Composición corporal y actividad física en las personas mayores

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Cambios fisiológicos con el envejecimiento
The purpose of this Position Stand is to provide an overview of issues critical to understanding the importance of exercise and physical activity in older adult populations. The Position Stand is divided into three sections: Section 1 briefly reviews the structural and functional changes that characterize normal human aging, Section 2 considers the extent to which exercise and physical activity can influence the aging process, and Section 3 summarizes the benefits of both long-term exercise and physical activity and shorter-duration exercise programs on health and functional capacity. **Although no amount of physical activity can stop the biological aging process, there is evidence that regular exercise can minimize the physiological effects of an otherwise sedentary lifestyle and increase active life expectancy by limiting the development and progression of chronic disease and disabling conditions.** There is also emerging evidence for significant psychological and cognitive benefits accruing from regular exercise participation by older adults. Ideally, exercise prescription for older adults should include aerobic exercise, muscle strengthening exercises, and flexibility exercises. The evidence reviewed in this Position Stand is generally consistent with prior American College of Sports Medicine statements on the types and amounts of physical activity recommended for older adults as well as the recently published 2008 Physical Activity Guidelines for Americans. All older adults should engage in regular physical activity and avoid an inactive lifestyle.
TOTAL WEIGHT AND RELATIVE FAT

- Weight (kg)
  - Young, sedentary: Men 80, Women 60
  - Older, sedentary: Men 70, Women 50
  - Young, trained: Men 65, Women 60
  - Older, trained: Men 50, Women 40

- Relative fat (%)
  - Young, sedentary: Men 15, Women 10
  - Older, sedentary: Men 25, Women 20
  - Young, trained: Men 10, Women 5
  - Older, trained: Men 10, Women 5
FAT MASS AND FAT-FREE MASS

[Two bar charts showing comparisons between fat mass and fat-free mass for different groups: Young and Older, sedentary and trained. The charts display the mass in kilograms for men and women in each category.]
Visceral adipose tissue (VAT)

Less VAT

More VAT
CHANGES IN $\dot{V}O_2$ MAX WITH AGE

- Runner, high intensity
- Runner, reduced intensity
- Runner, stopped training
- Fitness trained
- Untrained
CHANGES IN STRENGTH WITH AGING

(a) Maximal leg strength

(b) Peak knee extension strength (Nm)

% maximal voluntary contraction compared to that at age 20

Fast

Standing from sitting

Slow

Age (yr)

0 10 20 30 40 50 60 70 80 90

0 10 20 30 40 50 60 70 80

0 20 30 40 50 60 70 80 90

0 40 60 80 100 120 140 160 180 200 220 240

Strength-trained men
Untrained men
Multi-centric survey for the assessment of physical fitness, body composition and healthy lifestyles in non-institutionalized Spanish elderly: EXERNET

Aim: To study and describe possible relationships between physical fitness, body composition and lifestyles in a representative sample of non-institutionalized elderly of Spain.
Prevalencia de obesidad sarcopénica en mayores de vida independiente. Proyecto EXERNET

<table>
<thead>
<tr>
<th></th>
<th>Normal (%)</th>
<th>High Fat (%)</th>
<th>Low Muscle (%)</th>
<th>Sarcopenic Obesity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 to 69 years</td>
<td>241</td>
<td>44.4</td>
<td>26.6</td>
<td>20.7</td>
</tr>
<tr>
<td>70 to 74 years</td>
<td>212</td>
<td>37.3</td>
<td>22.2</td>
<td>17.9</td>
</tr>
<tr>
<td>≥ 75 years</td>
<td>218</td>
<td>36.2</td>
<td>17.4</td>
<td>22.9</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 to 69 years</td>
<td>801</td>
<td>39.2</td>
<td>29.5</td>
<td>21.2</td>
</tr>
<tr>
<td>70 to 74 years</td>
<td>691</td>
<td>34.4</td>
<td>26.6</td>
<td>26.5</td>
</tr>
<tr>
<td>≥ 75 years</td>
<td>696</td>
<td>31.2</td>
<td>20.4</td>
<td>28.3</td>
</tr>
</tbody>
</table>
30-Second Chair Stand

Back Scratch 8-Foot Up-and-Go

Chair Sit-and-Reach

6-Minute Walk

Flamingo test
Valores de referencia

One leg balance test (s)

6 minute walk test (m)

Chair stand test (rep)

### Comparison of strength levels

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Free-living</td>
<td>Institutionalized</td>
</tr>
<tr>
<td>Right hand</td>
<td>33.66±7.5*&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>21.36±8.8&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Left hand</td>
<td>32.16±7.0*&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>20.16±9.1&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>Right hand</td>
<td>18.25±4.54*</td>
<td>10.01±5.13</td>
</tr>
<tr>
<td>Left hand</td>
<td>17.24±4.18*</td>
<td>9.34±5.14</td>
</tr>
</tbody>
</table>

*<sup>p</sup> = 0.000 (mismo género).

a<sup>p</sup> = 0.000 (diferente género y mismo lugar de residencia).

b<sup>p</sup> = 0.000 (diferente género y lugar de residencia).

González-Gross et al, 2012
Relación entre B12, fuerza y resultados del MMSE en ancianos institucionalizados

Pedrero-Chamizo et al. 2013 (GGl, in press)
Porcentajes de la deficiencia subclínica de folato y vitamina B$_{12}$ en mayores institucionalizados según los distintos parámetros

Evolución niveles de B12 y tHcy y fuerza tren inferior a lo largo de un año

RISK FACTORS for DEMENTIA

- hiperuricemia
- hiperlipidemia
- obesity
- smoking
- age
- vascular disease
- white matter lesions in the brain
- small vessel disease
- cognitive impairment
- vascular dementias
- Alzheimer’s disease
- diabetes
- hipercholesterolemia
- homocysteine
- vascular disease
- obesity
- smoking
- diabetes
- Sedentarism
- Low strength
- Low CV fitness


Sin publicar
Biological vs chronological age

When should we start with anti-ageing therapy?
Anti-ageing effect of exercise and selected nutrients
Fitness as a Health Determinant in Elderly People

Prevalence of Metabolic Syndrome

Muscle strength

Cardiorespiratory Fitness

Jurca et al. MSSE 2004
Physical fitness and mortality risk in adults

Fitness as a Health Determinant in Elderly
Blair et al. JAMA 1989
Survival of the Fittest — More Evidence

Since this article has no abstract, we have provided an extract of the first 100 words of the full text and any section headings.

In 1859, Charles Darwin published his theory of evolution as an incessant struggle among individuals with different degrees of fitness within a species. At that time, his explanations created remarkable controversy, but they were to revolutionize the course of science. Darwin's writings reflected conclusions drawn from years of study and observation. Now, nearly 150 years later, in the era of evidence-based medicine and rigorous scientific method, when fitness is measured and study subjects are...
Cardiorespiratory Fitness as a Quantitative Predictor of All-Cause Mortality and Cardiovascular Events in Healthy Men and Women: A Meta-analysis

Satoru Kodama; Kazumi Saito; Shiro Tanaka; et al.

http://jama.ama-assn.org/cgi/content/full/301/19/2024

Conclusions  Better CRF was associated with lower risk of all-cause mortality and CHD/CVD. Participants with a MAC of 7.9 METs or more had substantially lower rates of all-cause mortality and CHD/CVD events compared with those with a MAC of less 7.9 METs.

JAMA. 2009;301(19):2024-2035  www.jama.com
Sitting time and all-cause mortality risk in 222 497 Australian adults

Figure. The combined relationships of sitting and physical activity with all-cause mortality. A, All participants (n=222 497). B, Healthy participants who at baseline had no cardiovascular disease, diabetes mellitus, or cancer, with the exception of nonmelanoma skin cancer (n=145 713). C, Participants with cardiovascular disease or diabetes at baseline (n=52 229). Deaths per 1000 person-years were adjusted for sex, age, educational level, marital status, urban or rural residence, body mass index, smoking status, self-rated health, and receiving help with daily tasks for a long-term illness or disability. *P<.05 compared with the reference group. †Reference group.
¿Qué importancia tiene un estilo de vida activo en la salud pública?
Demographic evolution in Europe

![Demographic pyramid for Europe in 1950](image)

**Proportion: Elderly (Age 60+)**
- Year: 1950
  - Total Population: 12.1%
  - Males: 6.9%
  - Females: 7.2%

**Proportion: Working-age Population (Age 20-59)**
- Year: 1950
  - Total Population: 55.3%
  - Males: 24.2%
  - Females: 29.1%

**Proportion: Children (Age 0-19)**
- Year: 1950
  - Total Population: 34.6%
  - Males: 17.5%
  - Females: 17.1%
HOW TO DIE OF CORONARY ARTERY DISEASE (AND OTHERS)

Come from a family with a history of coronary artery disease

Risk up 1.7 to 1

Smoke a package or more of cigarettes a day

Risk up 3 to 1

Got fat

Risk up 2 to 1

Don't exercise

Risk up at least 2 to 1

Eat a rich high fat diet

Risk up at least 2 to 1

Worry a lot; never relax; drive yourself; don't have any fun

Total increase of death at least 10 to 1 (may be more like 30 to 1)
Walking one mile burns about 100 kcal

Paffenbarger, R.S. Junior et al, 1986
Clasificación según la actividad física

• < 5000 pasos/día: sedentarios
• 5000 – 7499 : poco activos
• 7500 – 9999: algo activos
• 10000 – 12500: activos
• >12500: altamente activos
Mortality risk
Chronic diseases
“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”
Active healthy ageing

- **Endurance exercise** for older adults:
  - Frequency: For moderate-intensity activities, accumulate at least 30 or up to 60 (for greater benefit) min/d in bouts of at least 10 min each to total 150–300 min/wk, at least
  - 20–30 min/d or more of vigorous-intensity activities to total 75–150 min/wk, an equivalent combination of moderate and vigorous activity.
  - Intensity: On a scale of 0 to 10 for level of physical exertion, 5 to 6 for moderate-intensity and 7 to 8 for vigorous intensity.
  - Duration: For moderate-intensity activities, accumulate at least 30 min/d in bouts of at least 10 min each or at least 20 min/d of continuous activity for vigorous-intensity activities.
  - Type: Any modality that does not impose excessive orthopedic stress; walking is the most common type of activity. Aquatic exercise and stationary cycle exercise may be advantageous for those with limited tolerance for weight bearing activity.

- **Resistance exercise** for older adults:
  - Frequency: At least 2 d/week.
  - Intensity: Between moderate- (5–6) and vigorous- (7–8) intensity on a scale of 0 to 10.
  - Type: Progressive weight training program or weight bearing calisthenics (8–10 exercises involving the major muscle groups of 8–12 repetitions each), stair climbing, and other strengthening activities that use the major muscle groups.

- **Flexibility exercise** for older adults:
  - Frequency: At least 2 d/week.
  - Intensity: Moderate (5–6) intensity on a scale of 0 to 10.
  - Type: Any activities that maintain or increase flexibility using sustained stretches for each major muscle group and static rather than ballistic movements.

- **Balance exercise**
Nutrientes

Mental function: 
B₁, folate, B₁₂, B₆, niacina, Glucosa, Omega-3

Eye function: A
Teeth: A, D, C

Blood clotting: K

Blood Cells: E

Hormone formation:
steroids, A, B₆
pantothenic acid,
norepinephrine, thyroxine

Skin: A, C, B₆,
niacin, riboflavin,
pantothenic acid

Reproduction:
A, riboflavin

Bones: A, D, C
Ca, Si, F, Mg

Blood formation:
B₆, B₁₂, C, folate

Neuromuscular function:
A, B₆, B₁₂, thiamine,
niacin, pantothenic acid

Cell membranes: E

Energy release: thiamine,
riboflavin, niacin, biotin,
B₆, pantothenic acid

Modificado de: McArdle, Katch & Katch. 2004
CONCLUSIONES

- Ejercicio físico regular, junto con una dieta adecuada y evitando otros factores de riesgo, añade años y calidad a la vida.
- El ejercicio físico regular ayuda a mantener la masa magra y a disminuir la masa grasa en el proceso de envejecimiento.
- Las personas son más autónomas y tienen mayor facilidad para realizar las actividades de la vida diaria.
- El entrenamiento aeróbico debe complementarse con entrenamiento de la fuerza, en ambos sexos y a todas las edades.
- La vida activa es divertida y ayuda a socializarse.
- Nunca es tarde para empezar a hacer ejercicio físico.
“Met my sister for lunch the other day. She’s actually beginning to show her age. Of course, not her real age.”

Source: www.alecoxenford.com
Deterioro cognitivo asociado con niveles bajos de vitamina B12 y de HDL

Pérdida de fuerza en brazos y piernas asociada con niveles bajos de albúmina y de ApoA

Pérdida de fuerza en manos asociada con niveles bajos de HDL

Pérdida de fuerza en brazos y piernas asociada con niveles bajos de albúmina y de ApoA
Efficacy of a 28 days oral cyanocobalamin supplementation on vitamin B status in Spanish institutionalized elderly

LA ALIMENTACIÓN DIARIA

Tómate tu tiempo para comer

Almuerzo
Merienda
Desayuno
Comida
Cena

Es importante realizar 5 comidas al día.
Empieza el día con un desayuno equilibrado y completo.
Intercambia los alimentos del mismo grupo según aparecen en la cara 3.

“Spain is the most sedentary country in Europe” (Mendoza, 2000)

Prevalence of obesity > with age: > 55 years, (F = 33,9%; M = 21,6%)