Physical activity, physical condition and quality of life in older adults. Systematic review

Antonio M. López-Martí[1], Irene de Haro Padilla[2], Antonio López-Téllez[3], Jerónimo García Romero[4]

[1]Máster en Investigación en Actividad Física y Deporte. Facultad de Medicina. Universidad de Málaga (UMA). Málaga. [2]Grado Educación Primaria (Educación Física). Consejería Educación y Deporte. Junta de Andalucía. [3]Médico de Familia. Centro de Salud Puerta Blanca. Servicio Andaluz de Salud. Málaga. [4]Departamento de Fisiología Humana, Anatomía Patológica y Educación Física y Deportiva. Universidad de Málaga (UMA). Málaga.

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Summary

Background: The aging of the population together with sedentary lifestyle, can cause a functional deterioration that leads to the decrease of physical condition and quality of life. Promoting active aging can improve the quality of life and physical condition of our elders.
Objective: This work aims to investigate the available scientific evidence on the effect of physical activity in older adults, in terms of quality of life, physical condition, and maintenance of functional independence.
Material and method: A systematic review was performed in the WOS, SCOPUS and PubMed databases. Selection of articles: Intervention studies evaluating the quality of life and functional capacity of older adults were included. The studies were evaluated according to methodological quality with the PEDro scale.
Results: 1331 articles were found, of which 17 were included. Interventions included resistance, strength, balance, coordination, and gait speed exercises. The main findings indicated that a higher rate of physical activity was associated with less impairment of physical and cognitive functions in older adults and, therefore, with a better quality of life.
Conclusions: an active lifestyle is associated with a better quality of life, better physical condition and maintenance of functional independence. Other studies, with greater homogeneity in the data collection instruments, with greater frequency of interventions, would be convenient to define the most appropriate exercise programs and to increase the scientific evidence.

Key words:
Quality of Life. Physical condition. Physical activity elderly. Systematic review.

Actividad física, condición física y calidad de vida en los adultos mayores. Revisión sistemática

Resumen

Introducción: El envejecimiento de la población junto al sedentarismo, puede ocasionar un deterioro funcional que conduciría a la disminución de la condición física y de la calidad de vida. La promoción del envejecimiento activo puede mejorar la calidad de vida y la condición física de nuestros mayores.
Objetivo: Evaluar la evidencia científica disponible sobre el efecto de la actividad física en los mayores, en términos de calidad de vida, condición física y mantenimiento de la independencia funcional.
Material y método: Revisión sistemática en las bases de datos WOS, SCOPUS y PubMed. Selección de artículos: Se incluyeron estudios de intervención que evaluaban la calidad de vida y capacidad funcional de los adultos mayores. Los estudios fueron evaluados según la calidad metodológica con la escala PEDro.
Resultados: Se encontraron 1331 artículos, de los que se incluyeron 17. Las intervenciones incluyeron ejercicios de resistencia, fuerza, equilibrio, coordinación y velocidad de la marcha. Los hallazgos principales indicaron que un mayor índice de actividad física se relacionó con un menor deterioro de las funciones físicas y cognitivas de los mayores y, por lo tanto, con una mejor calidad de vida.
Conclusiones: Un estilo de vida activo se asocia a una mejor calidad de vida, mejor condición física y mantenimiento de la independencia funcional. Serían convenientes otros estudios, con una mayor homogeneidad en los instrumentos de recogida de datos, con mayor frecuencia de intervenciones, para definir los programas de ejercicios más adecuados y para incrementar la evidencia científica.

Palabras clave:
Calidad de vida. Condición física. Envejecimiento activo. Revisión sistemática.

Correspondence: Antonio López Téllez
E-mail: anlote01@gmail.com

Introduction

The drop in the birth rate and rise in life expectancy have led to an ageing population, especially in developed countries, where life expectancy has increased considerably[1]. In Spain, life expectancy stands at 85.8 for women and 80.5 for men. The percentage of the population over 65 is currently 19.3% and is expected to reach 25.6% by 2031 and 34.6% by 2066[1].

At the same time, more than 50% of the population over 60 years of age is physically inactive[1,2], which can lead to a state of frailty, disability and dependency. People who do not do enough physical activity have a risk of mortality between 20% and 30% higher than those who are sufficiently active[3,4].

Physical activity is recommended to improve physical condition and health-related quality of life (HRQoL) at all stages of life. Having an active lifestyle has been shown to promote a healthier and more independent life for older people, and improve their functional and mental abilities, and, consequently, their HRQoL[4–11]. It also contributes to the maintenance of bone and muscle mass, thereby increasing functional performance and decreasing sarcopenia[12], improving coordination and dynamic and static balance, important factors to prevent the frailty process (a clinical condition involving age-related decrease in functional reserve) and the risk of falls[13–15].

Physical condition and HRQoL are closely related, contribute to maintaining an overall level of functioning and favour satisfactory ageing, the aim of which is to maintain the autonomy and independence of the elderly[16,17].

Numerous studies with very different methodologies recommend physical activity as a means to prevent the appearance of frailty, disability and dependence, and, ultimately, enhance HRQoL and achieve satisfactory ageing [2,13–17]. However, we do not know which components of physical activity or interventions may be more decisive in improvement: group or individual physical activity, multi-component exercise programmes (ones which combine endurance, strength, coordination, balance and flexibility training) or others.

The objective of this study is to update our knowledge about the effect of physical activity on the quality of life, physical condition and maintaining functional independence in the elderly by reviewing the existing studies in the field to highlight the most effective interventions and be able to enhance them; and define possible focuses for research in this area.

Material and method

Search design and strategy

A systematic review was carried out in November 2020 by means of an advanced search for original papers and reviews in the databases available through the University of Malaga: *Catálogo Jábega,* the university library's automated catalogue, and the online databases Web of Science (WOS), SCOPUS and PubMed. The following MeSH descriptors were used: *'physical activity', 'exercise', 'physical condition', 'elderly', 'quality of life', 'frail'*, with the Boolean operators AND and OR. The review was complemented by a hand search of bibliographic references in the documents found to locate studies not identified with the electronic search. Figure 1 shows the flowchart used for the selection of papers relevant to the study.

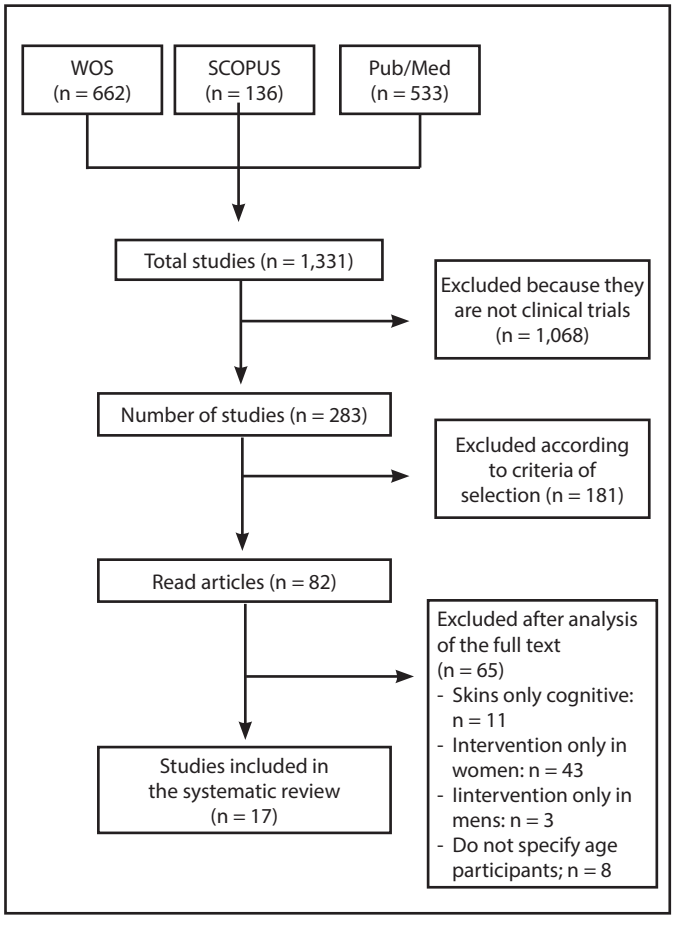
Inclusion criteria

Articles in English or Spanish published in the last 10 years. Intervention studies (clinical and quasi-experimental trials) evaluating the effect of physical activity on physical condition and HRQoL in people over 60 years of age of both sexes.

Exclusion criteria

Papers which did not meet the inclusion criteria described, papers where access to the full text was not available, duplicates and papers which did not have an explicit methodology were excluded.

Figure 1. Flowchart of the article selection process.



Selection of studies and data extraction

The papers of interest were selected independently by two reviewers who reviewed their titles and abstracts; when the abstract of a paper was not conclusive, the entire text was assessed. In the event of disagreement between the reviewers, consensus was sought.

In each original paper reviewed, information was sought on: author, year of publication, sample size, age of the subjects, characteristics of the intervention (groups, type of activity, components, duration of the programme, number of sessions and their duration, measurement instruments and results obtained).

Methodological quality assessment

The 17 studies which met the inclusion criteria were analysed. Methodological quality was scored using the Physiotherapy Evidence Database (PEDro) scale[18], which evaluates 11 items ('Yes', 'No' or 'Not reported'), of which only 10 are evaluable, the first not being scored because it refers to the external validity of the study. Items answered 'Yes' score 1 point, the rest 0.

Results

The diagram with the paper selection procedure is shown in Figure 1.

1,331 papers were reviewed. In a first screening, 1,068 papers were excluded because they were not experimental studies. Of the remaining 263, 181 were excluded according to the inclusion criteria; by population age; duplicate articles; articles relating physical exercise to specific diseases or only dealing with cognitive aspects related to exercise. The 82 resulting papers were reviewed a second time and 17 articles were finally selected.

Methodological quality

The scores obtained in the methodological assessment according to the PEDro scale ranged from 6 to 8, the mean score being 7.12. This indicates the good methodological quality of the papers selected.

Characteristics of the papers selected

The sample from the 17 papers analysed consisted of 1,910 men and women over 60 years old. As for the study environment, 16 were performed in the community[19–34] and one in a care home[35] (Table 1).

Characteristics of the interventions

Regarding the number of groups studied; 10 studies included two groups, an intervention group (IG) and a control group (CG)[19–21,23,26,30–35], and three studies included three groups (two with 2 IGs and 1 CG[22,28], and one with 3 IGs24). Two studies involved two groups, both IGs[27,29]; and one study (before-after) had no control group[25].

Type of intervention: the intervention with the control groups consisted of the usual community-level healthy lifestyle recommendations; such as staying active (walking at least 150 minutes a week) and a balanced diet[19–21,23,26,30,31,33,35].

The intervention groups did multi-component training programmes[9, 20, 25, 26, 30–35]; programmes to improve walking[21]; power training (muscle strengthening)[22]; Pilates exercises[23]; aquatic gymnastics, general gymnastics and weight training[24]; water- versus land-based exercises[27] and aquatic exercise[28,29].

Intervention period: between 8 weeks[33] and 6 months[19,25,29] with a median of 12 weeks[20–24,31,32,35].

Frequency of the interventions: most of the studies involved two[20,23–25,28,29,35] or three[27,32] weekly sessions lasting about 60 minutes.

Measurements

All the studies measured the participants at baseline and post-intervention, except one study[26], which evaluated the intervention one week after completion. Participants were followed up after the intervention in two studies: at 3 months[33] and at 12 months[21]. The rest of the studies did not involve any kind of follow-up.

Measurement of physical condition

Physical activity: Daily physical activity patterns were measured in 2 studies using accelerometers, pedometers, and the Physical Activity Scale for the Elderly (PASE) questionnaire; and observed a significant improvement in physical activity patterns and functional ability after a training programme[21,26].

Muscular strength: Significant improvement ($p<0.05$) was seen after the programme in most of the studies analysed, both in upper and lower limbs[20–22,25,29,32,35]. However, in one study which measured gripping strength in the upper limbs, no significance was found[19].

Gait speed: Gait speed was analysed in 10 studies, and a significant improvement ($p<0.05$) was obtained in all of them[19–21,25,26,28,29,32,33,35]. The tests used for measurement were the Timed-Meter Walk Test (MWT)[20.35]; the 6 min Walk Test (6MWT)[19.25.28]; and the Short Physical Performance Battery (SPPB)[33]. One study analysed walking speed using a VICON motion capture system consisting of a set of 8 cameras with sensors and motion markers on each patient, (which analysed gait speed, cadence and step length), obtaining significant improvements in physical condition and in the risk of falls after the intervention[32].

Balance: Balance was evaluated in 12 studies; different tests were used for dynamic or static balance depending on the study: the Test of Static Balance (FICSIT-4T)[35], Balance at 3 levels[20], functional capacity (SPPB)[19,33], the Berg Balance Scale[23,28], the Functional Reach Test (FRT)[29,32], TUG[30,34] and the Senior Fitness Test (SFT)[25]. Statistically significant improvements were obtained compared to the control groups in all the studies.

Flexibility was assessed through different tests, either in isolation or as a component of functional physical condition tests; the SPPB[19,33] test; the Chair Sit and Reach Test (CSAR)[25,29,34]. The study by Cichocki *et al.*[34] did not obtain a significant improvement in flexibility after the intervention.

Table 1. Characteristics of the papers selected (n=17).

Authors	Sample	Characteristics of intervention	Variables / Measuring tools	Results	PEDro
Harris *et al*. 2015[21]	n = 298; 160 women and 138 men. Age: 60 – 74	Walking programme. 3 months 2 groups: IG + CG. Intervention to increase walking, using: - Behaviour change techniques. - Individual walking plan.	- Accelerometer (ActiGraph GT3X+) to monitor physical activity. - Pedometer (step count)	The changes in mean daily step counts (CI 95%: 513-1560) and weekly MVPA in 10 min episodes (CI 95%: 40-87) were significantly higher in the IG than the CG	8/10
Sayers y Gibson, 2014[22]	n = 64; 43 women and 21 men. Age: 70.3 + 6.9	Strength exercise programme. 12 weeks. 3 groups: 2 IG: 1st: high-speed strength training 2nd: slow-speed strength training. CG: warm up and stretching.	Lower limb strength: measures of muscle performance.	High-speed strength exercises increased the speed of older adults (0.18±0.21 m/s; p<0.05), allowing improvement in functional tasks related to safety.	8/10
Tarazona-Santabalbina, 2016[19]	n = 100 54% women. Age: 79.9 + 3.8	Exercise programme. 24 weeks. 5 x 65-min. sessions/week. 2 groups: IG + CG Exercises for: - Proprioception - Endurance- aerobic. - Strength: - Flexibility. Stretching - Coordination, balance	Physical condition: - Handgrip strength; Balance and gait (Tinetti); Functional capacity (SPPB); Physical performance (PPT); Energy expenditure (PAEE). Others: - ADLs (Barthel) and IADLs (Lawton and Brody); Cognitive status (MMSE); Social support (Duke); Quality of Life (EQ-5D); Emotional status (GDS).	IG vs CG: Improvements in: - Static and walking (dynamic) balance (p=0.007) - Physical performance. Energy expended associated with exercise (P<0.001). - Functional ability ADLs, IADLs, cognitive status, emotional status, social support and quality of life (P<0.001). - Frailty: The frailty score dropped in the intervention group (P<0.001) (CI 95%: 20.3-45.0)	6/10
Ng, 2015[20]	n = 246 61.4% women. Age: 70 + 4.7 community	12 weeks. 2 x 90-min. sessions/week. 2 groups: IG + CG Multi-component training programme.	Physical condition: - Maximum dynamic strength (1RM); - Gait speed (6 min).	IG vs CG: Improvements in: - Muscle strength (leg flexion) (p<0.001) - Gait speed (p<0.001) Frailty: Reduction in frailty score (35.6% to 47.8%) (P<0.01)	8/10
Cadore, 2014[35]	n = 24 70% women. Age: 91.9 + 4.1	Exercise programme. 12 weeks. 2 x 40-min. sessions/week. 2 groups: IG + CG Maximum dynamic strength: 8-10 repetitions at 40-60% 1RM combined with balance and retraining of gait.	Physical condition: - Isometric and maximum dynamic muscle strength. - Lower limb strength (rise from a chair test); - Gait speed - Static balance. Others: - Incidence of falls; ADLs (Barthel)	IG pre-post: Improvements in: - Isometric hip flexion (P<0.05); and knee extension (P<0.01); - Gait speed (p<0.05) - Lower incidence of falls (P<0.0001); IG vs CG: Improvement in: - Isometric strength: handgrip, hip flexion and knee extension; Maximum dynamic strength: upper and lower limbs; Lower limb strength in the rise from a chair test (P<0.01) - Gait speed (p<0.05) - Static balance (P<0.05); - Lower incidence of falls (P<0.0001).	6/10

(continued)

Table 1. Characteristics of the papers selected (n=17) *(continuation).*

Authors	Sample	Characteristics of intervention	Variables / Measuring tools	Results	PEDro
Campos de Oliveira *et al.*, 2015[23]	n = 32 100% women. Age: 63.6 ± 1	Pilates exercise programme. 12 weeks. 2 sessions/week. 60 min. 2 groups: IG + CG Pilates. Stretching	- Isokinetic torque of knee extensors and flexors - Timed Up and Go (TUG) test. - Berg balance scale. - Evaluation of the Health Survey (SF-36).	Significant improvement of all variables (p<0.05), except the Berg Balance Scale (p = 0.0509) The control group shows no changes.	6/10
Vicentini de Oliveira *et al,* 2014[24]	n = 120 100% women. Age: 60-70	Three different exercise programmes for 3 groups. 3 months. 2 sessions/week. 3 IG: - G1: Water aerobics - G2: General gymnastics - G3: Weight training	WHO Quality of Life Test: WHOQOL-OLD	Benefits for quality of life in the 3 groups, but especially in the weight-training group (P<0.001)	8/10
López Téllez *et al*. 2012[25]	n = 29 27 women. Age: >65 Community	Exercise programme. 6 months. 2 sessions/week. 60 min. - Monthly health education sessions. - 3 days of social activities. - 2 x 60-min. physical activity sessions/week.	- HRQoL: SF-36 - Functional Physical Condition: Senior Fitness Test.	Improvement in health-related quality of life (P<0.05) and increase of 11.7 points in mental summary component (p<0.001). Improvement of functional physical condition. Improvements in: - Gait: increase 62 m (p<0.001) (CI 95%: 48-76). - Strength: 73.9% (CI 95%: 56-92) - Dynamic balance: 86.4% (CI 95%: 74-99); - Flexibility: 69.6% (CI 95%: 51-88).	7/10
de Roos *et al.* 2018[26]	n = 52; 34 women and 18 men. Age: 70.2 + 9.5	Combined exercise training and walking programme. Duration: 10 weeks.	- Accelerometry (to measure daily physical activity) - PASE questionnaire - 6 MWT - CVRS questionnaire (CRQ)	The increase in functional capacity between the groups was clinically relevant (CI 95%: 2.3 to 65.6) in favour of the intervention group.	7/10
Oh *et al.* 2015[27]	n = 66 Age: >65	Exercise programme. 10 weeks. 3 sessions/week. 2 IG: - land environment and - water environment.	- SF36 - M-FES questionnaire. (modified falls efficacy scale). - Measuring instruments: Hand dynamometer, Sit and Reach, hip strength in flexion, ext, abd and add; TUG (Timed Up-and-Go).	Improved hip abduction (p=0.001) and adduction strength (p=0.007). Significantly different quality of life improvement between the two groups (p < 0.001). Significant improvement in the risk of falls in both groups (p = 0.040) (CI 95%).	8/10
Arnold *et al.* 2010[28]	n = 79 Age: >65	Aquatic exercise and education programme. 11 weeks. 2 sessions/week. 3 groups: 2 IG + CG - 1st Aquatic exercise: stretching, postural control and balance. - 2nd Aquatic Exercise + education class: Same as above + education class. - Control G.	- Balance. Berg Balance Scale. - Falls. ABC scale. - Functional performance. (30s-CST) - Walking. 6MW	The combination of aquatic exercise and education is effective in improving risk factors for falls in older adults (p = 0.038).	8/10

(continued)

Table 1. Characteristics of the papers selected (n=17) *(continuation)*.

Authors	Sample	Characteristics of intervention	Variables / Measuring tools	Results	PEDro
Sato *et al*. 2011[29]	n = 35 Age: ≥65	Aquatic exercise programme. 6 months. 2 IG: 1st group: 1 session/week. 2nd group: 2 sessions/week. Gymnastic exercises in the pool, with 10 min of warm-up and stretching out of the water.	- Lower limb muscle strength. - Flexibility. - Balance (FRT). - Falls.	Improvements after intervention in muscle strength, balance and flexibility. In the mobility test (TUG) for the risk of falls, no significant differences were found in the tests before and after the intervention. Significant improvements were found in ADLs (p<0.05).	6/10
Siegrist *et al*., 2016[30]	n = 378; 285 women. Age: 65-94	16 weeks. 1 hour/week. Multi-component exercise programme: strength training, balance, walking and functional training.	- Balance. Timed Up-and-Go (TUG) - Functional performance. (30s-CST) - Falls. Falls Efficacy Scale; Romberg's Test.	Patients in the intervention group showed significant improvements in: Falls (CI 95 %:0.35; 0.84), p=0.007. Balance (p=0.014)	8/10
Oh *et al*. 2012[31]	n = 65 Age: ≥65	12 weeks. 2 groups: IG + CG Multi-component exercise programme: strength training, balance, agility, flexibility, muscular endurance.	- ABC scale. - SF-8	Reduces fear of falling (p=0.02), improved balance (5.84 ± 1.62) (p=0.003), flexibility (4.14 ± 0.73) (p<0.001) and muscle strength (7.42 ± 1.98) (p=0.004). Also improved quality of life (11%).	7/10
Zhuang *et al*., 2014[32]	n = 56 (36 women) Age: 60-80	Multi-component exercise programme + Tai chi. 12 weeks. 3 sessions/week. 60 min. 2 groups: IG + CG - Strength and balance exercise programme. - Tai chi (8-form T'ai chi ch'üan).	- Functional performance. (30s-CST) - Balance and falls. Timed Up-and-Go (TUG); - (FRT); Star Excursion Balance Test (SEBT) - Isokinetic strength of the knee and ankle extensors. Dynamometer. - Three-dimensional gait analysis. VICON system	After the intervention, significant improvements were found in all the variables (p<0.001; d=0.36), improving physical condition and reducing the risk of falls.	7/10
Cichocki *et al*., 2015[34]	n = 222 88% women. Age: 72-99	20 weeks. 1 session/week. 60 min. 2 groups: IG + CG. Multi-component exercise programme: strength training, walking, balance, dancing, stretching and yoga.	- Quality of life. EQ-5D. - Balance. Timed Up-and-Go (TUG); - Flexibility. Chair Sit and Reach (CSAR); Back Scratch Test (BS); Lower Back Scratch and Neck Reach Test. - Assessment of cognitive status. Mini-Mental State Examination (MMSE).	Improvements in HRQoL after intervention (p=0.001). No significant results were found in the flexibility and balance tests.	7/10
Otones *et al.*, 2020[33]	n = 44 78.1% women. Age: ≥65 Pre-frail with chronic pain (SHARE). Community	Multi-component exercise programme + Education prog. 8 weeks (1 session/week). 60 min. 2 groups: IG + CG.	- Quality of life (EQ-5D). - VAS (Chronic Pain) - SHARE (frailty index) - Functional capacity (SPPB: balance, gait speed and leg strength. - ADLs (Barthel).	Significant improvements in: Quality of life (CI 95%:– 0.33-0.04) and Functional capacity (p<0.01)	6/10

1RM: 1 repetition maximum (test); 6MWT: 6 Min Walk Test; 30s-CST: Test 30s Chair Stand Test; ADLs: Activities of Daily Living: IADLs Instrumental Activities of Daily Life; CRQ: Chronic Respiratory Questionnaire; HRQoL: Health-related Quality of Life; EQ-5D: Euroqol Quality-Of-Life Scale questionnaire; ABC scale: Activities specific Balance Confidence; FRT: the Functional Reach Test; MMSE: Mini-Mental State Examination; PAEE: Physical Activity Energetic Expenditure; PASE: Physical Activity Scale for the Elderly; PPT: Physical Performance Test; SF-8: Abbreviated version of the SF-36 questionnaire; VICON system: motion capture system consisting of cameras, markers and motion sensors; SPPB: Short Physical Performance Battery; TUG: Timed Up and Go; WHOQOL-OLD: World Health Organization Quality of Life-Old.

Measurement of HRQoL: Nine studies specifically measured HRQoL[19,23–27,31,33,34] and positive results (p<0.05) were obtained in all of them after the intervention. The measuring tools used were the Euroqol Quality-Of-Life Scale (EQ-5D) questionnaire[19,33,34], the SF-36 questionnaire[23,25,27], the SF-8 questionnaire (abbreviated version of SF-36)[31]; the Chronic Respiratory Questionnaire (CRQ)[26]; and WHOQOL-OLD (World Health Organization Quality of Life-Old)[24], a test developed by the World Health Organization to specifically assess the quality of life of the elderly.

Effect of physical exercise on other variables:

Falls: Seven papers assessed the risk of falling in their studies[27–32,35]. The measuring tools used were: the Falls Efficacy Scale[30]; Romberg's test[30], the Modified falls efficacy scale (M-FES) questionnaire[27]; the ABC (Activities-specific Balance Confidence) scale[28,31]; and the Timed Up-and-Go (TUG) test, widely used to assess dynamic balance, which is closely related to the risk of falls and, therefore, a reliable indicator of frailty in the elderly[19,27,29,30,32,34,35]. All the studies found a reduction in the incidence of falls after the intervention.

Frailty: Two articles evaluated the effects of physical exercise on frailty[19,20], both showing a statistically significant reduction in frailty test scores (p<0.05).

Four papers analysed the effect of physical activity on disability[19,29,33,35], obtaining an improvement in basic activities of daily living (ADL), evaluated with the Barthel scale[19,33] and with the disability indicator FIM (Functional Independence Measure)[29]. The study by Tarazona-Santabalbina et al also evaluated Instrumental Activities of Daily Life (IADLs) using the Adelaide Activities Profile (AAP) and the Lawton and Brody scale, obtaining an improvement in disability (p<0.05).

Two studies analysed the effects of exercise on cognitive status using the Mini-Mental State Examination (MMSE)[19,34]; only the study by Tarazona *et al.* described improvement after exercise, with a 9% increase in MMSE (p=0.025); they also observed improvements in emotional status and social support, measured with the Geriatric Depression Scale (GDS) (p =0.043) and the Duke scale (p < 0.001), respectively.

Discussion

The objective of this review is to update our knowledge about the effect of physical activity on active ageing in order to define possible focuses for research in this area in the future. The results obtained show the benefit of physical activity on the quality of life, physical condition and maintenance of functional independence of older adults through selected experimental studies. Most of the studies included indicate that physical activity improves the different components of physical condition and HRQoL in older people.

We found that most of the 17 studies analysed were carried out in the community, applied a multi-component intervention and lasted between 8 weeks and 6 months. In general, despite the methodological differences between the different studies, the results of this review demonstrate a statistical association between physical activity and the improvement of physical condition and HRQoL.

The intervention programmes and tests used to assess HRQoL and physical condition were heterogeneous, although all the tests are validated. Some are generic instruments, which have different components or scales; others are more specific, aimed at aspects of interest (illness, frailty, elderly, etc.) or at certain components of physical condition (endurance, strength, flexibility, balance or coordination).

Among the questionnaires used to evaluate HRQoL, the SF36 stood out due to its ready availability in several languages, reliability, validity and sensitivity, together with its reduced version, SF8. Other questionnaires used were: the Euroqol Quality-Of-Life Scale (EQ-5D), the WHOQOL-OLD (World Health Organization Quality of Life-Old) questionnaire and the Chronic Respiratory Questionnaire (CRQ). To analyse functional ability and performance, the following were used: Short Physical Performance Battery (SPPB), the 30s Chair Stand Test (30s-CST), the Functional Reach Test (FRT), the Physical Performance Test (PPT), the Senior Fitness Test (SFT) and the Functional Independence Measure (FIM). All are validated tests widely used with the elderly population and easy to carry out. However, the diversity of scales and the absence of population reference values could hinder the comparability of the studies[15,17].

The type of intervention was different in the 17 papers analysed, although they all sought the same objective: to maintain or improve the physical condition and quality of life of the elderly. Most of the studies involved multi-component training programmes[19,20,25,26,30,31,33–35] or a combination of programmes of this type with a more specific intervention in water exercise[24,27] or Tai chi[32]. The latter consisted of multi-component training exercises combined with T'ai chi ch'üan exercises (8-form Tai chi: movements involving weight changes, body alignment and coordinated movements carried out in a slow, continuous, circular and fluid manner). Only five studies focused intervention on a single type of activity or sport[21–23,28,29].

Interventions with physical activity programmes appear to be effective in achieving improvements in HRQoL and show improvements in the physical condition and functional independence of older adults[13,14,17].

We believe that, despite the difficulty that their implementation may entail, varied activities with different components are more satisfactory for the elderly, provide greater benefits; and favour adherence to the programme, reducing the dropout rate. However, there is also the disadvantage of not knowing which components are the most decisive in any improvement when an overall assessment is made. Based on the results of the studies, including multi-component programmes with exercises centring on strength, gait, balance and flexibility brings benefits in the prevention of disability[15,19,29,34,35], favours functional independence[28,30,32], improves physical condition[19,20,24-27,30-32,34,35] and reduces the risk of falls[27–32,35].

In addition, improvements have been observed in the performance of activities of daily living[19,29,33,35], as have decreases in cognitive impairment[19,34], decreases in frailty[19,20] and improvements in HRQo[19,24–27,31,33,34].

The rest of the studies, in which specific exercises focussing on gait[21], strength[22], Pilates[23] or exercise in water[28,29] were carried out, also obtained significant improvements in terms of physical condition[21–23,28,29], functional independence[22,23,28,29] and quality of life[23].

All the exercise programmes involved exercises to improve balance and develop muscle strength because they enhance postural stability and, therefore, lead to a reduction in falls[27–32,35–37]. Equilibrium and walking speed have been determined as indicators of frailty in the elderly 38 and are directly related to the risk of falls in this population[39,40]. The studies analysed demonstrate the effectiveness of exercise programmes to improve the physical condition of the elderly and delay and prevent disability caused by ageing[19,29,34,35,41–44].

Regarding the limitations of the studies selected, there is variability in the number of participants, and the different types of interventions and measuring instruments. We believe that studies which obtain a standard reference value are necessary to facilitate the comparability of the measurements, as are studies which indicate the ideal exercise programmes for this population, those which provide the greatest benefits and those which favour continuity and permanence over time. Although most of the interventions identified described positive results in their evaluations, design limitations (small number of participants, small scopes, difficulty in masking participants or researchers) could limit their extrapolation.

In this review, the articles finally selected were those that best met the inclusion criteria; studies carried out in our setting were also included, which could favour the extrapolation of their results to our population. There is possibly a publication bias of studies with positive results, so there could be studies with negative results which have not been published. One aspect to highlight is that most of the studies were carried out in the community, which would facilitate their extrapolation; although this does mean future focuses of research in care homes and hospitals should be considered.

It is necessary to carry out studies to assess which types of programmes are most effective and applicable, with greater homogeneity in the data collection instruments, in order to facilitate the comparability of the measurements and their applicability to the elderly population, and to increase the degree of scientific evidence.

Conclusions

This systematic review shows that, despite the methodological differences in the studies, an active lifestyle with the performance of multi-component, group or community activities is beneficial for older adults and is associated with better HRQoL, physical condition and maintenance of functional independence, and a reduction in the risk of falls.

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Conflict of interest

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