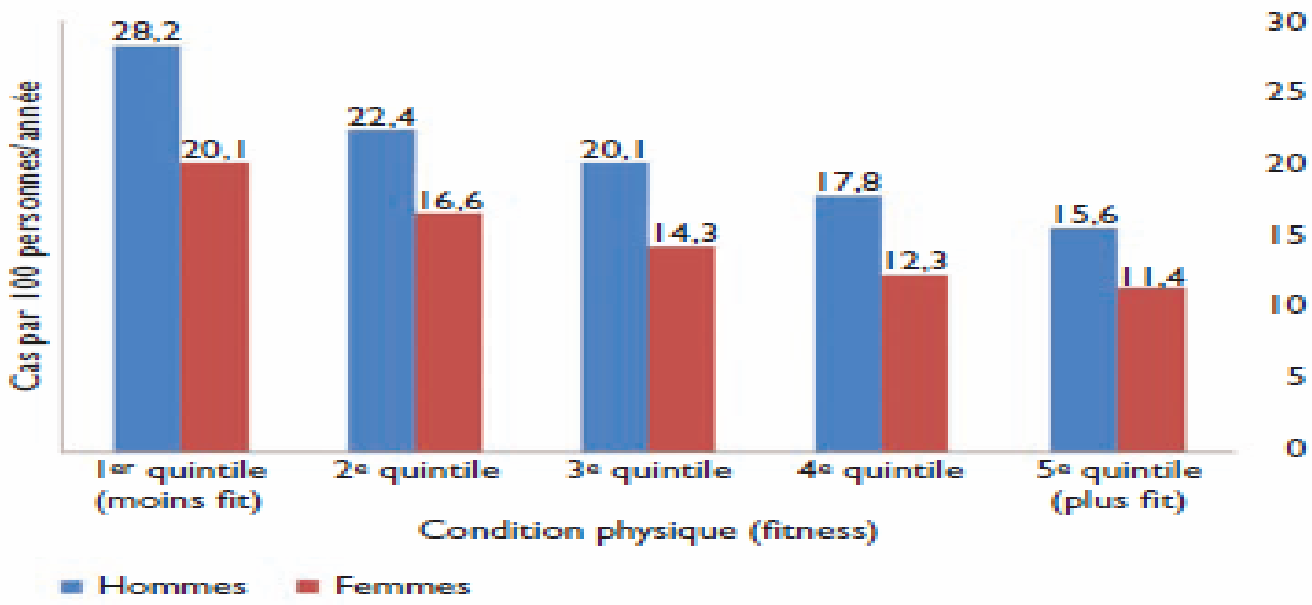

Figure 1. Incidence de maladies chroniques après 65 ans en fonction du degré de condition physique chez les hommes et les femmes

Quintile de condition physique allant du moins «fit» au plus «fit». (Adaptée de réf.[2]).

Willis BL et al. Arch Intern Med 2012; 27:1-8

The LIFE (Lifestyle Interventions and Independence for Elders) Study Randomized Clinical Trial

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Effect of Structured Physical Activity on Prevention of Major Mobility Disability in Older Adults

- **1635 community-living participants, aged 70-89 years, mean age 78.9**
- **No cognitive impairment**
- **Follow-up 2,6 years**
- **Sedentary, at risk for mobility disability but able to walk 400m**
- **<u>Interventions:</u>**
  - a structured class (2 times/wk) and home (3-4 times/wk) **exercice program** (walking, resistance training and flexibility exercices) n=818
  - Weekly **health education** sessions n=817

- **<u>Main outcomes and measures:</u> major mobility disability objectively defined by loss of ability to walk 400m within 15'**

Pahor M, et al. JAMA 2014; 311:2387-96

The LIFE (Lifestyle Interventions and Independence for Elders) Study Randomized Clinical Trial

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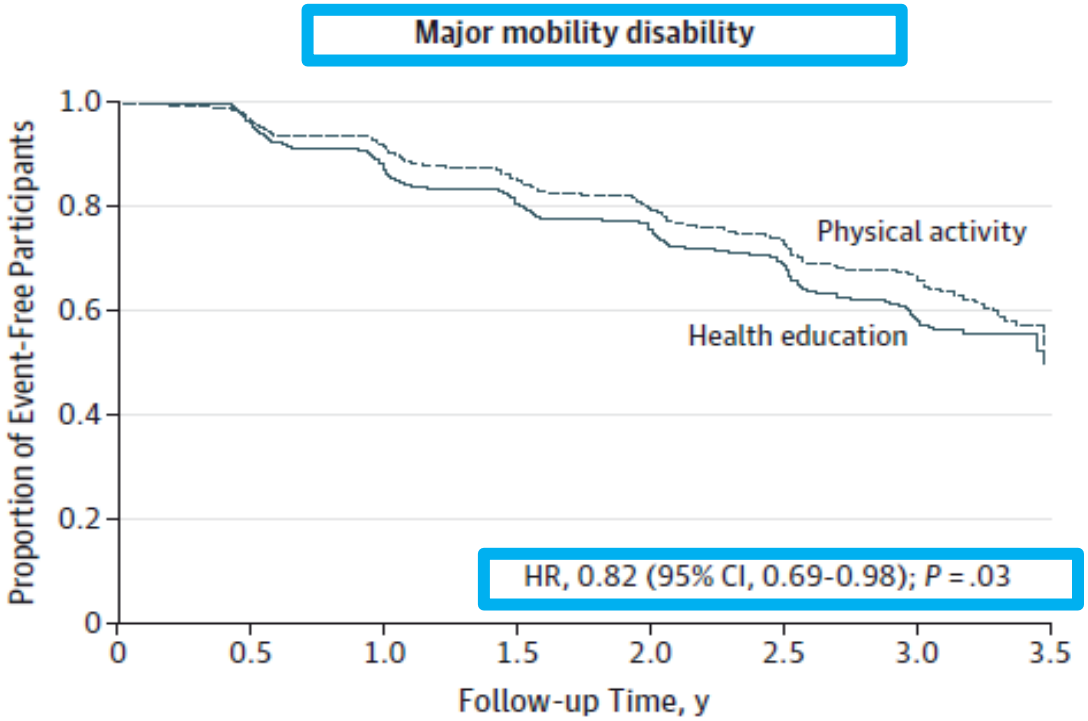
Effect of a Moderate Physical Activity Intervention on the Onset of Major Mobility Disability



Pahor M, et al. JAMA 2014; 311:2387-96

The LIFE (Lifestyle Interventions and Independence for Elders) Study Randomized Clinical Trial

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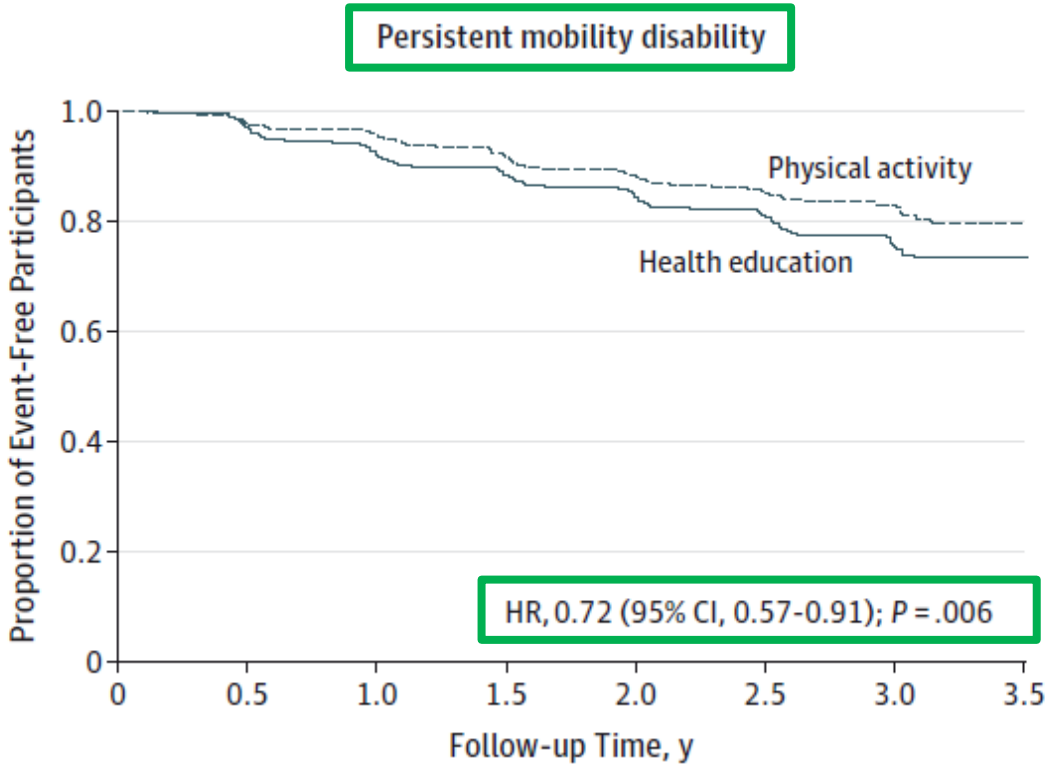
Effect of a Moderate Physical Activity Intervention on the Onset of Major Mobility Disability and Persistent Mobility Disability



Pahor M, et al. JAMA 2014; 311:2387-96

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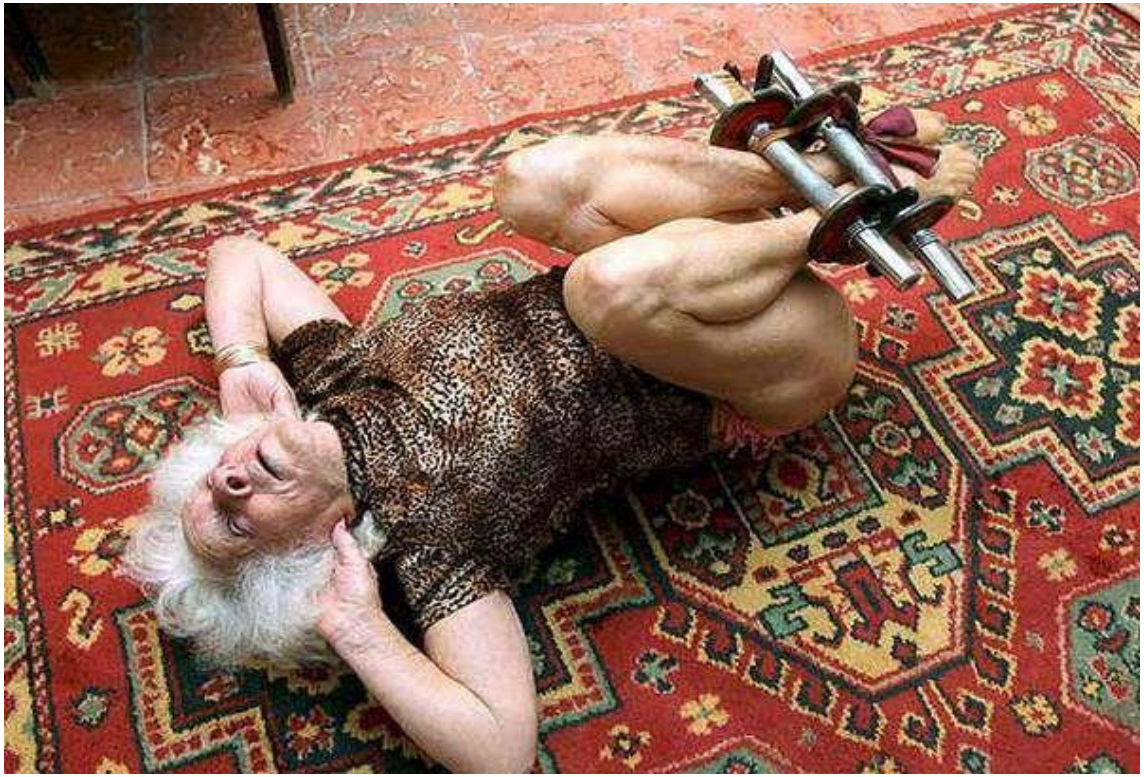
Benefits of physical activity: at any dose ?

« The benefits of exercice are indisputable and the current perception is that a curvilinear relation ship exist between the amount of physical activity and the related health benefits. »



Eijsvogels TMH, Thompson PD. JAMA 2015; 314: 1915-16

Leisure Time Physical Activity (LTPA) and Mortality

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Table 1. Descriptive Characteristics of 661 137 Study Participants

Characteristic	No. of Participants	LTPA Level, MET h/wk, No. (%)[a]						
		0	0.1 to <7.5	7.5 to <15.0	15.0 to <22.5	22.5 to <40.0	40.0 to <75.0	≥75.0
Participants	661 137	52 848 (8.0)	172 203 (26.1)	170 563 (25.8)	118 169 (17.9)	124 446 (18.8)	18 831 (2.9)	4077 (0.6)
Deaths	116 686	11 523 (9.9)	33 511 (28.7)	28 957 (24.8)	19 979 (17.1)	21 114 (18.1)	1390 (1.2)	212 (0.2)
Age, y								
<60	276 418	25 554 (50)	75 671 (45)	71 031 (43)	45 451 (39)	44 721 (36)	11 261 (65)	2729 (76)
60 to <70	307 556	19 694 (39)	75 954 (45)	79 553 (48)	60 978 (53)	66 113 (54)	4631 (27)	633 (18)
≥70	61 356	5924 (12)	16 838 (10)	16 022 (10)	9190 (8)	11 838 (10)	1332 (8)	212 (6)
Sex								
Men	291 485	19 867 (38)	71 564 (42)	74 298 (44)	61 553 (49)	5685 (49)	5685 (30)	1123 (28)
Women	369 652	32 981 (62)	100 639 (58)	96 265 (56)	60 774 (51)	62 893 (51)	13 146 (70)	2954 (72)
Smoking status								
Never	275 388	21 168 (41)	73 112 (43)	72 824 (43)	47 519 (41)	49 729 (41)	8984 (48)	2052 (51)
Former	298 256	21 239 (41)	74 182 (44)	76 979 (46)	56 663 (49)	59 759 (49)	7900 (42)	1534 (38)
Current	74 977	9730 (19)	21 866 (13)	17 721 (11)	11 272 (10)	12 101 (10)	1826 (10)	461 (11)
Alcohol intake								
None	179 676	19 935 (38)	52 463 (30)	44 710 (26)	26 271 (22)	30 912 (25)	4415 (23)	970 (24)
1 Drink/d	376 861	26 750 (51)	95 829 (56)	99 981 (59)	69 817 (59)	69 498 (56)	12 298 (65)	2688 (66)
2 Drinks/d	54 063	2542 (5)	11 550 (7)	13 745 (8)	12 114 (10)	12 609 (10)	1273 (7)	230 (6)
Educational level								
College graduate	250 564	14 324 (29)	61 415 (37)	67 527 (41)	50 433 (44)	48 175 (40)	7257 (44)	1433 (43)
Marital status								
Married	474 338	38 407 (77)	123 151 (77)	123 954 (77)	83 143 (74)	89 568 (76)	13 176 (81)	2939 (76)
BMI								
<25.0	277 193	18 841 (36)	63 975 (38)	70 716 (42)	51 582 (44)	58 629 (48)	11 043 (60)	2407 (60)
25.0 to <30.0	256 713	19 133 (37)	66 709 (39)	67 480 (40)	47 325 (40)	49 015 (40)	5867 (32)	1184 (30)
≥30.0	119 988	14 046 (27)	39 736 (23)	30 758 (18)	18 057 (15)	15 367 (12)	1632 (9)	392 (10)
Race								
White	627 393	49 915 (96)	162 946 (96)	162 468 (97)	111 831 (96)	118 415 (97)	18 042 (96)	3776 (93)
Comorbidities								
Heart disease	61 158	4380 (8)	15 450 (9)	15 462 (9)	12 512 (11)	12 445 (10)	777 (4)	132 (3)
Cancer	46 358	4381 (8)	13 140 (8)	12 214 (7)	7099 (6)	8109 (7)	1198 (6)	217 (5)

Arem H, et al. JAMA Intern Med 2015; 175:959-67

Leisure Time Physical Activity (LTPA) and Mortality

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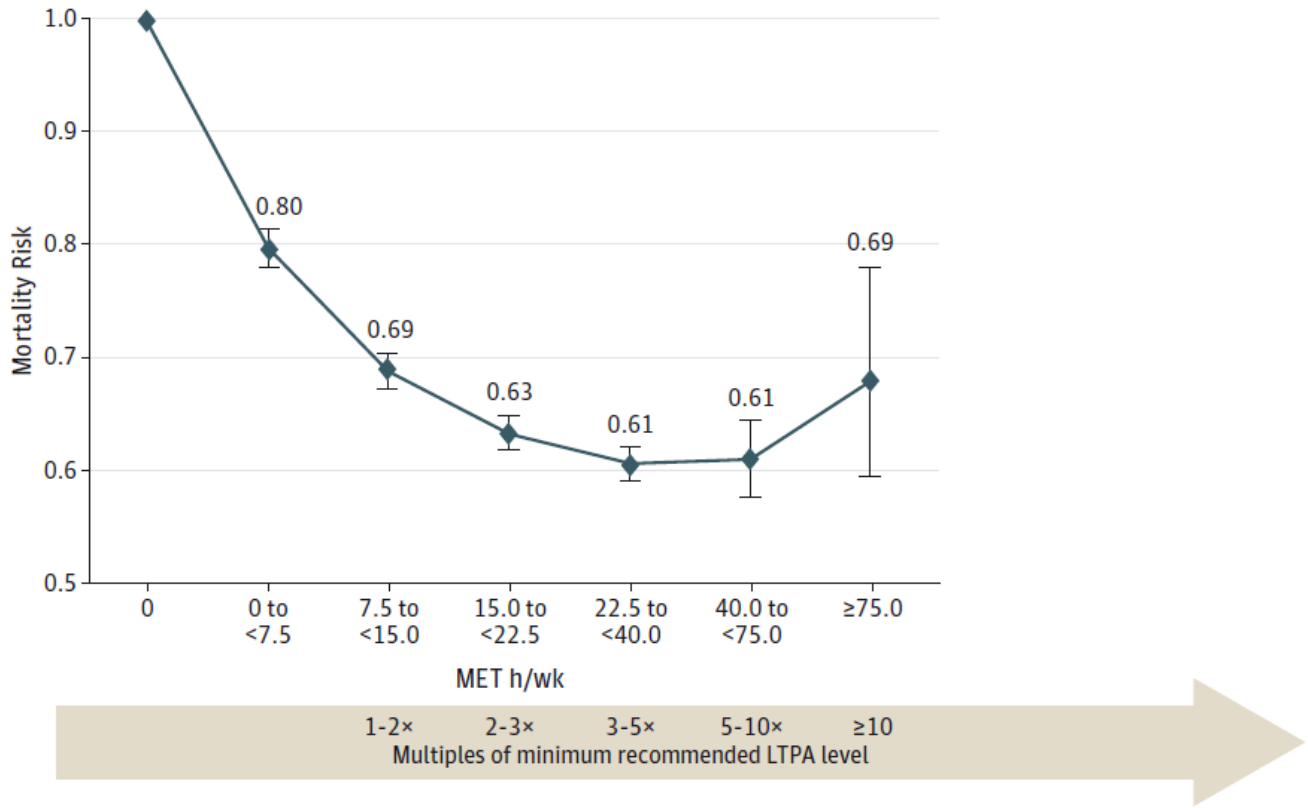
Figure. Hazard Ratios (HRs) and 95% CIs for Leisure Time Moderate- to Vigorous-Intensity Physical Activity and Mortality



The dose-response curve and category-specific HR estimates of exercise levels compared with the federally recommended minimum of 7.5 metabolic equivalent (MET) hours per week. Models were stratified by cohort and use age as the underlying time scale. The model was adjusted for sex, smoking (never, former, current, or missing), alcohol (none, <15 g/day, 15 to <30 g/day, or ≥30 g/day), educational level (dropout, high school, post-high school training, some college, college graduate, postcollege, or missing), marital status (married, divorced, widowed, single, or missing), history of cancer, history of heart disease, and body mass index (calculated as weight in kilograms divided by height in meters squared) (<18.5, 18.5 to <25.0, 25.0 to <30.0, 30.0 to <35.0, or ≥35.0).The dotted line between categories illustrates an assumed dose-response curve rather than individual data points. Crude and adjusted risk estimates are presented in eTable 3 in the Supplement.

Arem H, et al. JAMA Intern Med 2015; 175:959-67

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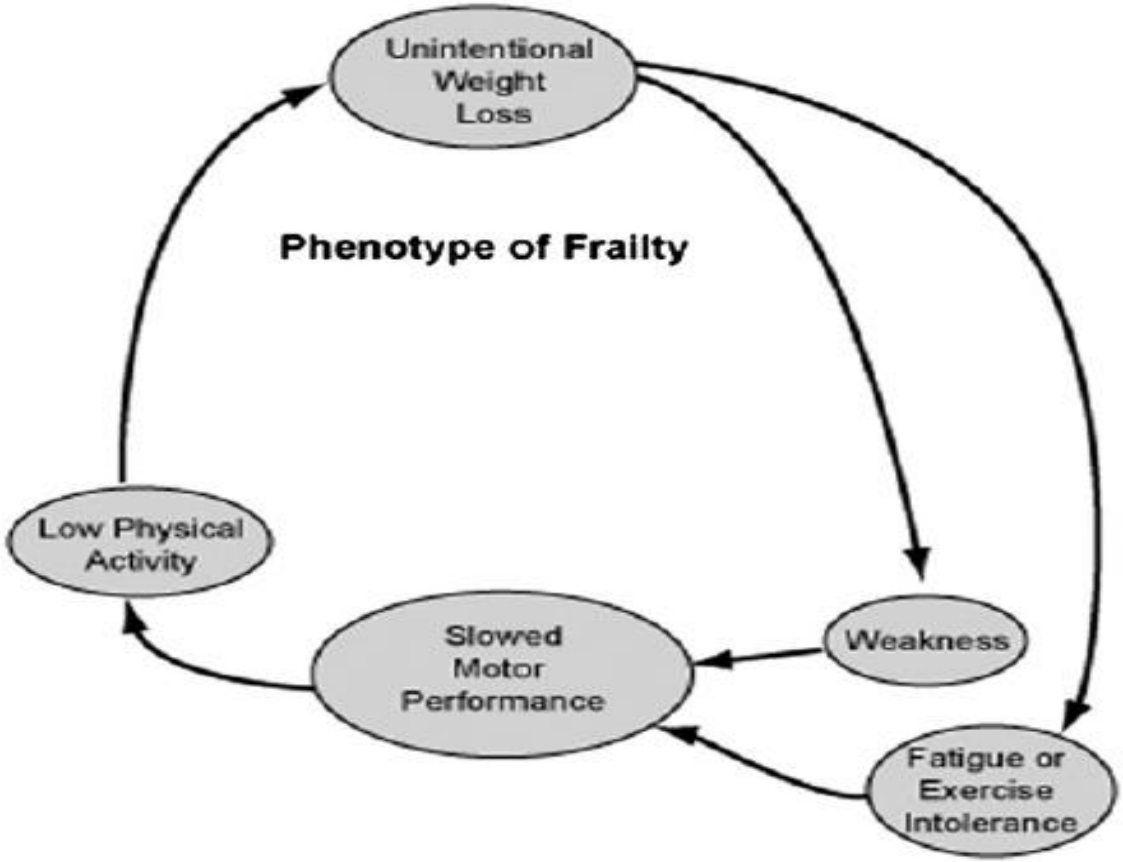
Components of Frailty



Liu KL, Fielding RA. Clin Geriatr Med 2011;27:101-110

Schematic representation of the pathophysiology of frailty

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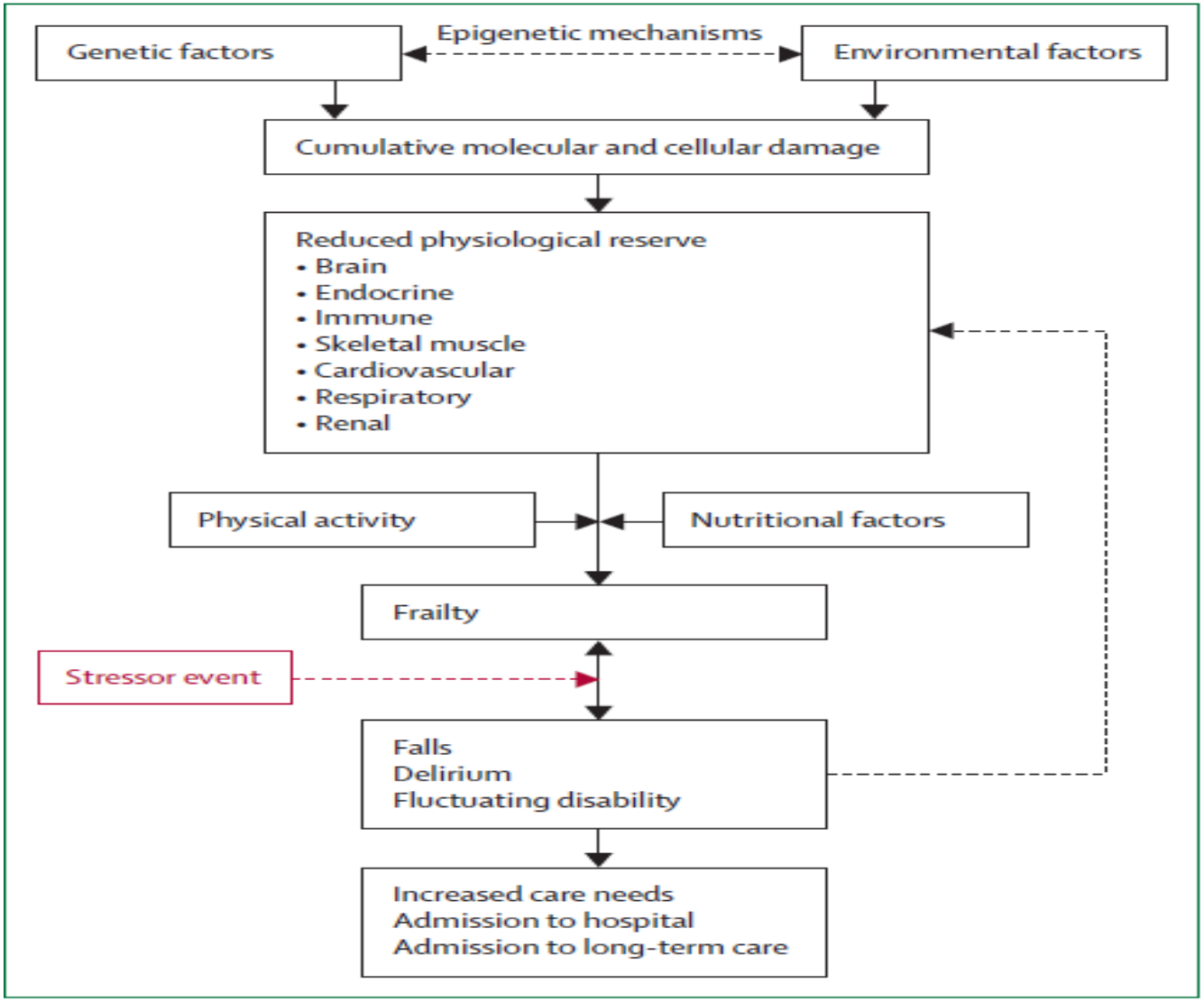
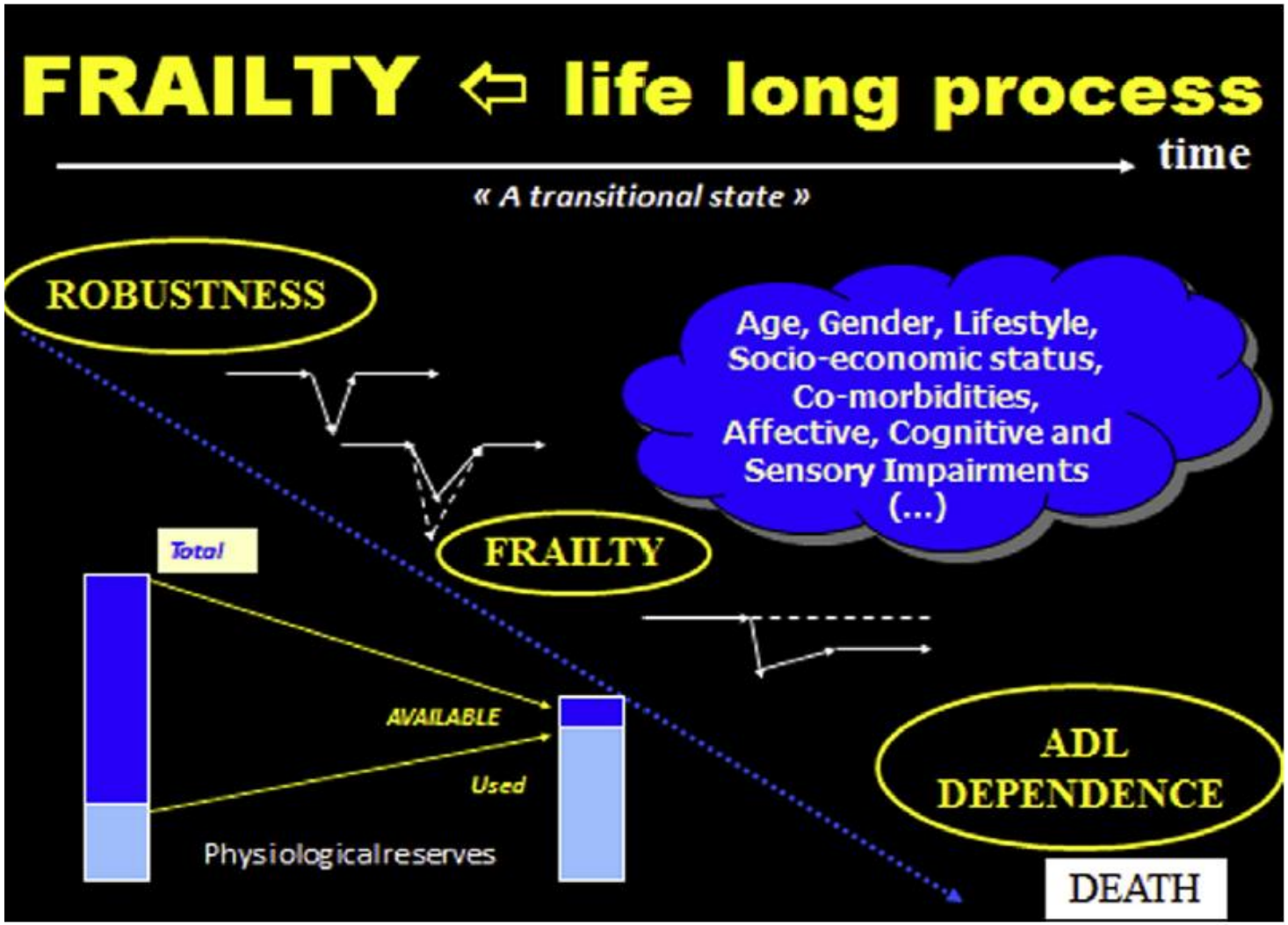


Clegg A, et al. Lancet 2013,381;752-62

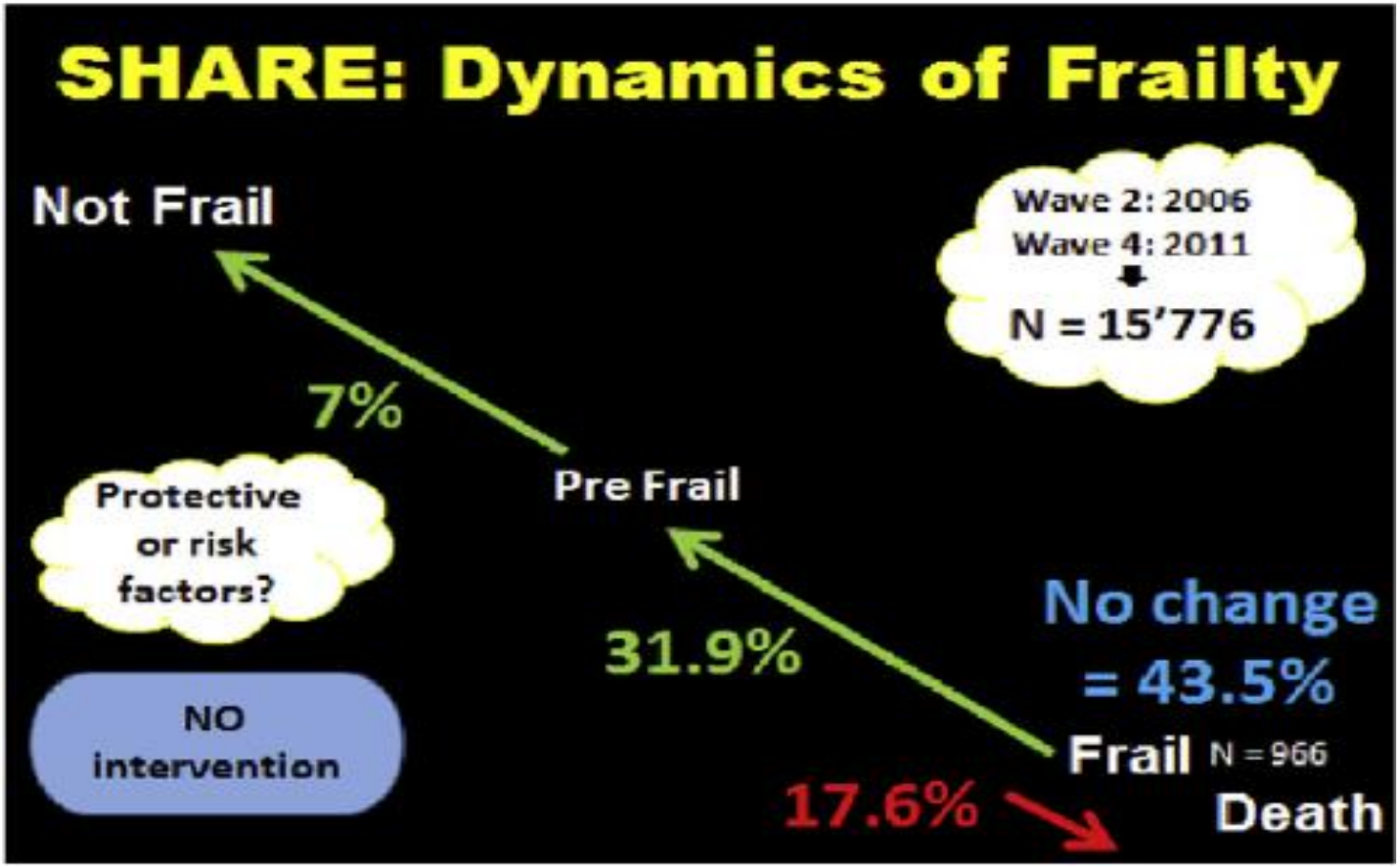
Dynamics of frailty : the SHARE study



Michel JP, Cruz-Jentoft AJ, Cederholm T. Clin Geriatr Med 2015;31:375-87

Natural transitions occurring from the frail state

C



Physical activity as preventive strategy for frailty

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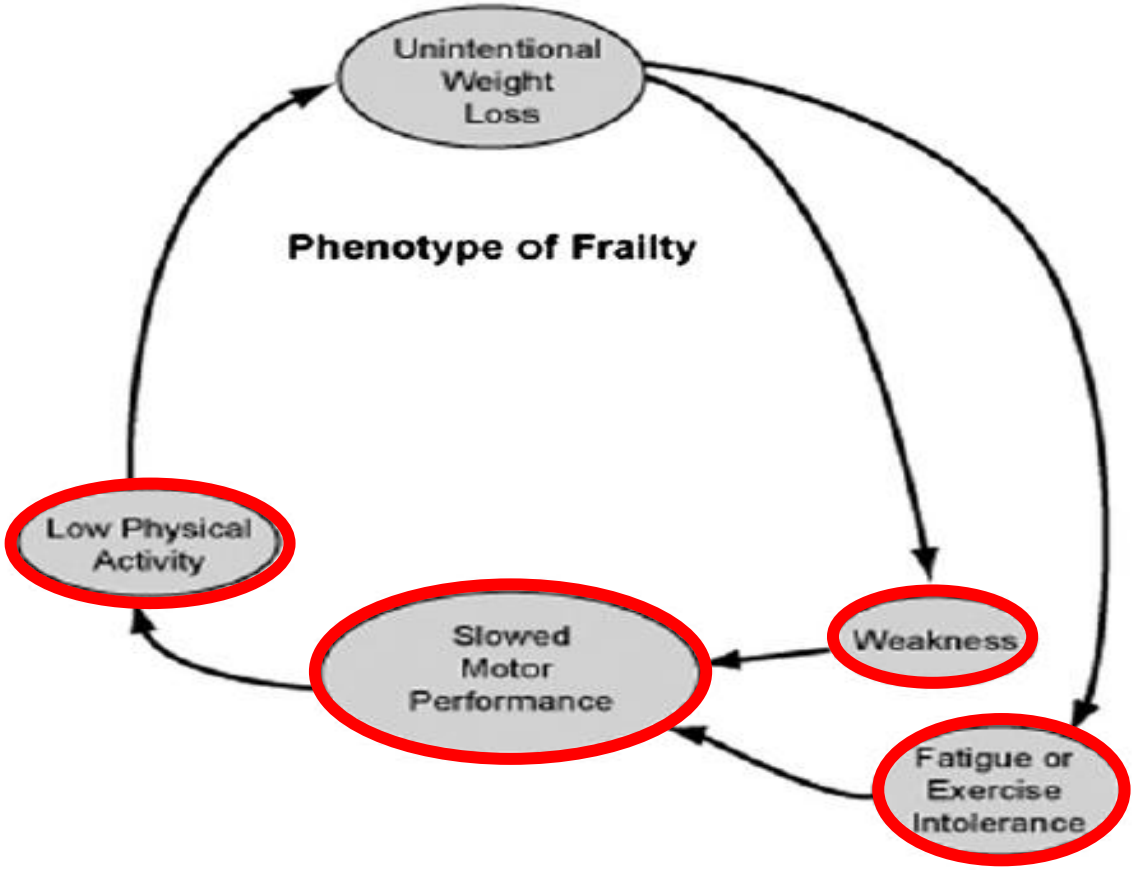

Liu KL, Fielding RA. Clin Geriatr Med 2011;27:101-110

Exercice as an intervention for frailty

Forster A,et al. Cochrane Database Syt Rew 2009

- **49 RCT of exercice interventions (particulary those with strength and balance training) for long term care residents can increase muscle strength and functional abilities**

De Vries NM, et al. Ageing Res Rev 2012

- **Meta-analysis**
  - **Small effect for mobility (HR 0.18 95% CI 0.05-0.30)**
  - **Moderate effect for functional ability (HR 0.27 95% CI 0.08-0.46)**

- **Problems:**
  - definition variable of frailty
  - the most frail patients seemed to gain the least benefit (but, small gains in strength of long term residents might translate into important functional gains!)

Clegg A, et al. Lancet 2013,381;752-62

Physical exercice in frail elders (Fried criteria)

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Meta-analysis 8 RCT

- **1068 frails participants (Fried criteria), age 75.3-86.8 years**
- **Inactive or**

  exercice intervention group (60', twice/week, follow-up at least 8 months)

- **Positive impact on of several variables:**
  - Gait speed
  - Berg balance scale score
  - ADL performance

Chou Ch, et al. Arch Phys Med Rehab 2012; 93:237-44

Meta-analysis of 12 RCT

- **Inactive control group of community-dwelling older adults or exercice intervention group (45', twice/week, follow-up at least 6-24 months)**

- **Improvement of several parameters:**
  - Normal Gait speed
  - Fast gait speed
  - Short physical performance battery

Gine-Garriga M, et al. Arch Phys Med Rehab 2014; 95:753-69

A Physical Activity Intervention to Treat the Frailty Syndrome in Older Persons—Results From the LIFE-P Study

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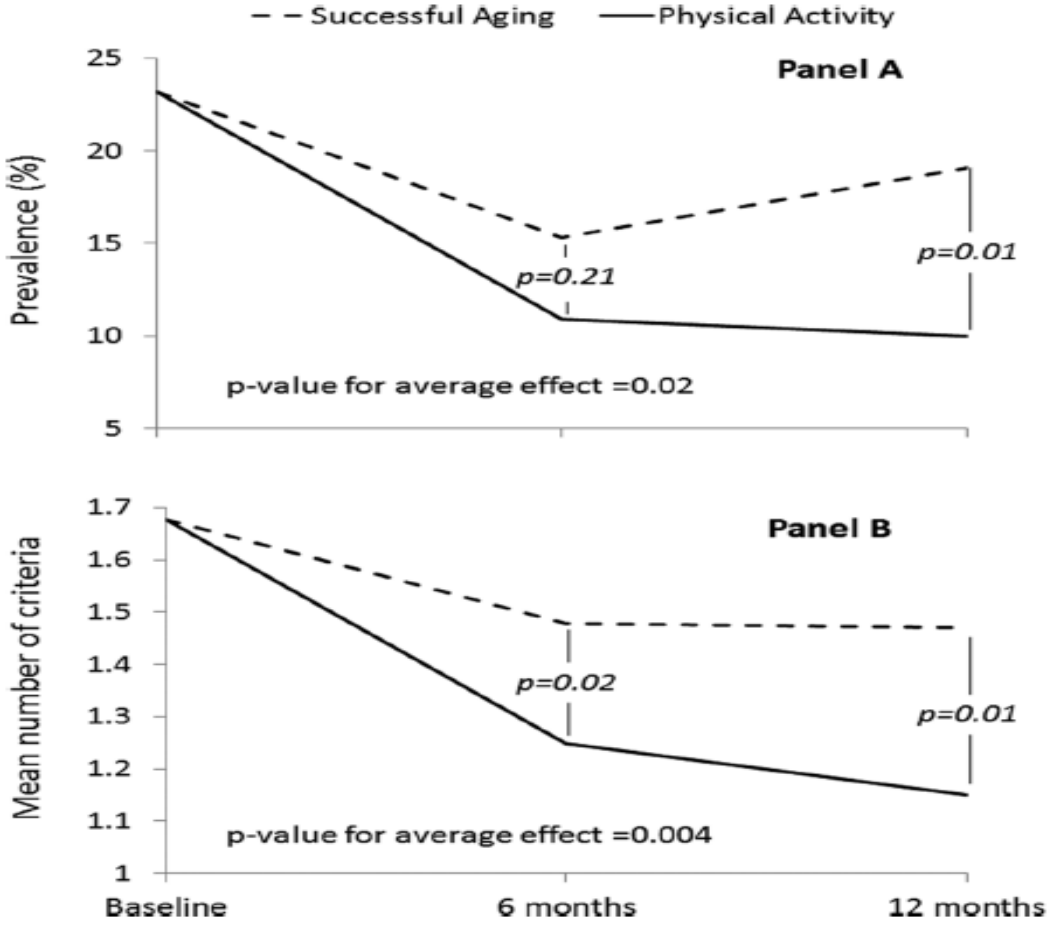

Prevalence of frailty at 12 months:
10 % intervention group vs 19.1% control group

Cesari M, et al. J Gerontol A Biol Sci Med Sci 2015; 70:216-22

A Physical Activity Intervention to Treat the Frailty Syndrome in Older Persons—Results From the LIFE-P Study

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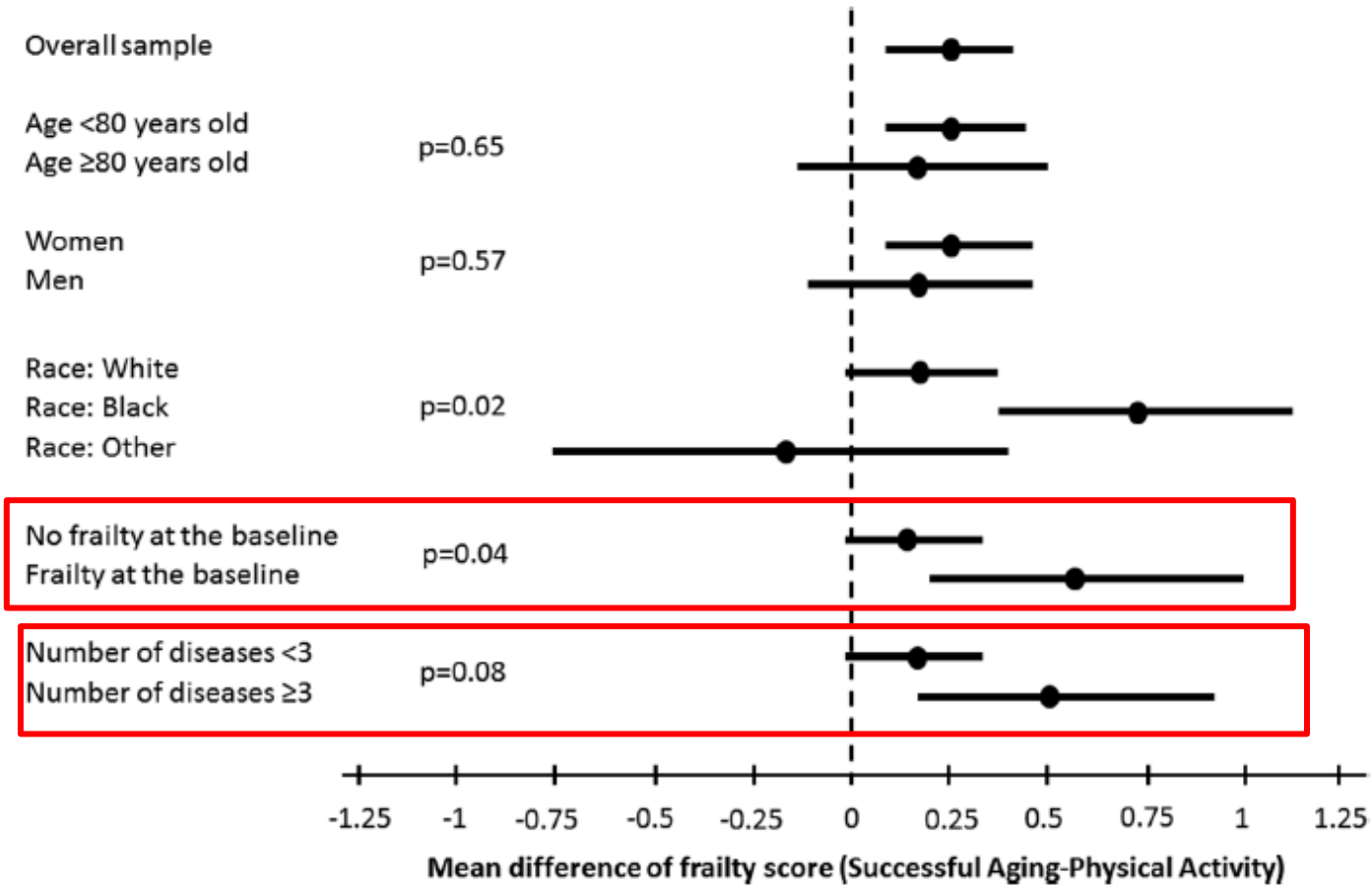

Cesari M, et al. J Gerontol A Biol Sci Med Sci 2015; 70:216-22

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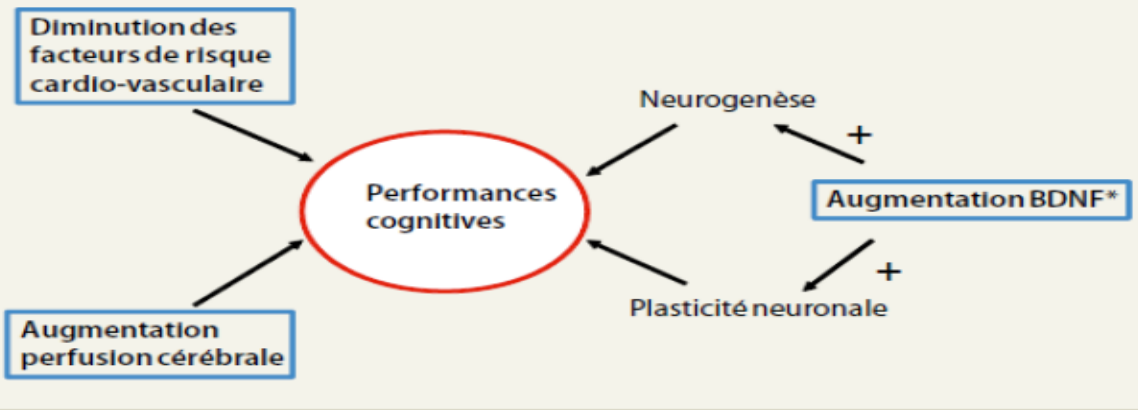
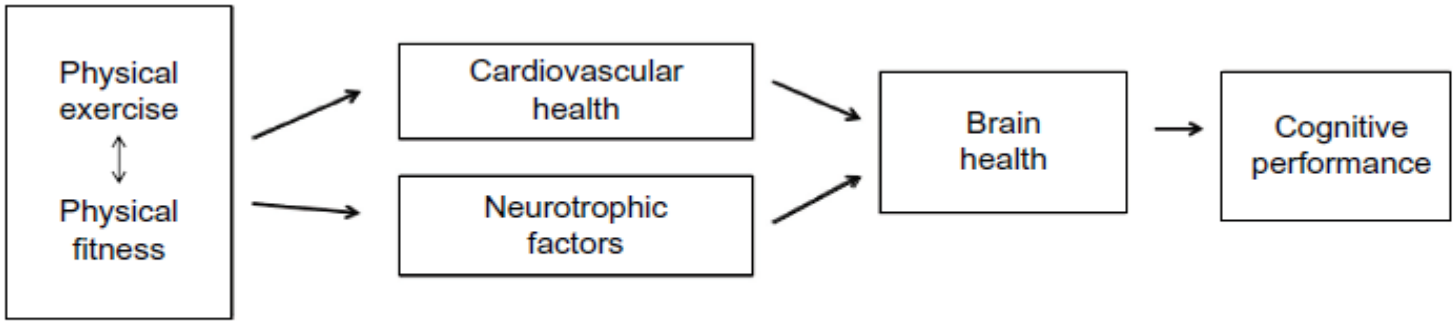
Activité Physique et Performances Cognitives

Fig. 1 **Association entre l'activité physique et performances cognitives**



Mécanismes hypothétiques pouvant expliquer l'association entre activité physique et performances cognitives.
*BDNF= «Brain derived neurotrophic factor»

Seematter-Bagnoud LS et al., **Ger Prat** 2010;3:33-36



Physical exercise and cognitive performance in older adults: a theoretical model.

Kirk-Sanchez NJ, et al.Clin Interv in Aging 2014; 9: 51-62

Activité physique et performance cognitive

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Spital Wallis

ETUDES OBSERVATIONNELLES

Exercice is associated with reduced risk for incident dementia among persons 65 years of age and older

Hôpital du Valais
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- **Objective: to determine whether regular exercice is associated with a reduced risk for dementia and Alzheimer disease**
- **Design: prospective cohort study**
- **Participants: 1740 older than 65 years (74.5 +/- 5.7) without cognitive impairment**
- **Follow-up: 6.2 years**
- **Measurements: exercice frequency < 3times/week or ≥ 3times/week (≥15')**

Larson EB, et al. Ann Intern Med 2006; 144:73-81

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

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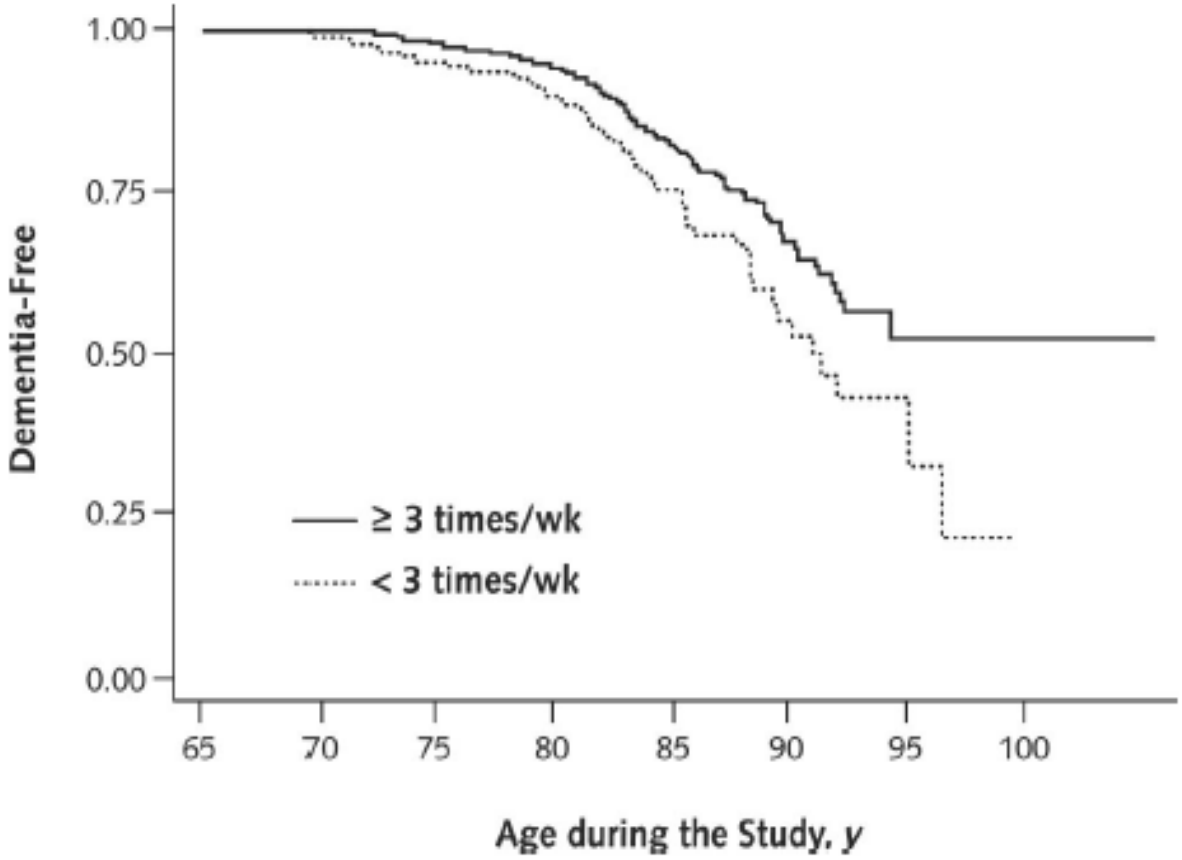

HR 0.62 (95 % CI: 0.44-0.86; P=0.004)

Larson EB, et al. Ann Intern Med 2006; 144:73-81

The Association Between Midlife Cardiorespiratory Fitness Levels and Later-Life Dementia

Hôpital du Valais
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Design: Prospective, observational cohort study.

N= 19 458

Age. 49.8 ± 8.7 years (baseline)

Follow-up : 25 years

Table 1. Characteristics of Participants at Midlife Visit, by Quintile of Fitness Level

Variable	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	All Quintiles	*P* Value*
Participants, *n*	3322	3882	4085	4213	3956	19 458	–
Female, *n (%)*	552 (16.6)	774 (19.9)	746 (18.3)	1020 (24.2)	1008 (25.5)	4100 (21.1)	<0.001
Mean baseline age (SD), *y*	46.8 (8.6)	48.5 (8.8)	50.0 (8.4)	51.2 (8.7)	51.7 (8.2)	49.8 (8.7)	<0.001
Mean education (SD), *y*†	15.2 (2.7)	15.5 (2.5)	15.6 (2.6)	15.8 (2.6)	16.0 (2.5)	15.7 (2.6)	<0.001
Hypertension, *n (%)*	835 (25.1)	741 (19.1)	692 (16.9)	669 (15.9)	505 (12.8)	3442 (17.7)	<0.001
Diabetes, *n (%)*	168 (5.1)	112 (2.9)	95 (2.3)	75 (1.8)	45 (1.1)	495 (2.5)	<0.001
Smoker, *n (%)*	961 (28.9)	783 (20.2)	614 (15.0)	403 (9.6)	235 (5.9)	2996 (15.4)	<0.001
Mean alcohol use (SD), *drinks/wk*‡	8.5 (10.9)	8.6 (10.9)	8.9 (11.9)	8.8 (11.0)	8.7 (10.8)	8.7 (11.1)	0.002
Mean body mass index (SD), kg/m^2	28.1 (4.9)	26.4 (3.7)	25.8 (3.3)	25.0 (3.0)	23.8 (2.6)	25.7 (3.8)	<0.001
Mean systolic blood pressure (SD), *mm Hg*	123.7 (14.8)	121.6 (14.3)	121.1 (14.7)	120.9 (14.7)	120.5 (14.9)	121.5 (14.7)	<0.001
Mean diastolic blood pressure (SD), *mm Hg*	82.6 (10.1)	81.5 (9.8)	80.8 (9.7)	80.2 (9.4)	79.2 (9.1)	80.8 (9.7)	<0.001
Mean glucose level (SD)							<0.001
mmol/L	5.8 (1.3)	5.6 (1.0)	5.6 (0.8)	5.5 (0.7)	5.5 (0.7)	5.6 (0.9)	
mg/dL	103.7 (22.9)	101.7 (18.2)	100.0 (14.1)	99.1 (12.5)	98.2 (12.8)	100.4 (16.4)	
Mean total cholesterol level (SD)							<0.001
mmol/L	5.7 (1.1)	5.6 (1.0)	5.6 (1.0)	5.5 (1.0)	5.4 (1.0)	5.5 (1.0)	
mg/dL	220.3 (41.2)	216.1 (39.7)	215.2 (39.0)	211.5 (38.2)	207.7 (36.7)	213.9 (39.1)	
Mean cardiorespiratory fitness level (SD), *MET*	8.1 (1.4)	9.4 (1.4)	10.4 (1.4)	11.3 (1.6)	13.3 (2.2)	10.6 (2.4)	<0.001

Defina LF, et al. Ann Intern Med. 2013; 158: 162-68

The Association Between Midlife Cardiorespiratory Fitness Levels and Later-Life Dementia

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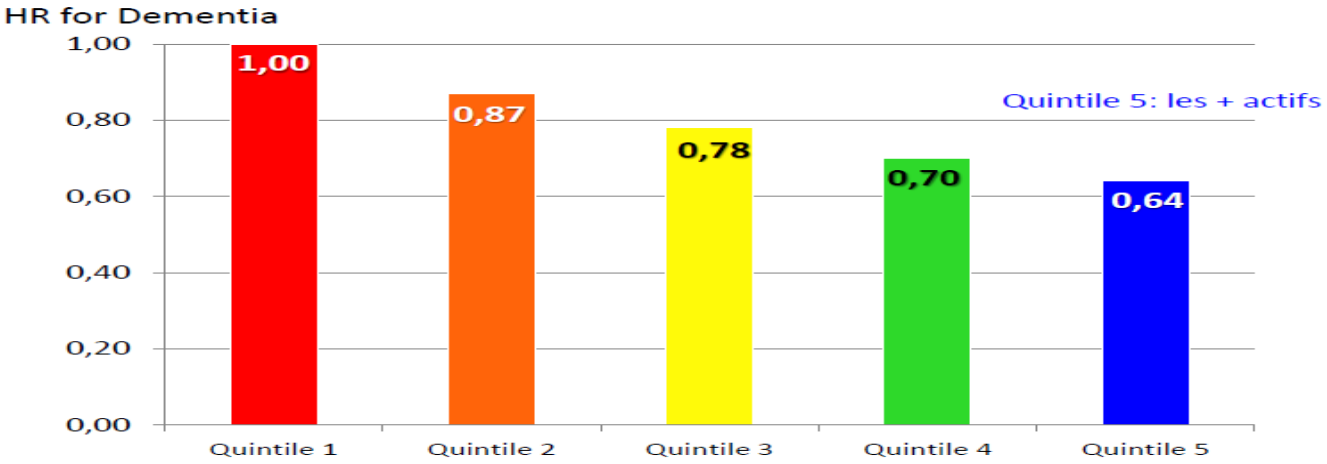
Table 2. Cox Proportional Hazards Model for Incident Alzheimer Disease and Related Types of Dementia

Effect, by Model Adjustment	Hazard Ratio (95% CI)	*P* Value
Adjustment 1 (*n* = 19 458)*		
Quintile 1 (reference)	1.00	–
Quintile 2	0.87 (0.75–1.01)	0.069
Quintile 3	0.78 (0.67–0.91)	0.001
Quintile 4	0.70 (0.60–0.81)	<0.001
Quintile 5	0.64 (0.54–0.76)	<0.001

Probabilité de développer une démence 25 ans plus tard en fonction niveau d'endurance à l'âge adulte?



The Association between Midlife Cardiorespiratory Fitness and Later-Life Dementia, DeFina LF et al. Ann Intern Med 2013; 158: 162-168

Defina LF, et al. Ann Intern Med. 2013; 158: 162-68

Activité physique et performance cognitive

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META-ANALYSES

Physical activity and risk of cognitive decline: a meta-analysis of prospective studies

Hôpital du Valais
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- **15 prospective studies included**
- **33 816 nondemented subjects, followed for 1-12 years**
- **Primary ou secondary outcome: association between physical activity and cognitive decline**
- **3210 patients showed cognitive decline during follow-up**

Sofi F, et al. Journal of Internal Medicine, 2011;269:107-17

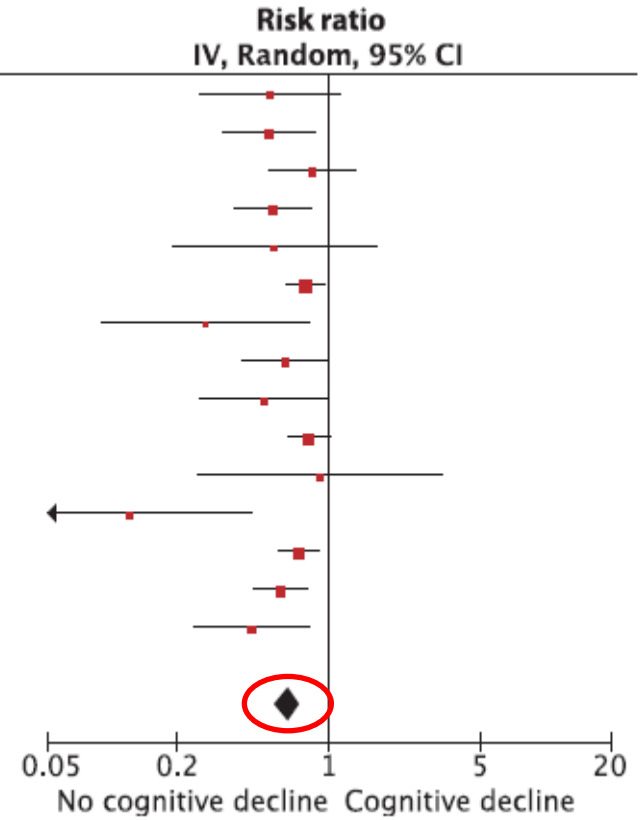
Physical activity and risk of cognitive decline: a meta-analysis of prospective studies

Hôpital du Valais
Spital Wallis

Studies investigating a low-to-moderate level of physical activity

Study or Subgroup	Weight	Risk ratio IV, Random, 95% CI
Ho *et al.*, (M)	3.0%	0.53 [0.25, 1.12]
Ho *et al.*, (F)	5.9%	0.53 [0.32, 0.87]
Laurin *et al.*, (M)	6.4%	0.84 [0.53, 1.34]
Laurin *et al.*, (F)	7.6%	0.55 [0.36, 0.83]
Schuit *et al.*,	1.5%	0.56 [0.19, 1.66]
Yaffe *et al.*,	16.0%	0.78 [0.64, 0.96]
Pignatti *et al.*,	1.4%	0.27 [0.09, 0.82]
Lytle *et al.*,	6.4%	0.63 [0.40, 1.00]
Flicker *et al.*,	3.4%	0.50 [0.25, 1.00]
Singh-Manoux *et al.*,	14.8%	0.81 [0.65, 1.01]
Sumic *et al.*, (M)	1.1%	0.91 [0.25, 3.36]
Sumic *et al.*, (F)	1.1%	0.12 [0.03, 0.44]
Middleton *et al.*,	15.2%	0.73 [0.59, 0.91]
Niti *et al.*,	12.1%	0.60 [0.45, 0.80]
Etgen *et al.*,	4.1%	0.44 [0.24, 0.82]
Total (95% CI)	**100.0%**	**0.65 [0.57, 0.75]**

Heterogeneity: $Tau^2 = 0.02$; $\chi^2 = 20.93$, df = 14 ($P = 0.10$); $I^2 = 33\%$
Test for overall effect: $Z = 6.17$ ($P < 0.00001$)



Significant protection (↓35 %) against cognitive decline (HR0.65, 95%CI0.57-0.75;p<0.00001)

Sofi F, et al. Journal of Internal Medicine, 2011;269:107-17

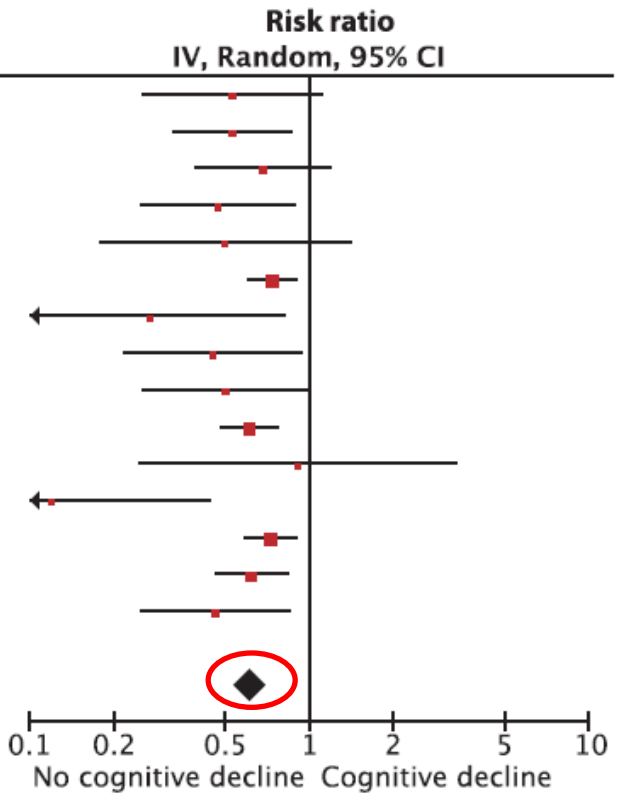
Physical activity and risk of cognitive decline: a meta-analysis of prospective studies

Hôpital du Valais
Spital Wallis

Studies investigating a high level of physical activity

Study or Subgroup	Weight	Risk ratio IV, Random, 95% CI
Ho *et al.*, (M)	2.7%	0.53 [0.25, 1.12]
Ho *et al.*, (F)	5.8%	0.53 [0.32, 0.87]
Laurin *et al.*, (M)	4.6%	0.68 [0.39, 1.19]
Laurin *et al.*, (F)	3.6%	0.47 [0.25, 0.89]
Schuit *et al.*,	1.4%	0.50 [0.18, 1.41]
Yaffe *et al.*,	20.5%	0.74 [0.60, 0.91]
Pignatti *et al.*,	1.3%	0.27 [0.09, 0.82]
Lytle *et al.*,	2.8%	0.45 [0.22, 0.94]
Flicker *et al.*,	3.2%	0.50 [0.25, 1.00]
Singh–Manoux *et al.*,	16.7%	0.61 [0.48, 0.78]
Sumic *et al.*, (M)	0.9%	0.91 [0.25, 3.36]
Sumic *et al.*, (F)	0.9%	0.12 [0.03, 0.44]
Middleton *et al.*,	19.1%	0.73 [0.59, 0.91]
Niti *et al.*,	12.6%	0.62 [0.46, 0.84]
Etgen *et al.*,	3.9%	0.46 [0.25, 0.85]
Total (95% CI)	**100.0%**	**0.62 [0.54, 0.70]**

Heterogeneity: $Tau^2 = 0.01$; $\chi^2 = 16.94$, df = 14 ($P = 0.26$); $I^2 = 17\%$
Test for overall effect: $Z = 7.49$ ($P < 0.00001$)



Significant protection (↓38 %) against cognitive decline
(HR 0.62, 95%CI0.54-0.70;p<0.00001)

Sofi F, et al. Journal of Internal Medicine, 2011;269:107-17

Does physical activity prevent cognitive decline and dementia?

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Reduced risk of cognitive decline: 35 %
(HR 0.65, 95% CI 0.55-0.76)

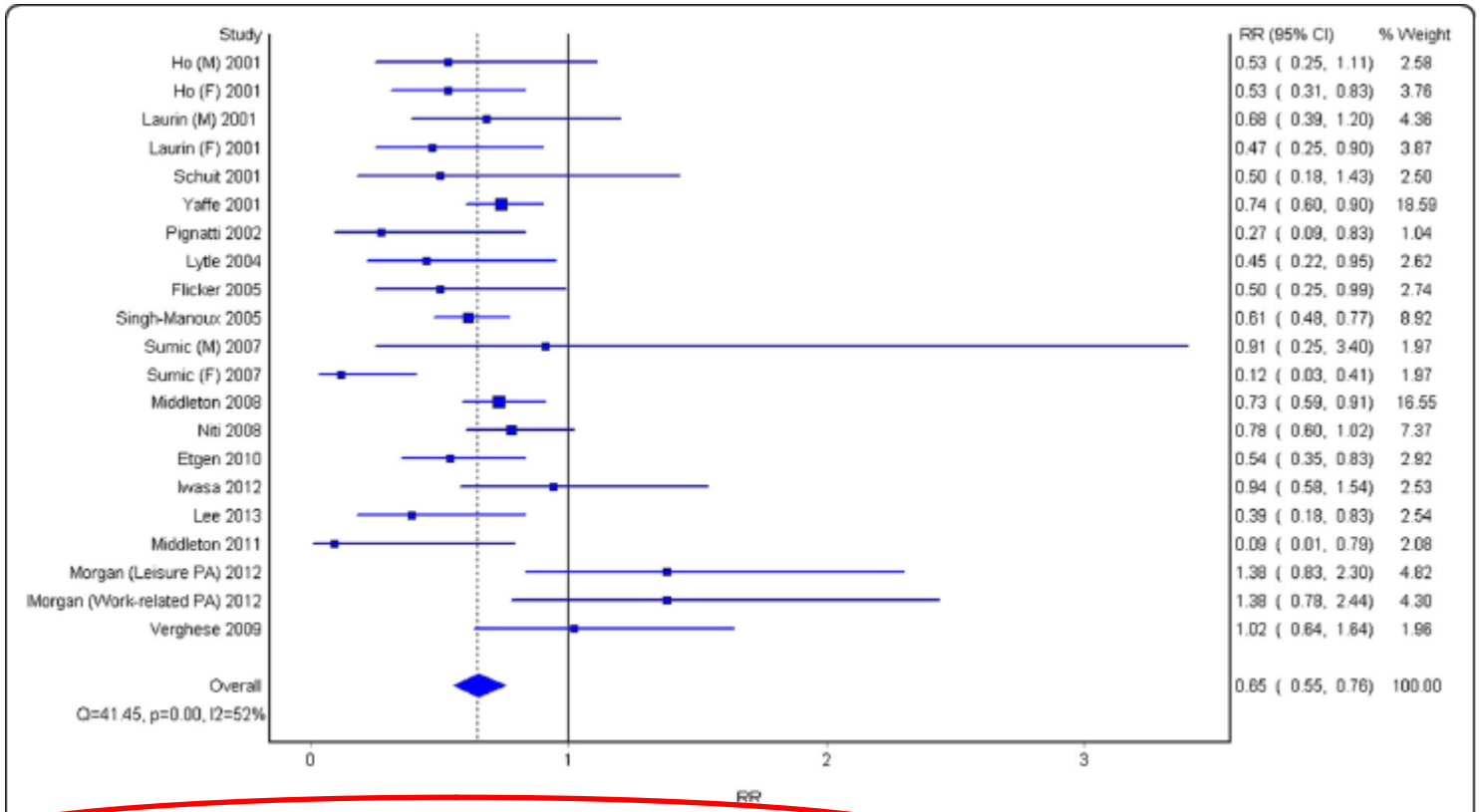

Figure 2 The association between high physical activity and cognitive decline.

Blondell SJ, et al. BMC Public Heath, 2014, 14:510

Does physical activity prevent cognitive decline and dementia?

Hôpital du Valais
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Reduced risk of dementia: 14 %
(HR 0.86, 95% CI 0.76-0.97)

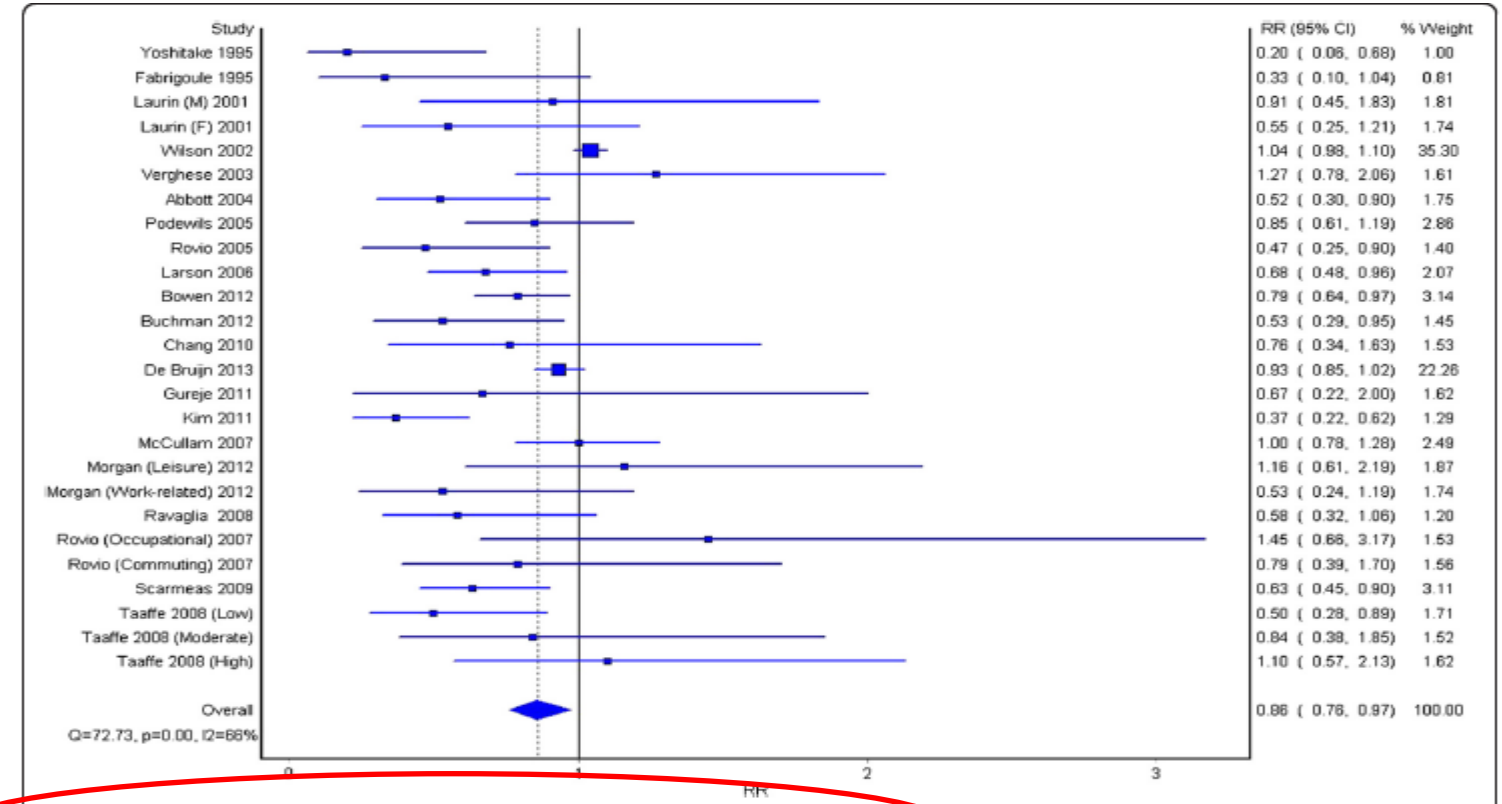

Figure 3 The association between high physical activity and dementia.

Blondell SJ, et al. BMC Public Heath, 2014, 14:510

Activité physique et performance cognitive

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ETUDES INTERVENTIONNELLES

Aerobic Exercice in older people without known cognitive impairment

Hôpital du Valais
Spital Wallis

THE COCHRANE COLLABORATION®

- **<u>Objectives</u>: effect of aerobic physical activity on cognitive function in cognitively healthy older adults**

- **<u>Review</u>:** meta-analysis of 12 RCT, 754 participants, duration of studies between 8-26 weeks
- Cognitives outcomes measures groupes into 11 categories covering attention, memory, perception, executive functions, cognitive inhibition, cognitive speed and motor function.
- **<u>Results</u>:**
  - **No evidence of benefit from aerobic exercice in any cognitive domain!**

Young J, et al. Cochrane Database Syst Rev 2015;4:CD005381

The LIFE (Lifestyle Interventions and Independence for Elders) Study Randomized Clinical Trial

Hôpital du Valais
Spital Wallis

Effect of a 24-Month Physical Activity Intervention vs Health Education on Cognitive Outcomes in Sedentary Older Adults

- **1635 community-living participants, aged 70-89 years**
- **No cognitive impairment**
- **Sedentary, at risk for mobility disability but able to walk 400m**
- **<u>Interventions:</u>**
  - a structured class and home exercice program (walking, resistance training and flexibility exercices) n=818
  - Weekly health education sessions n=817

- **<u>Primary cognitive outcomes:</u> measure of psychomotor speed, attention and memory.**

  Secondary: incident of MCI and dementia

Sink KM, et al. JAMA 2015; 314:781-90

The LIFE (Lifestyle Interventions and Independence for Elders) Study Randomized Clinical Trial

Hôpital du Valais
Spital Wallis

Effect of a 24-Month Physical Activity Intervention vs Health Education on Cognitive Outcomes in Sedentary Older Adults

Table 3. Incident Mild Cognitive Impairment or Dementia at 24 Months

	No./Total (%)		Odds Ratio (95% CI)[a]	P Value
	Physical Activity	Health Education		
Mild cognitive impairment[b]	70/686 (10.2)	62/682 (9.1)	1.14 (0.79-1.62)	.48
Dementia[c]	28/743 (3.8)[d]	29/747 (3.9)[d]	0.96 (0.57-1.63)	.88
Mild cognitive impairment or dementia	98/743 (13.2)[d]	91/747 (12.1)[d]	1.08 (0.80-1.46)	.61

[a] From unadjusted logistic regression.

[b] Of those free of mild cognitive impairment or dementia at baseline.

[c] Of those free of dementia at baseline.

[d] Denominator is slightly larger than in Table 1 because some participants were adjudicated but did not receive cognitive testing at 24 months (eg, those who died).

Sink KM, et al. JAMA 2015; 314:781-90

The LIFE (Lifestyle Interventions and Independence for Elders) Study Randomized Clinical Trial

Hôpital du Valais
Spital Wallis

- **Possible explanations for the lack of cognitive benefit of the physical activity intervention:**

  - Level of physical activity insufficient to produce changes in cognitive measures (despite its effect on physical function)

  - Improvements in cognitive function in some shorter clinical trials may dissipate by 24 months

  - Participants were well educated (>2/3 went to college), with probable high cognitive reserve (and protection against cognitive decline over 2 years!)

  - Health education intervention may have benefit cognition

Sink KM, et al. JAMA 2015; 314:781-90

Finish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (FINGER)

Hôpital du Valais
Spital Wallis

- **A 2 year multidomain intervention of diet, exercice, cognitive training, and vascular risk monitoring vs control**

- **Double-blind randomised controlled trial**
  - 1260 individuals,
  - Age 60-77 years
  - Cognitive score slighty lower than expected for age

- **<u>Interventions group</u>:**
  - Individual and group sessions for
    - dietary counseling (3x individual and 9x group sessions)
    - cognitive training (144x individual and 10 x group)
    - supervised aerobic (2-5x/week) and muscle-strengthening exercices(1-3x/week)
    - regular monitoring of vascular risk factors

- **<u>Control group</u>: general health advice**

- **<u>Primary outcome</u>: change in cognitive performance measured with neuropsychological test battery (NTB) Z score**

Ngandu T, et al. Lancet 2015; 385:2255-63.

Change in cognitive performance during the 2 year intervention (FINGER)

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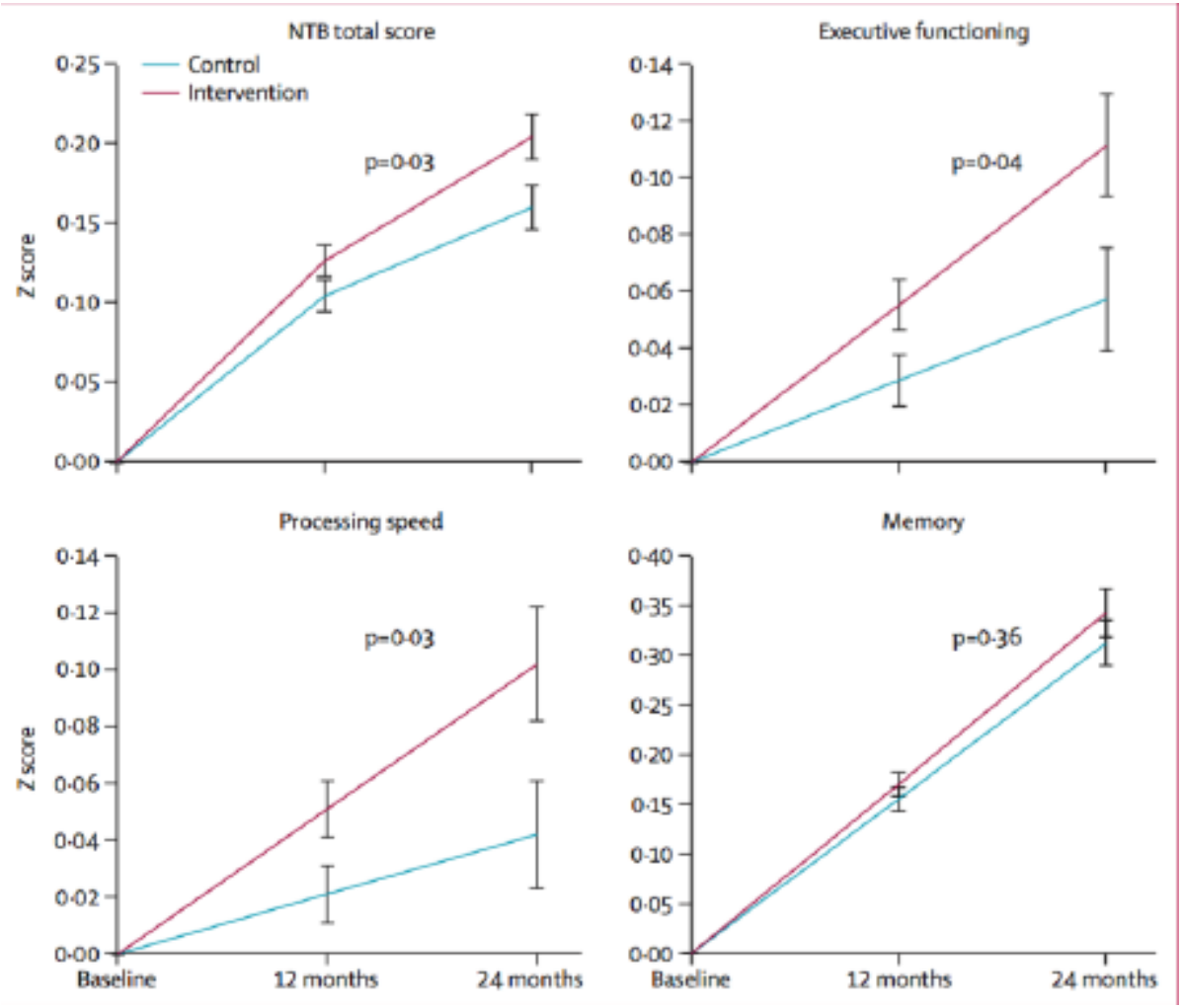

Ngandu T, et al. Lancet 2015; 385:2255-63.

Risk of cognitive decline from baseline to 24 months (FINGER)

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	Odds ratio (95% CI)		p value
	Intervention (n=554)	Control (n=565)	
Overall cognitive decline			
NTB total score	1 (reference)	1·31 (1·01–1·71)	0·04
Cognitive decline per domain			
NTB memory score	1 (reference)	1·23 (0·95–1·60)	0·12
NTB executive functioning score	1 (reference)	1·29 (1·02–1·64)	0·04
NTB processing speed score	1 (reference)	1·35 (1·06–1·71)	0·01

In post-hoc analyses, we defined cognitive decline as decrease in NTB total score (overall decline) and NTB domain scores (decline per domain) between the assessments at baseline and at 24 months. Logistic regression analyses were used to assess risk of cognitive decline in the control group compared with the intervention group. Analyses are based on all participants with data available at both baseline and 24 months. NTB=neuropsychological test battery.

Table 2: Risk of cognitive decline from baseline to 24 months

Ngandu T,et al. Lancet 2015; 385:2255-63.

Activité physique et performance cognitive

Hôpital du Valais
Spital Wallis

ETUDES
DE
PREVENTION SECONDAIRE

Hôpital du Valais
Spital Wallis

Exercice programs for people with dementia

THE COCHRANE COLLABORATION®

- **Objectives:** do exercice programs for older people with dementia improve cognition, ADLs, neuropsychiatric symptoms, depression?

- **Review:** meta-analysis of 17 RCT, 1067 participants. Cave: very substantial heterogeneity

- **Results:**
  - **Improve ability to perform ADLs (6 trials, 289 participants)**
  - **No benefit from exercice on cognition, neuropsychiatric symptoms, depression**

Forbes D, et al. Cochrane Database Syst Rev 2015; 4: CD006489

Hôpital du Valais
Spital Wallis

The effect of physical activity on cognitive function in patients with dementia: A meta-analysis of randomized control trials

- **802 patients with dementia included in 18 RCT**
- **Mean age: 79.7 ± 4.2 years**
- **MMSE: 16.4 ± 4.5**
- **<u>Outcome measure</u>: physical activity intervention with cognitive function in patients with dementia**
- ***<u>Interventions groups</u>: 3 groups of Physical activity interventions: aerobic-only, non-aerobic and combined**

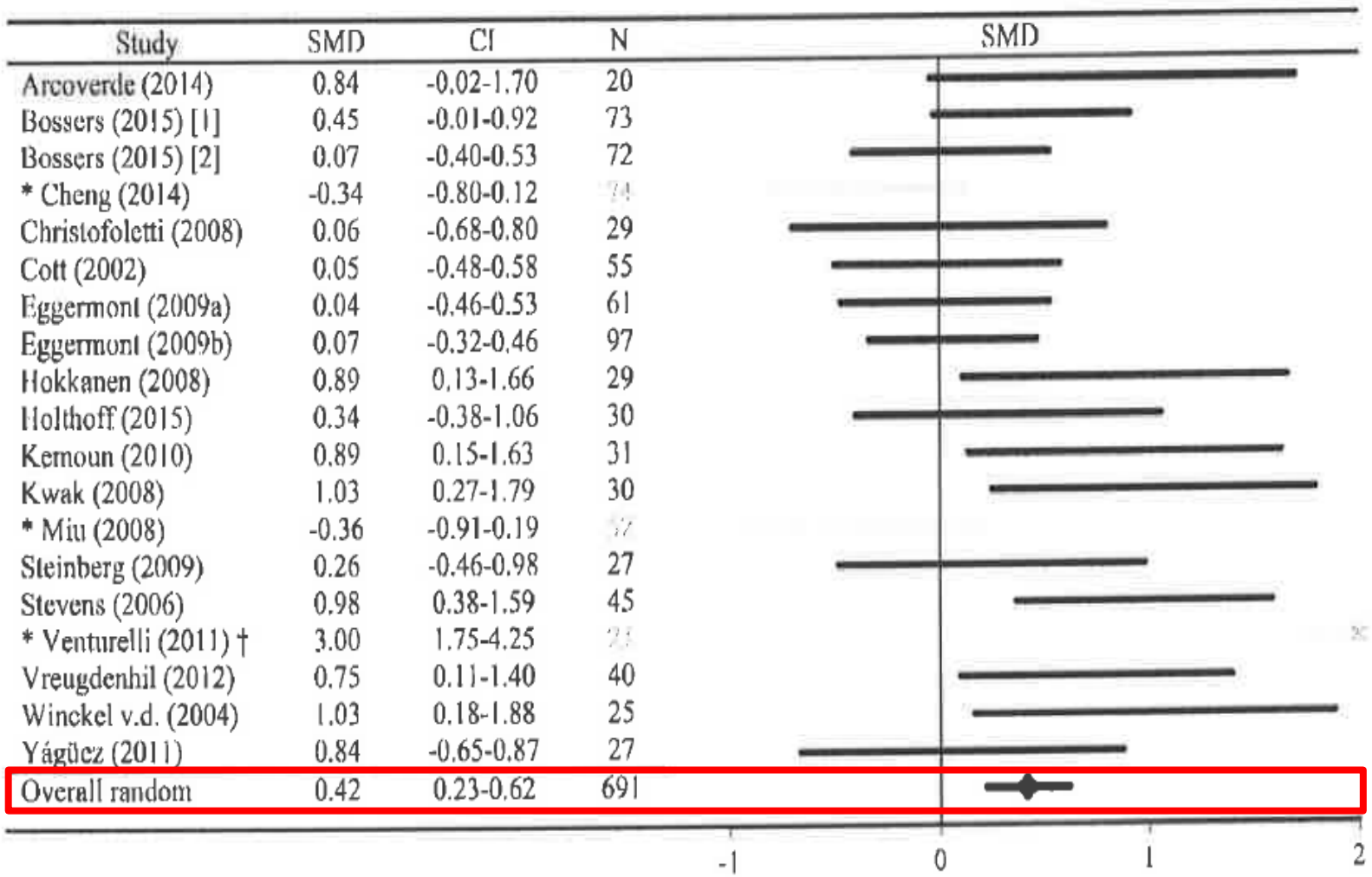
  ***<u>Control groups</u>: therapies aimed at social interaction or standard care**

Groot C, et al. Aging Res Rev. 2016,25:13-23

Overall effect of physical activity interventions on cognitive function in dementia

Hôpital du Valais
Spital Wallis

Study	SMD	CI	N
Arcoverde (2014)	0.84	-0.02-1.70	20
Bossers (2015) [1]	0.45	-0.01-0.92	73
Bossers (2015) [2]	0.07	-0.40-0.53	72
* Cheng (2014)	-0.34	-0.80-0.12	[illegible]
Christofoletti (2008)	0.06	-0.68-0.80	29
Cott (2002)	0.05	-0.48-0.58	55
Eggermont (2009a)	0.04	-0.46-0.53	61
Eggermont (2009b)	0.07	-0.32-0.46	97
Hokkanen (2008)	0.89	0.13-1.66	29
Holthoff (2015)	0.34	-0.38-1.06	30
Kemoun (2010)	0.89	0.15-1.63	31
Kwak (2008)	1.03	0.27-1.79	30
* Miu (2008)	-0.36	-0.91-0.19	[illegible]
Steinberg (2009)	0.26	-0.46-0.98	27
Stevens (2006)	0.98	0.38-1.59	45
* Venturelli (2011) †	3.00	1.75-4.25	[illegible]
Vreugdenhil (2012)	0.75	0.11-1.40	40
Winckel v.d. (2004)	1.03	0.18-1.88	25
Yágüez (2011)	0.84	-0.65-0.87	27
Overall random	0.42	0.23-0.62	691

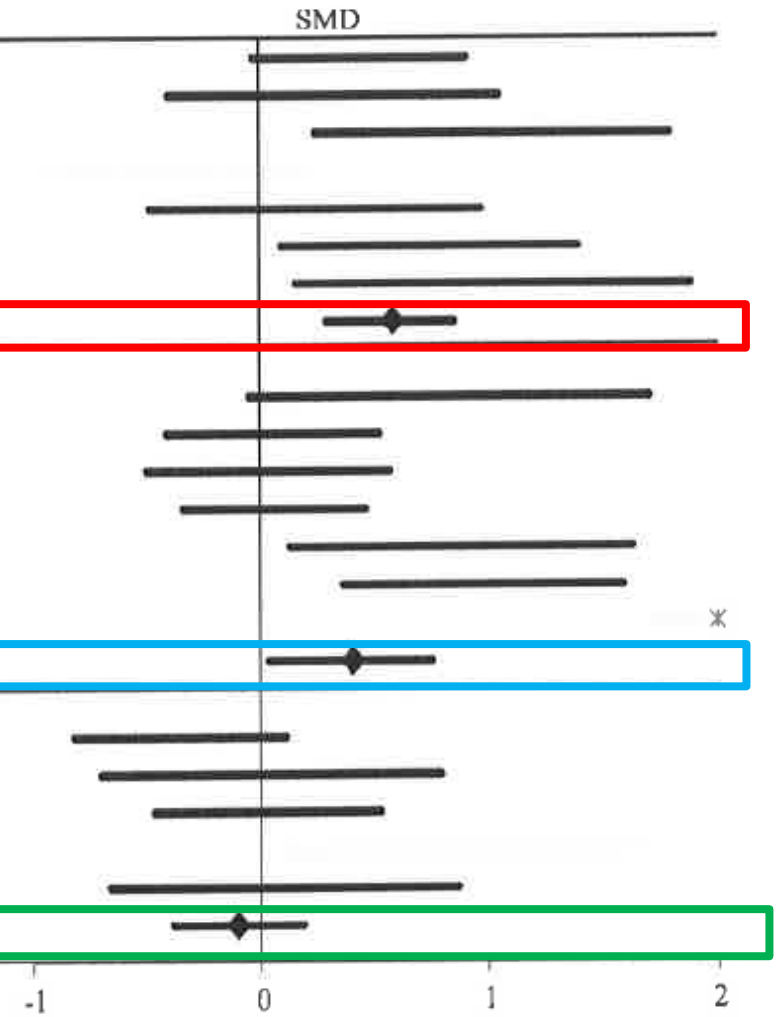


Groot C, et al. Aging Res Rev. 2016,25:13-23

Intervention type and the association between physical activity and cognition

Hôpital du Valais
Spital Wallis

Study	SMD	CI	N
Combined aerobic and non-aerobic interventions			
Bossers (2015) [1]	0.45	-0.01-0.92	73
Holthoff (2015)	0.34	-0.38-1.06	30
Kwak (2008)	1.03	0.27-1.79	30
* Miu (2008)	-0.36	-0.91-0.19	[illegible]
Steinberg (2009)	0.26	-0.46-0.98	27
Vreugdenhil (2012)	0.75	0.11-1.40	40
Winckel v.d. (2004)	1.03	0.18-1.88	25
Overall random	0.59	0.32-0.86	225
Aerobic-only interventions			
Arcoverde (2014)	0.84	-0.02-1.70	20
Bossers (2015) [2]	0.07	-0.40-0.53	72
Cott (2002)	0.05	-0.48-0.58	55
Eggermont (2009b)	0.07	-0.32-0.46	97
Kemoun (2010)	0.89	0.15-1.63	31
Stevens (2006)	0.98	0.38-1.59	45
* Venturelli (2011) †	3.00	1.75-4.25	[illegible]
Overall random	0.41	0.05-0.76	320
Non-aerobic interventions			
Cheng (2014)	-0.34	-0.80-0.12	74
Christofoletti (2008)	0.06	-0.68-0.80	29
Eggermont (2009a)	0.04	-0.46-0.53	61
* Hokkanen (2008)	0.89	0.13-1.66	[illegible]
Yágüez (2011)	0.11	-0.65-0.87	27
Overall random	-0.10	-0.38-0.19	191

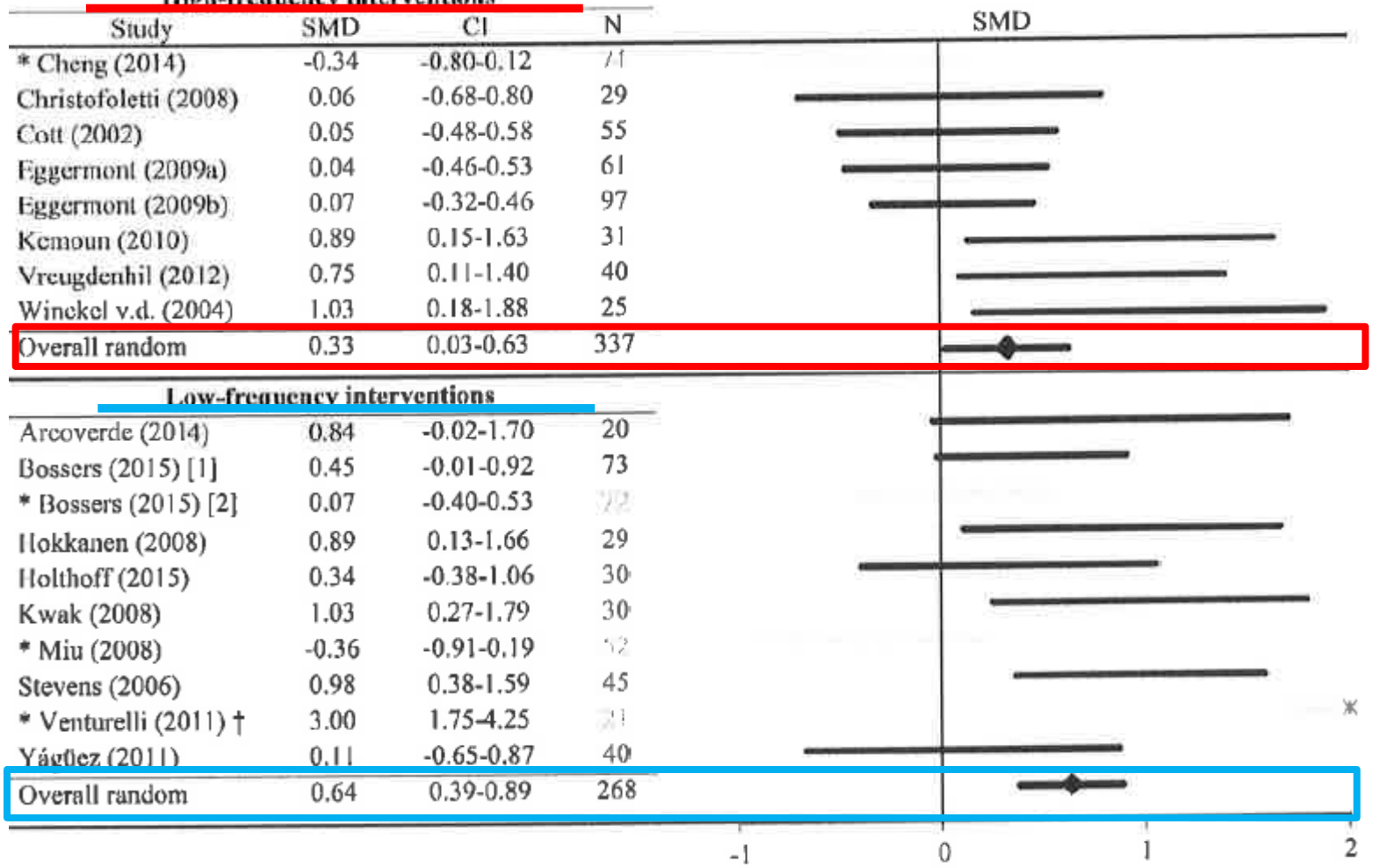


Groot C, et al. Aging Res Rev. 2016,25:13-23

Intervention frequency and the association between physical activity and cognition

Hôpital du Valais
Spital Wallis

Study	SMD	CI	N
High-frequency interventions			
* Cheng (2014)	-0.34	-0.80-0.12	71
Christofoletti (2008)	0.06	-0.68-0.80	29
Cott (2002)	0.05	-0.48-0.58	55
Eggermont (2009a)	0.04	-0.46-0.53	61
Eggermont (2009b)	0.07	-0.32-0.46	97
Kemoun (2010)	0.89	0.15-1.63	31
Vreugdenhil (2012)	0.75	0.11-1.40	40
Winekel v.d. (2004)	1.03	0.18-1.88	25
Overall random	0.33	0.03-0.63	337
Low-frequency interventions			
Arcoverde (2014)	0.84	-0.02-1.70	20
Bossers (2015) [1]	0.45	-0.01-0.92	73
* Bossers (2015) [2]	0.07	-0.40-0.53	72
Hokkanen (2008)	0.89	0.13-1.66	29
Holthoff (2015)	0.34	-0.38-1.06	30
Kwak (2008)	1.03	0.27-1.79	30
* Miu (2008)	-0.36	-0.91-0.19	52
Stevens (2006)	0.98	0.38-1.59	45
* Venturelli (2011) †	3.00	1.75-4.25	21
Yágüez (2011)	0.11	-0.65-0.87	40
Overall random	0.64	0.39-0.89	268



Groot C, et al. Aging Res Rev. 2016,25:13-23

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Sommaire

- **Bénéfices de l'activité physique**
- **Activité physique et fragilité**
- **Activité physique et performance cognitive**
- **Prescrire l'activité physique au senior**

Prescrire l’activité physique au senior?

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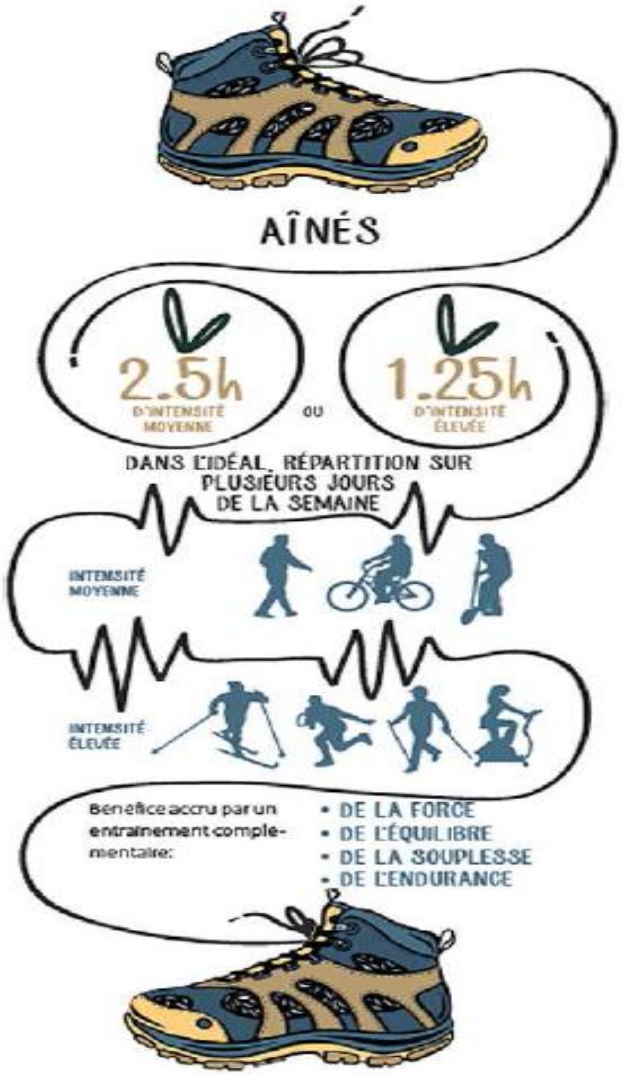
Recommandations en matière d'activité physique



Saubade M et al. Rev Med Suisse 2015

Büla C et al. Forum Med Suisse 2014

Changing emphasis on physical activity in older adults

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- **150 min target may still to high for many older adults**

  (barriers: inexperience with intense physical effort, associated fatigue and pain, risk of injury, medical complications,…)

Sparling PB, et al. BMJ, 2015

Changing emphasis on physical activity in older adults

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Changing emphasis on physical activity in older adults

- **150 min target may still to high for many older adults**

  (barriers: inexperience with intense physical effort, associated fatigue and pain, risk of injury, medical complications,…)

- **Dose-response relation between physical activity and health!**

  Health benefits begin with any increase above the very lowest levels of activity

- **Risk of death increases significantly when adults sit for more than 7 hours a day**

Sparling PB, et al. BMJ, 2015

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PRESCRIPTION D'ACTIVITÉ PHYSIQUE

Type d'activité physique	Intensité légère	Intensité modérée	Intensité modérée à élevée
Exemples d'activité	marche d'un bon pas, ménage…	marche rapide, escaliers, jardinage, vélo…	footing léger, marche en montagne, sports légers…
Comment apprécier l'intensité?	sans être essoufflé(e)	en étant légèrement essoufflé(e)	en étant essoufflé(e) et en transpirant légèrement
Jours/semaine	*4 ×*	*2 ×*	*selon envie*
Minutes/jour	*30 minutes*	*30 minutes*	
Durée totale/ semaine	*2 heures*	*1 heure*	

Commentaires:

- *Choisissez des activités pour améliorer la force, l'équilibre et la souplesse (par ex. cours de tai chi, gymnastique, etc.).*
- *Privilégiez des activités améliorant l'endurance mais ménageant le genou (cf. arthrose): par ex. aquagym, natation, marche avec bâtons, etc. Pratiquez le vélo selon douleurs (cf. lombalgie).*
- *Variez vos activités!*

Büla C et al. Forum Med Suisse 2014;14: 836-841

Les acteurs et programmes de promotion de l'activité physique

LIGUES DE LA SANTÉ
www.liguesdelasante.ch

ça marche!
BOUGER PLUS, MANGER MIEUX

PAS À PAS
CONSEIL ET SUIVI EN ACTIVITÉ PHYSIQUE

espace PRÉVENTION

AllezHOP
ROMANDIE

Pas de retraite pour ma santé

PRO SENECTUTE VAUD

FVGA

MdA
Mouvement des aînés Vaud

AVIVO VAUD
Bienvenue sur le site de l'AVIVO Vaud!

ligue vaudoise contre le cancer

Ligue vaudoise contre le rhumatisme
Notre action – votre mobilité

Association Vaudoise du Diabète
www.diabete-vaud.ch

LVCV

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Réseaux local d'offres en AP

Réseau local:

- « ca marche ! »

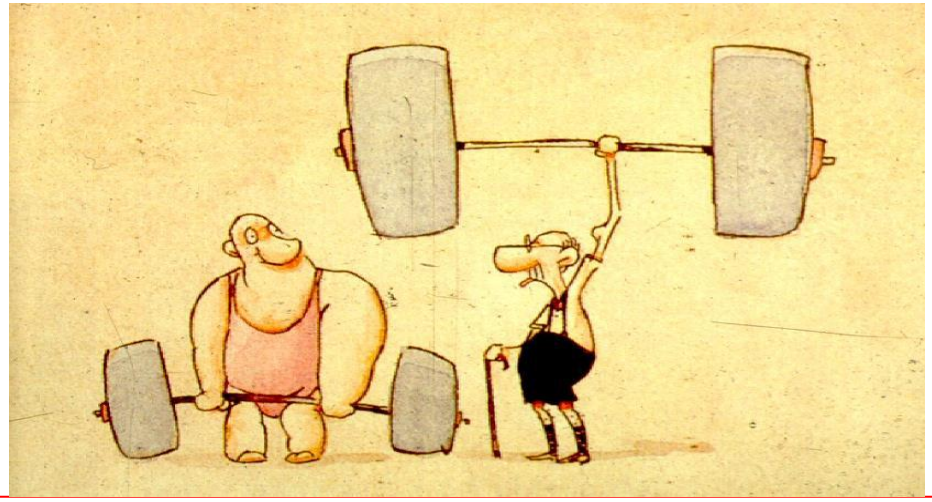
http://www.ca-marche.ch/

- « Allez hop Romandie »

http://www.allezhop-romandie.ch/

Take Home Messages

- **Exercice is Medecine at any age!**
- **Physical activity interventions positively influence cognitive function**
- **Frailty may be delayed or even reversed by physical exercice**
- **Health and functional benefits begin with any increase above the lowest levels of activity**
- **Any exercice is better than none!**
- **Assess physical activity or exercice at every medical visit**



Merci de votre attention !

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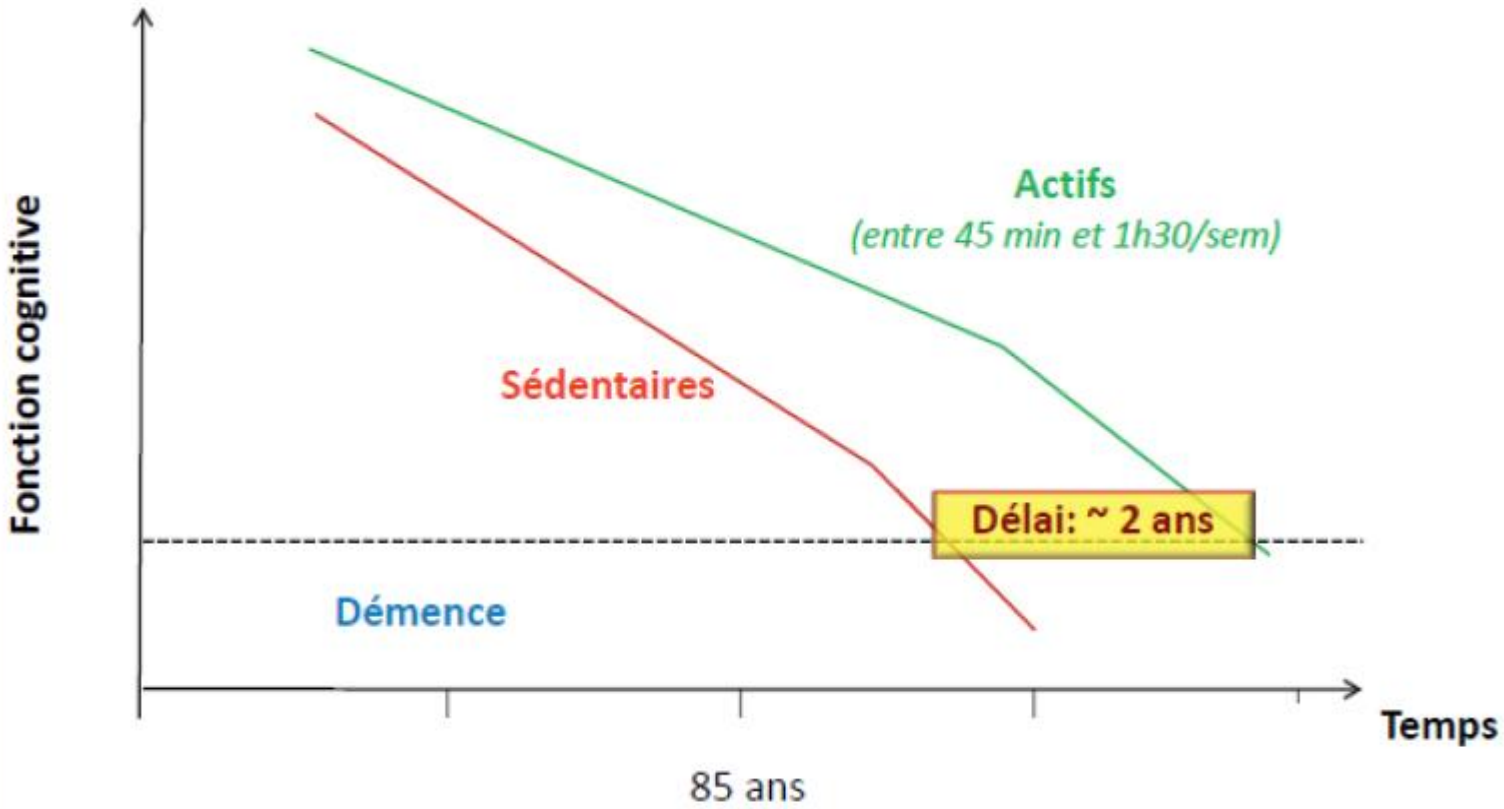
Evolution des capacités cognitives en fonction de l'âge et de l'activité physique



Büla C et al. Swiss Med Forum 2014;14:836–841)

Activité physique et bénéfice sur la santé

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Büla C et al. Forum Med Suisse 2014;14: 836-841

Daily time spent sedentary and in moderate and vigorous physical activity by age

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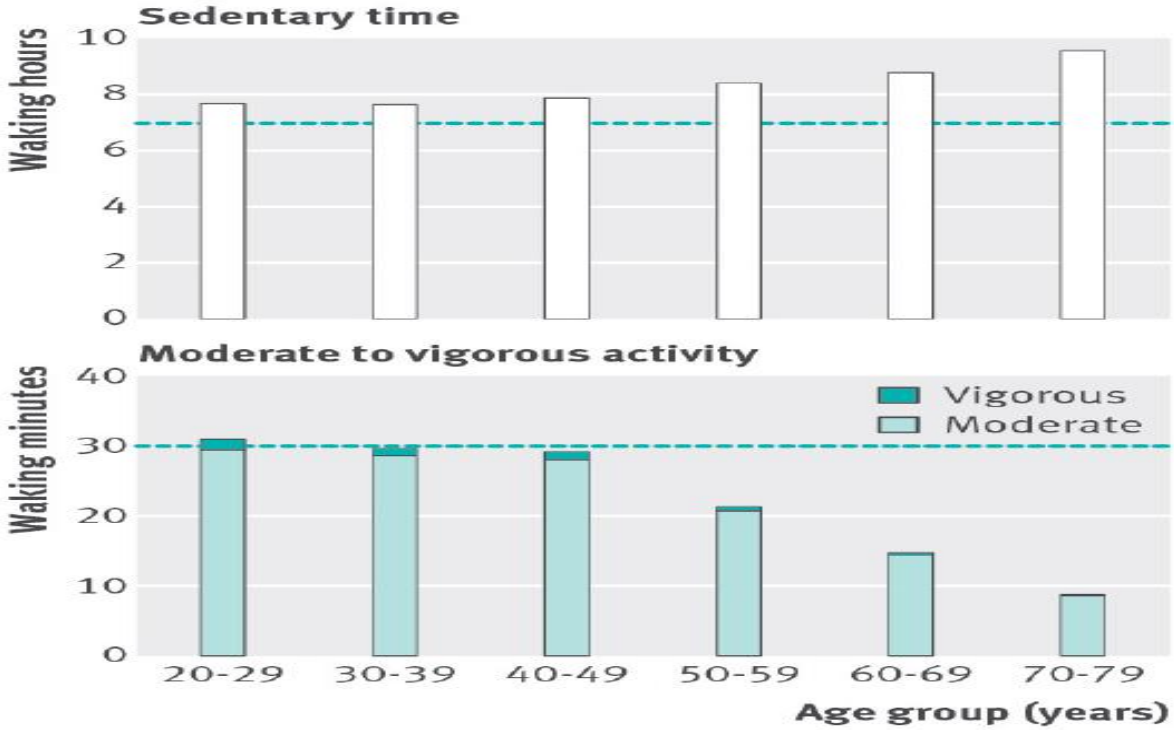

Waking time spent each day sedentary (top) and in moderate or vigorous activity (bottom) among some 7000 US adults aged 20-79. The dotted lines shows the recommended amount of daily exercise (30 minutes) and the level at which sedentary behaviour is estimated to be harmful (7 hours) [12]

Sparling PB, et al. BMJ, 2015

Benefits of physical activity : exercice is medecine

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- **« Eating alone will not keep man well; he must also take exercice. For food and exercice work together to produce health. »**

Benefits of physical activity : exercice is medecine

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- **« Eating alone will not keep man well; he must also take exercice. For food and exercice work together to produce health. »**

  Hippocrates

- **« In fact, there is no single medication treatment that can influence as many organ systems in a positive manner as can physical activity. »**

  Manini TM,
  JAMA Internal Medicine 2015;175:968-9

Changing conversations with patients

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- **Introducing light activity throughout the day (30 minutes a day) : to sit less et move more**

  - Getting up from the chair and moving during television commercial breaks
  - Pacing when on the phone
  - Adding gentle five minutes walks throughout the day (eg, mid-morning, mid-day, mid-afternoon)
  - Walking rather driving for short trips

- Déplacements : marche, escaliers, achats, etc…

- Activités ménagères

- Jardinage

Sparling PB, et al. BMJ, 2015