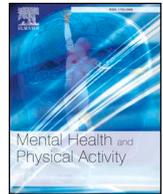




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Physical activity and health-related quality of life in adults: The “Pas a Pas” community intervention programme

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ABSTRACT

Physical activity is associated with improved mental health and well-being, both factors closely linked to health-related quality of life (HRQoL). Studies that analyse the effect of aerobic physical activity on HRQoL have shown inconsistent results. The aim of this study was to evaluate the effectiveness a supervised aerobic physical activity programme consisted on walking groups and including socio-cultural activities on HRQoL in adult who attend primary care centres. We conducted a randomized clinical trial with controlled group, which consisted of a 9-month intervention comprising 120 min of supervised group walking per week and socio-cultural activities. Socio-demographic characteristics, diagnoses of chronic diseases, BMI (kg/m²) and self-esteem score (Rosenberg Scale) were recorded. Physical activity (IPAQ-s) and HRQoL (SF-36) were assessed at baseline and post-intervention and multivariate models adjusted for potential confounders were applied. A total of 440 patients were recruited; 419 met the inclusion criteria and were individually randomized to either the control (n = 114) or intervention groups (n = 305). Results from post-intervention showed that total physical activity significantly increased in the intervention group compared to the control group (+832.7 vs -162.1 MET/min/week, respectively). In women, the intervention had a positive effect significantly on the following HRQoL items: Physical Functioning (+10.19 points), Bodily Pain (+7.32 points), General Health (+2.53 points) and Mental Health (+5.65 points). No significant effects were observed in men. Participation in the physical activity intervention programme including socio-cultural activities improved HRQoL in women who attend primary-health care centres.

1. Introduction

Health-related quality of life (HRQoL) is defined as the perception of the physical, mental and social effects of disease on well-being (Urzúa, 2010). HRQoL is considered an important health outcome among population and an essential public health instrument to assess their physical and social functioning, mental health and well-being, and to evaluate population-based intervention programmes (Romero, Vivas-Consuelo, & Alvis-Guzman, 2013).

In Spain, more than 20% of the population over 18 years of age reported low scores in HRQoL, particularly in relation to bodily pain and discomfort (physical area) (Ministerio de Sanidad Servicios Sociales e Igualdad, 2014, pp. 1–85). Similar results were reported in an

epidemiological study conducted in Germany, HRQoL in the population tended to show more physical than mental health impairments (H. M. Wang, Beyer, Gensichen, & Gerlach, 2008). In addition, a UK-based study attributed the poor perception of HRQoL mainly to mental health, specifically to anxiety and depression (Walters, Munro, & Brazier, 2001).

Poor perception of HRQoL has been associated with sex (female), chronic medical conditions, socio-demographic characteristics (older age and low social class), low self-esteem, lack of social support, high levels of depression, high body mass index (BMI) and sedentary lifestyle (Lubetkin, Jia, Franks, & Gold, 2005; Søltøft, Hammer, & Kragh, 2009).

Physical activity has been showed to play a key role in the prevention of different diseases, such as excess of weight, cardiovascular

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disease, type 2 diabetes, chronic pain and some types of cancer in different populations (Katz & Pate, 2016). Although, evidence of the beneficial effects of physical activity on HRQoL has been clearly provided in the results of epidemiological and cross-sectional studies, the results and conclusions of randomized controlled trials (RCTs) including aerobic physical activity interventions among sedentary adults have been less consistent (Colcombe & Kramer, 2003; Heyn, Abreu, & Ottenbacher, 2004; López Sáez de Asteasu, Martínez-Velilla, Zambom-Ferraresi, Casas-Herrero, & Izquierdo, 2017).

Specifically, while studies based on aerobic physical activity counselling (Elley, Kerse, Arroll, & Robinson, 2003; Kinmonth et al., 2008; Lawton et al., 2008; Olsson et al., 2015) and supervised aerobic physical activity programmes (Battaglia et al., 2016; Bowen et al., 2006; Chin A Paw, van Poppel, Twisk, & van Mechelen, 2004; Randomized et al., 2010) report benefits, unsupervised trials which involved intense aerobic physical activity (Conradsson, Littbrand, Lindelöf, Gustafson, & Rosendahl, 2010; Imayama et al., 2011) have failed to show HRQoL improvement.

The presence of inconsistent results and evidence makes it difficult to draw conclusions about the beneficial effects of aerobic physical activity on HRQoL, especially in adults. The high variability of different aerobic physical activity intervention protocols may explain why outcomes on the relationship between aerobic physical activity and HRQoL are not consistent.

The future research is needed to confirm the effect of aerobic physical activity on HRQoL, but also consider how it can be fostered. Therefore, in conducting this study we intend to also include favourable aspects which proved to enhance the effects of aerobic physical activity on HRQoL, such as walking groups, considering walking as a highly accessible form of aerobic physical activity in sedentary adults, and is associated with a range of positive health benefits (Hanson & Jones, 2015; Kassavou, Turner, & French, 2013); supervision (Picorelli, Pereira, Pereira, Felício, & Sherrington, 2014) and socio-cultural activities to increase the social support within the participants (Kouvonen et al., 2012; Tiessen, Smit, Broer, Groenier, & van der Meer, 2012).

We hypothesize that an aerobic physical activity programme that includes the most favourable methodological characteristics to support behaviour change will improve HRQoL in sedentary adults. The aim of the current study was to evaluate the effectiveness a supervised aerobic physical activity programme consisted on walking groups and including socio-cultural activities on HRQoL in adult who attend primary care centres.

2. Methods

2.1. Design

This study is a RCT consisting of a 9-month aerobic physical activity intervention that included supervised walking groups for 120 min/week and socio-cultural activities conducted in 4 primary care centres (PCC) in Reus (Tarragona, Spain). This study is a component of the “Pas a Pas” intervention programme carried out in PCCs to assess the effect of physical activity on different aspects of self-perceived health and well-being in different groups. The effect on cardiovascular health and self-esteem has already been published (Arija et al., 2018, 2017; Villalobos et al., 2018).

The Clinical Research Ethics Committee of the Primary Care Research Institute IDIAP Jordi Gol approved the study protocol. Data were analysed in accordance with Consolidated Standards of Reporting Trials (CONSORT) guidelines for randomized trials. The study is registered at Clinicaltrials.gov, NCT02767739.

2.2. Participants, randomization and sample size

Participants were recruited during a 6-month period prior to the start of the intervention by health-care professionals of the PCCs. The

nurse responsible for the study in each PCC assessed participants for eligibility. Participants who met the eligibility criteria were asked to sign the informed consent form and were individually randomized to either the intervention or control group on a 3:1 ratio by means of a table of computer generated random numbers. In our study a large number of participants were randomized to the intervention group, since the favourable effect of the intervention was predictable (based on published literature) and, as such, would benefit a greater number of individuals (Arija et al., 2017).

Inclusion criteria was being able to access the facilities of the PCC. Exclusion criteria were having suffering an episode of ischemic heart disease during the previous 6 months; acute episode of arthritis that limits ability to walk; and lung or heart disease with mild to moderate effort dyspnoea, which would limit the ability to undertake the proposed physical activity regimen.

Sample size calculation was based on the Physical Component Summary and Mental Component Summary of HRQoL (SF-36) as the main dependent variables, using the following criteria: alpha risk of 0.05, beta risk of 0.2 in a bilateral contrast and 10% loss-to-follow-up. The Physical Component Summary of HRQoL required 145 subjects in the intervention group and 47 in the control group, assuming a standard deviation of 7 points and a difference at follow-up ≥ 4 points. For the Mental Component Summary, 141 subjects were needed in the intervention group and 46 in the control group, assuming a standard deviation of 6 points and a difference at follow-up ≥ 3 points. The estimated sample size was calculated using the Granmo software (version 7.12; Granmo; IMIM Hospital del Mar, Barcelona, Spain).

2.3. Intervention

The physical activity intervention was based on current recommendations and consisted of two 60-min supervised walking sessions per week (396 MET/min/week aerobic physical activity) (Haskell et al., 2008; World Health Organization, 2015, pp. 1–58), including socio-cultural activities once monthly. Walking itineraries and cultural activities were pre-set by nurses. On average, walking itineraries consisted of a 5-km circuit around the city. Socio-cultural activities included visits to museums and libraries, cultural exhibitions, tourist attractions and dance lessons.

These activities were supervised by a nurse and a physical activity coach, who accompanied the groups of 15–30 participants. Attendance at walking sessions and socio-cultural activities was recorded. Participants randomized to the control group received standard care (Arija et al., 2017).

2.4. Variables

2.4.1. Variables measured at baseline

Age, gender and social class were obtained from face-to-face interviews. Social class was coded in three categories (high (class I-II), middle (class III_N-III_M) and lower (class IV-V)) using an adaptation of the British Register General (Domingo & Marcos, 1989).

Baseline data included smoking and chronic diseases (hypertension, type 2 diabetes, dyslipidemia, overweight or obesity, anxiety, depression and osteoporosis).

Weight (kg) was measured to the nearest 0.1 kg using a calibrated scale. Height (cm) was measured to the nearest 1 cm using a calibrated stadiometer. Weight and height measurements were used to calculate the body mass index [BMI as kg/m²].

Self-esteem was evaluated with the Rosenberg Self-Esteem Scale validated (Cronbach's alpha = 0.87) (Vázquez-Morejón, Jiménez García-Bóveda, & Vázquez-Morejón Jiménez, 2004), which consists of 10 items rated from 1 to 4, with higher scores indicating better self-esteem.

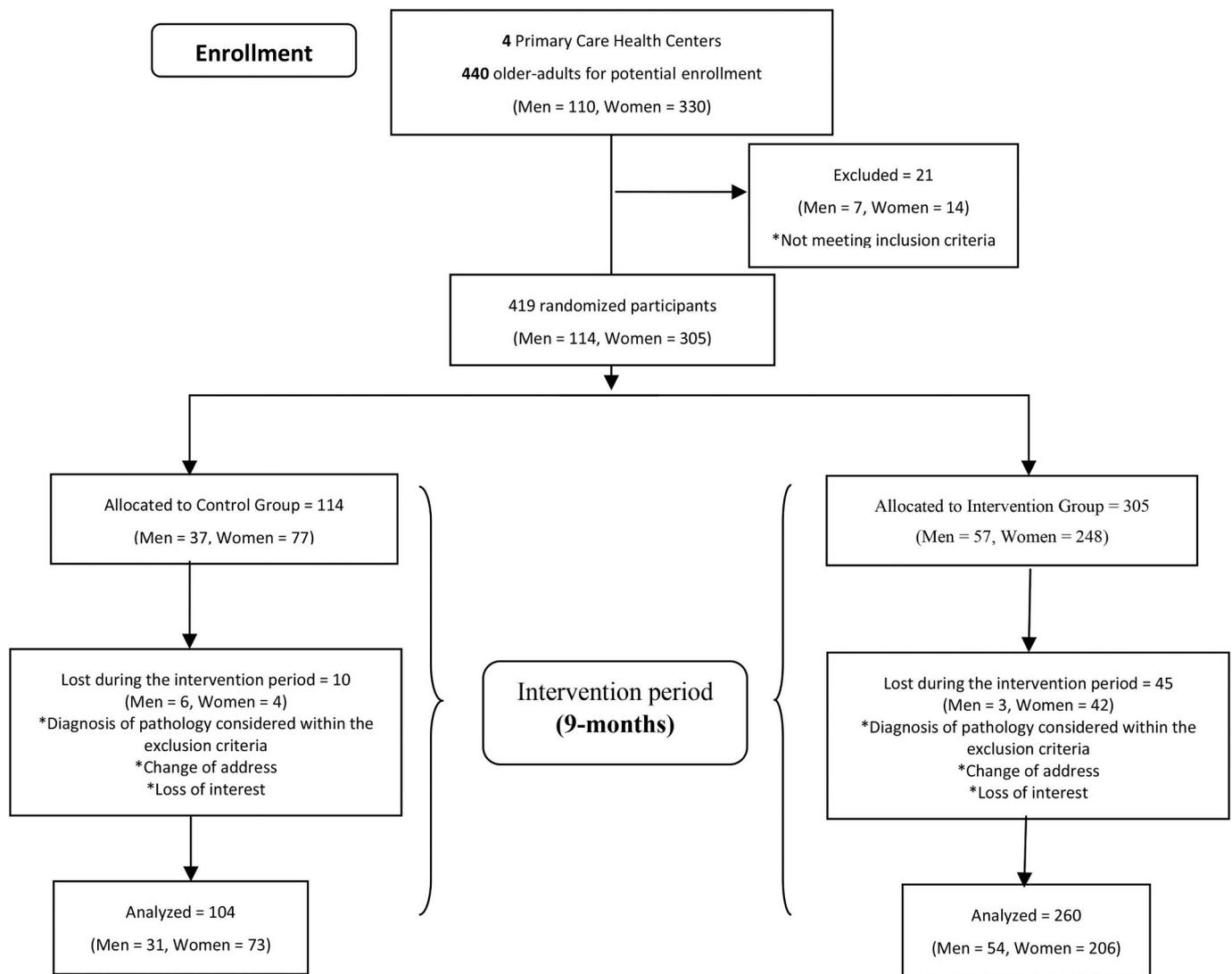


Fig. 1. Flow diagram of the study.

2.4.2. Variables measured at baseline and post-intervention

2.4.2.1. Physical activity. Levels of physical activity were measured using the short version of the International Physical Activity Questionnaire (IPAQ-S) validated for the Catalan population (moderate correlations ($r = 0.27$; $p < 0.05$); sensitivity and specificity 75% ($\kappa = 0.33$)) (Román, Ribas, Ngo, & Serra, 2013). Intensity (walking, moderate or vigorous exercise), frequency and duration of physical activity were registered. The min/week of each physical activity was calculated. The metabolic equivalent of task (MET)/min/week score was obtained multiplying the average energy expenditure by min/week for each physical activity (3.3 MET for walking, 4.0 MET for moderate exercise, and 8.0 MET for vigorous exercise). The results of each category of physical activity (walking + moderate exercise + vigorous exercise) were added to obtain the total physical activity in METs/min/week.

2.4.2.2. Health-related quality of life. HRQoL was assessed using the Spanish version of the 36-item Short Form Health Survey (SF-36) (Cronbach's alpha > 0.70) (Alonso, Prieto, & Anto, 1995), which comprises 36 items to measure health status and outcomes and includes the following eight health concepts: 1. Limitations in physical activities due to health problems (Physical Functioning); 2. Limitations in usual role activities due to physical health problems (Role Physical); 3. Bodily pain; 4. General health perceptions (General

Health); 5. Energy and fatigue (Vitality); 6. Limitations in social activities due to physical or emotional problems (Social Functioning); 7. Limitations in usual role activities due to emotional problems (Role Emotional); and 8. Psychological distress and well-being (Mental Health). Two summary measures, the Physical Component Summary and the Mental Component Summary, are derived from the last eight health scores. Physical functioning, physical role, bodily pain and general health contribute to the Physical Component Summary, whereas social functioning, role emotional, vitality and mental health reflect the Mental Component Summary. The participants' responses to each item total a numerical score on a 0–100 scale, where a higher score corresponds to a better health status.

Changes in total physical activity and HRQoL domains during the intervention period were calculated as the difference between the post-intervention and baseline values.

2.5. Statistical analyses

All categorical variables are described as percentages. Mean and standard deviation were used for continuous variables. The χ^2 test was used to compare categorical variables in different groups and the unpaired Student's *t*-test to compare continuous variables.

Multiple Linear Regression models were applied to assess the effect of the intervention programme (no, yes) (independent variable) on all

domains of HRQoL (dependent variables) (Physical Component Summary, Physical Functioning, Role Physical, Bodily Pain, General Health, Mental Component Summary, Vitality, Social Functioning, Role Emotional and Mental Health), adjusted for controlling variables associated with HRQoL. The following baseline covariates were considered: age (years), social class (dummy variables comparing social class were created; lower (reference) versus middle and high); PCC (dummy variables comparing centres were created; PCC 1 (reference) versus PCC 2, PCC 3, PCC 4); BMI (kg/m²); self-esteem (score); hypertension (no, yes); type 2 diabetes (no, yes); dyslipidemia (no, yes); depression (no, yes); anxiety (no, yes); osteoporosis (no, yes); and the dependent variable of each model at baseline.

Statistical significance was set at $p < 0.05$. SPSS for Windows Version 22.0 (SPSS Statistics 22.0) was used for analyses.

3. Results

A total of 419 participants were recruited and randomized to the control (n = 114) or the intervention group (n = 305). During the 9-month intervention period 10 and 45 participants dropped out of the control group and the intervention group, respectively; 364 patients (87%) completed the study (Fig. 1). There were no statistically significant differences with respect to sociodemographics: age, sex, social class, and presence of chronic medical conditions between the participants who dropped-out compared to those who continued in the study.

At baseline, when we analysed the results by sex, no significant differences between men and women in terms of age, social class, and risk factors for poor HRQoL (smoking, chronic medical conditions, IMC and self-esteem) were detected. However, women presented significant lower scores than men in the following HRQoL items: Physical Component Summary, Physical Functioning, Bodily Pain, Mental Component Summary, Vitality, Role Emotional and Mental Health (Table 1).

Baseline characteristics (age, social class, and risk factors for poor HRQoL -smoking, chronic medical conditions, IMC and self-esteem-) were similar between the intervention group and the control group in men and women (Table 2).

Walking every week accounted for 396 METs/min/week of physical activity energy expenditure. Average attendance at walking sessions was 74.3%, which amounts to a mean expenditure of 303.6 MET/min/week for the intervention group. No significant differences in total physical activity were detected at baseline between the intervention group and the control group in men and women (Table 3). In contrast, the change in total physical activity from baseline to post-intervention significantly increased in the intervention group post-intervention, whereas it decreased in the control group (Table 4).

Table 1
Baseline HRQoL of the participants by sex.

	Baseline		p
	Men (n = 85)	Women (n = 279)	
Physical Component Summary (scores)	47.8 (8.6)	45.5 (8.5)	0.031
Physical functioning (scores)	81.9 (18.7)	75.4 (19.6)	0.009
Role physical (scores)	78.0 (38.4)	71.2 (39.9)	0.175
Bodily pain (scores)	72.6 (26.9)	62.9 (25.9)	0.004
General health (scores)	56.7 (16.4)	56.0 (18.2)	0.785
Mental Component Summary (scores)	50.1 (10.3)	44.8 (12.3)	0.001
Vitality (scores)	65.6 (20.8)	58.8 (22.3)	0.016
Social functioning (scores)	82.5 (20.9)	79.5 (23.4)	0.304
Role emotional (scores)	84.3 (33.3)	71.1 (39.6)	0.003
Mental health (scores)	71.1 (20.0)	65.1 (21.2)	0.025

Values expressed as mean and (standard deviation).

No significant differences were observed with respect to HRQoL between the intervention and control group in men and women at baseline (Table 3). The change in HRQoL during the intervention period was significantly favourable for women in the intervention group when compared to the control group, specifically in relation to Physical Functioning, Role Physical, Bodily Pain, General Health, Role Emotional and Mental Health. No significant changes were observed in men between the intervention group and control group (Table 4).

Table 5 shows the effects of the intervention programme on HRQoL according to multiple linear regression models. In women, a favourable effect of the intervention on HRQoL was observed in the Physical Component Summary (+5.00 points, $p = 0.036$), Physical Functioning (+14.62 points, $p = 0.001$), Role Physical (+13.59 points, $p = 0.020$), Bodily Pain (+10.84 points, $p = 0.016$), General Health (+6.56 points, $p = 0.011$) and Vitality (+4.45 points, $p = 0.050$), independently of the baseline levels of each component or domain. No significant effect was observed in men.

We conducted an analysis in which change in total physical activity (the increasing from baseline to post-intervention) was considered as mediator of the study effects on HRQoL and corroborated the positive effects of physical activity on HRQoL. In women, we observed that every MET/min/week of change in total physical activity there was an increase in Physical Function (+0.001 points, $p = 0.050$; $-R^2 \times 100 = 33.4\%$; $F_{12,249} = 10.41$; $p = 0.001$ -), Bodily Pain (+0.001 points, $p = 0.016$; $-R^2 \times 100 = 33.2\%$; $F_{12,249} = 10.29$; $p = 0.001$) and Mental Health (+0.001 points, $p = 0.044$; $R^2 \times 100 = 41.4\%$; $F_{12,270} = 41.40$; $p = 0.001$) multiple linear regression models (Annex Table). No significant effect was observed in men.

4. Discussion

4.1. HRQoL

This study reported poor HRQoL in all population at baseline. Our results showed low scores in the physical and mental areas, similarly to other cross-sectional studies conducted in different populations (adults over 65 years of age, postmenopausal women, diabetics and other) (Alcañiz & Solé-Auró, 2018; Burström, Johannesson, & Diderichsen, 2001; Casado et al., 2001; Lubetkin et al., 2005; Mulasso, Roppolo, & Rabaglietti, 2014; Rendas-Baum, White, Kosinski, Vietri, & Bjorner, 2016; Salinero-Fort et al., 2015; Sun et al., 2011; Tourani et al., 2018; R.; Wang et al., 2008). The findings in this study will help justify the importance of establishing strategies for health promotion to enhance HRQoL in our population.

In addition, as opposed to men, women in our study presented a lower perception of HRQoL in physical functioning, bodily pain and in most domains of the mental component (vitality, role emotional and mental health) at baseline. These results are similar to those observed in a descriptive epidemiological study conducted in the Catalan population, which included 2264 adults over 80 years of age (1025 men and 1239 women), reporting that women compared to men, had a lower perception of HRQoL in bodily pain and in the mental area (anxiety and depression problems) (Alcañiz & Solé-Auró, 2018). We consider that assessment of HRQoL among men and women is important in identifying subgroups with poor health status and in guiding effective intervention strategies to improving health of the population.

The poorer perception of HRQoL in women could be explained by the high prevalence of chronic diseases and the higher risk of depression (Barile et al., 2012; Gallegos-Carrillo et al., 2009; Hajian-Tilaki, Heidari, & Hajian-Tilaki, 2017). In addition, during the menopause women can suffer from vasomotor symptoms (hot flushes, palpitations), psychological disturbances (mood swings, depression, irritability, anxiety, sleep disorders), atrophic vaginitis, bladder irritability, nocturnal sweats, headaches, fatigue, decreased libido and general pain. These symptoms impact women's daily activities and reduce quality of life (Pintado Vázquez, 2007; Stojanovska, Apostolopoulos, Polman, &

Table 2
Baseline characteristics of participants in the control and intervention groups by sex.

	Men		P	Women		p
	Control group (n = 31)	Intervention group (n = 54)		Control group (n = 73)	Intervention group (n = 206)	
Age (years)*	66.2 (2.3)	66.1 (3.8)	0.951	67.2 (2.7)	64.0 (3.5)	0.069
Social Class						
High class I-II (%)	25.9	22.2	0.932	27.5	24.1	0.259
Middle class III _N -III _M (%)	66.7	70.4		56.5	50.3	
Lower class IV-V (%)	7.4	7.4		15.9	25.6	
Risk factor						
Smoking (%)	7.4	7.4	1.000	2.9	8.0	0.172
Hypertension (%)	55.6	59.3	0.814	58.0	52.8	0.486
Type 2 diabetes (%)	18.5	25.9	0.582	18.8	19.1	1.000
Overweight (%)	48.1	44.4	0.815	33.3	37.7	0.564
Obesity (%)	33.3	51.9	0.156	50.2	40.2	0.092
Dyslipidemia (%)	59.3	46.3	0.347	46.4	50.3	0.675
Depression (%)	7.4	9.3	1.000	11.6	18.1	0.259
Anxiety (%)	11.1	13.0	1.000	29.0	20.6	0.182
Osteoporosis (%)	-	-	-	24.6	20.6	0.500
BMI (kg/m ²)*	28.6 (4.4)	30.7 (4.31)	0.065	30.4 (4.9)	29.7 (5.1)	0.368
Self-esteem (score)*	31.3 (4.0)	30.8 (3.3)	0.561	31.1 (4.4)	30.1 (4.2)	0.125

Values expressed as mean and (standard deviation).

Borkoles, 2014). Indeed, descriptive studies report that approximately 45% of women consider that menopausal symptoms negatively impact their HRQoL (Lizcano & Guzmán, 2014; Lwow, Jedrzejuk, Dunajska, Milewicz, & Szmigiero, 2013).

4.2. Physical activity

Our results showed an increase in total physical activity from baseline to post-intervention (9-month follow-up) in men and women of the intervention group. This was more than double that achieved in the walking sessions of the intervention programme which consisted in 303.6 METs/min/week. The increase of activity beyond the programme target indicates the effectiveness of this programme in promoting different leisure-time physical activity. The characteristics of our programme such as being part of a group, having supervision and taking part in socio-cultural activities have been described as enhancers of compliance and sustainability of physical activity by participants (Kouvonen et al., 2012; Tiessen et al., 2012).

4.3. Intervention programme and HRQoL

The 9-month aerobic physical activity intervention which included a supervised walking group for 120 min/week and socio-cultural activities had a positive effect on the HRQoL of women who attend primary care centres. Notably, no significant effect on HRQoL was

observed for men. We want to mention that although the socio-cultural activities were included in the programme, they were not properly measured, nonetheless the authors, based on previous evidence, believe that it might have an impact.

Despite these circumstances, aerobic physical activity and other methodological components of our programme improved the perception of HRQoL in women, with increased scores in the domains of physical function (+10.1 points), bodily pain (+7.3 points), general health (+2.5 points) and mental health (+5.6 points), according to multivariate models adjusted for variables associated with HRQoL. The lack of improvement observed in men could be ascribed to the limited time and lower intensity of physical activity of our intervention. Some descriptive studies conclude that men prefer to perform physical activities for longer and of higher intensity (moderate-vigorous physical activity), whereas women would prefer activities of lower intensity (aerobic physical activity) for shorter periods of time, such as the activity designed for our intervention (Sherwood & Jeffery, 2000).

The improvement in the perception of mental health and individual well-being through the practice of physical activity is attributed to the release of the neurotransmitters serotonin, dopamine and noradrenaline, which improve mood and reduce stress, anxiety, symptoms of depression, and also inhibit the nerve fibres that transmit pain (Arruza et al., 2008). These mechanisms could also counteract the hormonal effects produced by the menopause, since during this stage neurotransmitters are affected by the decrease in female sex hormones

Table 3
Baseline physical activity and HRQoL by sex.

	Men		p	Women		p
	Control group (n = 31)	Intervention group (n = 54)		Control group (n = 73)	Intervention group (n = 206)	
Total physical activity (MET/min/week)	2894.0 (6921.1)	3078.9 (3952.6)	0.079	2301.6 (3393.1)	2139.1 (2059.3)	0.746
HRQoL						
Physical Component Summary (scores)	45.1 (9.8)	49.2 (7.7)	0.480	44.0 (8.9)	46.0 (8.3)	0.094
Physical functioning (scores)	80.9 (23.2)	82.4 (16.2)	0.740	74.8 (22.5)	75.6 (18.5)	0.772
Role physical (scores)	75.0 (39.8)	79.6 (37.9)	0.612	74.2 (39.0)	70.2 (40.3)	0.469
Bodily pain (scores)	65.1 (28.8)	76.4 (25.3)	0.077	61.3 (25.6)	63.5 (26.0)	0.546
General health (scores)	57.4 (15.8)	56.3 (16.9)	0.766	59.1 (19.9)	55.0 (17.4)	0.104
Mental Component Summary (scores)	50.5 (10.8)	49.9 (10.2)	0.790	48.4 (12.6)	43.6 (11.9)	0.666
Vitality (scores)	64.0 (19.0)	66.3 (21.7)	0.640	57.9 (25.4)	59.1 (21.1)	0.731
Social functioning (scores)	81.4 (26.0)	83.1 (18.1)	0.745	81.3 (26.3)	78.9 (22.3)	0.504
Role emotional (scores)	88.8 (26.1)	82.0 (36.4)	0.391	82.1 (34.0)	67.3 (40.7)	0.074
Mental health (scores)	73.7 (20.6)	69.8 (19.8)	0.411	71.3 (23.6)	63.0 (19.9)	0.110

Values expressed as mean and (standard deviation).

Table 4
Changes during the intervention period of total physical activity and HRQoL by sex.

	Changes during the intervention period (Post-intervention – Baseline)					
	Men			Women		
	Control group (n = 31)	Intervention group (n = 54)	P	Control group (n = 73)	Intervention group (n = 206)	P
Total Physical Activity (MET/min/week)	-857.2 (7149.4)	560.6 (5432.6)	0.032	-162.1 (3469.7)	832.7 (3536.31)	0.044
HRQoL						
Physical Component Summary (scores)	3.2 (8.8)	0.4 (8.2)	0.066	-0.1 (9.0)	2.4 (9.5)	0.075
Physical functioning (scores)	-1.6 (19.3)	2.3 (21.5)	0.895	-4.7 (18.0)	7.8 (20.4)	0.001
Role physical (scores)	-7.5 (37.2)	6.0 (43.1)	0.238	-4.7 (43.5)	10.1 (54.9)	0.044
Bodily pain (scores)	7.3 (30.6)	-3.7 (24.2)	0.079	-3.18 (25.8)	5.6 (28.0)	0.023
General health (scores)	3.5 (12.3)	3.4 (17.7)	0.973	0.5 (16.1)	4.6 (15.3)	0.034
Mental Component Summary (scores)	-0.5 (7.23)	1.1 (11.2)	0.480	-1.6 (12.4)	1.5 (13.0)	0.082
Vitality (scores)	-0.5 (14.3)	2.7 (23.0)	0.495	-0.7 (17.8)	2.5 (19.8)	0.221
Social functioning (scores)	3.7 (26.5)	-0.6 (27.0)	0.490	-3.9 (25.1)	1.6 (23.1)	0.087
Role emotional (scores)	0.0 (26.1)	1.8 (50.7)	0.859	-3.8 (38.9)	9.3 (47.3)	0.025
Mental health (scores)	1.9 (15.9)	5.4 (20.8)	0.438	-5.6 (19.1)	4.1 (18.0)	0.001

Values expressed as mean and (standard deviation).

Table 5
Effect of the intervention programme on HRQoL in women.

	All			
	B	SE	p	
Physical functioning (score)				
Intervention programme (0,1)	10.190	2.503	0.001	$R_C^2 \times 100 = 41.7\%$; $F_{16,248} = 11.09$; $p = 0.001$
BMI (kg/m ²)	-0.889	0.223	0.001	
Physical functioning - baseline (score)	0.425	0.058	0.001	
Bodily pain (score)				
Intervention programme (0,1)	7.321	3.473	0.036	$R_C^2 \times 100 = 36.8\%$; $F_{16,248} = 9.04$; $p = 0.001$
Type 2 diabetes (0, 1)	-8.927	3.818	0.020	
BMI (kg/m ²)	-1.343	0.311	0.001	
Bodily pain - baseline (score)	0.443	0.058	0.001	
General health (score)				
Intervention programme (0, 1)	2.530	2.178	0.024	$R_C^2 \times 100 = 48.2\%$; $F_{16,249} = 14.49$; $p = 0.001$
Osteoporosis (0, 1)	-5.872	2.430	0.016	
BMI (kg/m ²)	-0.540	0.194	0.006	
General health - baseline (score)	0.632	0.060	0.001	
Mental health (score)				
Intervention programme (0,1)	5.656	2.471	0.023	$F_C^2 \times 100 = 42.50\%$; $F_{16,249} = 11.68$; $p = 0.001$
Mental health - baseline (score)	0.581	0.057	0.001	

Multiple linear regression adjusted for age (years); Social Class (dummy variables, 0 = reference); 4 Primary Care Centres (dummy variables, 0 = reference); BMI (kg/m²); Self-Esteem (score); Hypertension (0 = no; 1 = yes); Type 2 Diabetes (0 = no; 1 = yes); Dyslipidemia (0 = no, 1 = yes); Depression (0 = no; 1 = yes); Anxiety (0 = no; 1 = yes); Osteoporosis (0 = no; 1 = yes) and the dependent variable of each model at baseline.

(Pintado Vázquez, 2007).

On the other hand, we could hypothesize that the effects of physical activity on mental health and individual well-being in our study are enhanced by the methodological components of the programme, i.e., supervision, walking group and socio-cultural activities. Individual and group supervision are considered motivational strategies to implement and sustain activities in intervention programmes (Richards et al., 2013). Similarly, group activities improve the wellbeing and mental health of the individual by means of the creation and consolidation of social support networks which favour the development of bonds

between individuals through the exchange of feelings, thoughts and experiences (Guallar-Castillón, Santa-Olalla, Ramón, López, & Rodríguez-Artalejo, 2004).

The effect of aerobic physical activity programmes on HRQoL reported in the literature is inconsistent. Randomised clinical trials conducted in adults over 40 years of age from different populations (general population, primary care users, women, people with depression, diabetics) which included intervention programmes based on physical activity counselling (Elley et al., 2003; Kinmonth et al., 2008; Lawton et al., 2008; Olsson et al., 2015) and on physical activity (supervised, 120–140 min/week, 2–12 months of duration) (Battaglia et al., 2016; Bowen et al., 2006; Chin A Paw et al., 2004; Randomized et al., 2010) observed an increase in HRQoL scores similar to our study, namely, physical function (between +2.17 and +16.47 points) (Battaglia et al., 2016; Kinmonth et al., 2008; Lawton et al., 2008), bodily pain (between +6.51 and +20.23 points) (Battaglia et al., 2016; Elley et al., 2003), general health (between +4.5 and +9 points) (Elley et al., 2003; Kinmonth et al., 2008; Olsson et al., 2015) and mental health (between +1.73 and 7.88) (Battaglia et al., 2016; Bowen et al., 2006; Chin A Paw et al., 2004; Lawton et al., 2008). However, previous studies also showed improvement in other domains and components of HRQoL not observed in our study, such as physical role (+10.53 points), vitality (+5.36 points) (Elley et al., 2003), Physical Component Summary (between +6 and +6.25 points) and Mental Component Summary (between +3.6 and +6.48 points) (Battaglia et al., 2016; Lawton et al., 2008; Olsson et al., 2015).

In contrast, other aerobic physical activity intervention studies did not observe significant benefits on HRQoL, which could be attributed to the methodological characteristics of their interventions, such as 360 min per week of physical activity (Imayama et al., 2011) and high-intensity exercise (Conradsson et al., 2010). It is possible that physical activity programmes of longer periods of times and higher intensity produce a negative effect on some HRQoL aspects, for instance body or joint pain, disruption of regular social interactions and negative mood changes caused by the high demands of the programme, particularly in sedentary individuals (Guallar-Castillón et al., 2004).

Our study provides scientific knowledge to building public health strategies on health promotion at community level. These results support the crucial role of intervention programmes in promoting physical activity and HRQoL in special population as the women. Health institutions should design and deliver intervention programmes take into account the sex differences and the type and intensity of physical activity.

The strengths of this study include the strong evidence of an RCT, which provide the highest level of evidence. In this case, the control group underscored the impact of a intervention programme on HRQoL.

Additionally, the results of this study are supported by the controlled the related factors for poor HRQoL (sociodemographic, smoking, chronic medical conditions, IMC and self-esteem-) through multivariable statistical techniques; and the intervention programme combined current physical activity recommendations (Haskell et al., 2008; World Health Organization, 2015, pp. 1–58) with methodological characteristics regarded as favourable in previous studies: walking groups (Hanson & Jones, 2015; Kassavou et al., 2013) socio-cultural activities (Kouvonen et al., 2012; Tiessen et al., 2012) and supervision (Picorelli et al., 2014).

As was previously mentioned, we consider a limitation of the study the not assessment of the effects of socio-cultural activities individually. However, in order to build the evidence for the effects of physical activity on HRQoL, we conducted an analysis in which change in total physical activity was considered as mediator of the study effects on HRQoL and corroborated the positive effects of aerobic physical activity on HRQoL.

5. Conclusion

This intervention programme for physical activity which combined 120 min per week of supervised walking sessions and socio-cultural activities during a 9-month period improved HRQoL in women who attend primary care centres. The benefits on HRQoL might derive from the characteristics of the programme, which included socio-cultural activities and supervision. No beneficial effect was observed in men. We speculate that men respond better to more intense physical activity of longer duration.

Contributions

All authors have confirmed that they meet the IC-MJE criteria for authorship credit (www.icmje.org/ethical_1author.html) with respect to: (1) making substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; (2) drafting the article or revising it critically for important intellectual content; and (3) giving final approval of the version to be published.

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Declaration of competing interest

The authors declare that they have no conflict of interest.

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References

- Alcañiz, M., & Solé-Auró, A. (2018). Feeling good in old age: Factors explaining health-related quality of life. *Health and Quality of Life Outcomes*, 16(1), 48. <https://doi.org/10.1186/s12955-018-0877-z>.
- Alonso, J., Prieto, L., & Anto, J. (1995). La versión española del SF-36 health survey (cuestionario de Salud SF-36): Un instrumento para la medida de resultados clínicos. *Medicina Clínica*, 104, 771–776.
- Arija, V., Villalobos, F., Pedret, R., Vinuesa, A., Jovani, D., Pascual, G., et al. (2018). Physical activity, cardiovascular health, quality of life and blood pressure control in hypertensive subjects: Randomized clinical trial. *Health and Quality of Life Outcomes*, 16(1), 1–11. <https://doi.org/10.1186/s12955-018-1008-6>.
- Arija, V., Villalobos, F., Pedret, R., Vinuesa, A., Timón, M., Basora, T., et al. (2017). Effectiveness of a physical activity program on cardiovascular disease risk in adult primary health-care users: The “Pas-a-Pas” community intervention trial. *BMC Public Health*, 17(1), 576. <https://doi.org/10.1186/s12889-017-4485-3>.
- Arruza, J. A., Arribas, S., Gil De Montes, L., Irazusta, S., Romero, S., & Cecchini, J. A. (2008). Repercusiones de la duración de la actividad físico-deportiva sobre el bienestar psicológico. *Revista Internacional de Medicina Y Ciencias de La Actividad Física Y Del Deporte*, 8(30), 171–183.
- Barile, J. P., Thompson, W. W., Zack, M. M., Krahn, G. L., Horner-Johnson, W., & Haffer, S. C. (2012). Activities of daily living, chronic medical conditions, and health-related quality of life in older adults. *The Journal of Ambulatory Care Management*, 35(4), 293–304. <https://doi.org/10.1097/JAC.0b013e31826746f5>.
- Battaglia, G., Bellafiore, M., Alesi, M., Paoli, A., Bianco, A., & Palma, A. (2016). Effects of an adapted physical activity program on psychophysical health in elderly people. *Clinical Interventions in Aging*, 11, 1009–1015. <https://doi.org/10.2147/CIA.S109591>.
- Bowen, D. J., Fesinmeyer, M. D., Yasui, Y., Tworoger, S., Ulrich, C. M., Irwin, M. L., et al. (2006). Randomized trial exercise in sedentary middle aged women: Effects on quality of life. *International Journal of Behavioral Nutrition and Physical Activity*, 3(1), 34. <https://doi.org/10.1186/1479-5868-3-34>.
- Burström, K., Johannesson, M., & Diderichsen, F. (2001). Swedish population health-related quality of life results using the EQ-5D. *Quality of Life Research*, 10(7), 621–635. <https://doi.org/10.1023/A:1013171831202>.
- Casado, J. M., González, N., Moraleda, S., Orueta, R., Carmona, J., & Gómez-Calcerrada, R. M. (2001). Calidad de vida relacionada con la salud en pacientes ancianos en atención primaria. *Atención Primaria*, 28(3), 167–173. [https://doi.org/10.1016/S0212-6567\(01\)78926-3](https://doi.org/10.1016/S0212-6567(01)78926-3).
- Chin A Paw, M. J., van Poppel, M. N., Twisk, J. W., & van Mechelen, W. (2004). Effects of resistance and all-round, functional training on quality of life, vitality and depression of older adults living in long-term care facilities: A “randomized” controlled trial. *BMC Geriatrics*, 4(1), 5. <https://doi.org/10.1186/1471-2318-4-5>.
- Colcombe, S., & Kramer, A. F. (2003). Fitness effects on the cognitive function of older adults: A meta-analytic study. *Psychological Science*, 14(2), 125–130. <https://doi.org/10.1111/1467-9280.t01-1-01430>.
- Conradsson, M., Littbrand, H., Lindelöf, N., Gustafson, Y., & Rosendahl, E. (2010). Effects of a high-intensity functional exercise programme on depressive symptoms and psychological well-being among older people living in residential care facilities: A cluster-randomized controlled trial. *Aging & Mental Health*, 14(5), 565–576. <https://doi.org/10.1080/13607860903483078>.
- Domingo, A., & Marcos, J. (1989). Propuesta de un indicador de la «clase social» basado en la ocupación. *Gaceta Sanitaria*, 3(10), 320–326. [https://doi.org/10.1016/S0213-9111\(89\)70948-1](https://doi.org/10.1016/S0213-9111(89)70948-1).
- Elley, C. R., Kerse, N., Arroll, B., & Robinson, E. (2003). Effectiveness of counselling patients on physical activity in general practice: Cluster randomised controlled trial. *BMJ*, 326(7393), 793. <https://doi.org/10.1136/bmj.326.7393.793>.
- Gallegos-Carrillo, K., García-Peña, C., Mudgal, J., Romero, X., Durán-Arenas, L., & Salmerón, J. (2009). Role of depressive symptoms and comorbid chronic disease on health-related quality of life among community-dwelling older adults. *Journal of Psychosomatic Research*, 66(2), 127–135. <https://doi.org/10.1016/j.jpsychores.2008.07.007>.
- Gaullar-Castillón, P., Santa-Olalla, P., Ramón, J., López, E., & Rodríguez-Artalejo, F. (2004). Actividad física y calidad de vida de la población adulta mayor en España. *Medicina Clínica*, 123(16), 606–610. <https://doi.org/10.1157/13068435>.
- Hajian-Tilaki, K., Heidari, B., & Hajian-Tilaki, A. (2017). Are gender differences in Health-related quality of life attributable to sociodemographic characteristics and chronic disease conditions in elderly people? *International Journal of Preventive Medicine*, 8, 95. https://doi.org/10.4103/ijpvm.IJPVM_197_16.
- Hanson, S., & Jones, A. (2015). Is there evidence that walking groups have health benefits? A systematic review and meta-analysis. *British Journal of Sports Medicine*, 49(11), 710–715. <https://doi.org/10.1136/bjsports-2014-094157>.
- Haskell, W. L., Lee, I.-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., et al. (2008). Physical activity and public health: Updated recommendation for adults from the American college of sports medicine and the American heart association. *Medicine & Science in Sports & Exercise*, 39(8), 1423–1434. <https://doi.org/10.1249/mss.0b013e3180616b27>.
- Heyn, P., Abreu, B. C., & Ottenbacher, K. J. (2004). The effects of exercise training on elderly persons with cognitive impairment and dementia: A meta-analysis. *Archives of Physical Medicine and Rehabilitation*, 85(10), 1694–1704. <https://doi.org/10.1016/j.apmr.2004.03.019>.
- Imayama, I., Alfano, C. M., Cadmus, L. A., Wang, C., Xiao, L., Duggan, C., et al. (2011). Effects of 12-month exercise on health-related quality of life: A randomized controlled trial. *Preventive Medicine*, 52(5), 344–351. <https://doi.org/10.1016/j.ypmed.2011.02.016>.
- Kassavou, A., Turner, A., & French, D. P. (2013). Do interventions to promote walking in

- groups increase physical activity? A meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 18. <https://doi.org/10.1186/1479-5868-10-18>.
- Katz, P. P., & Pate, R. (2016). Exercise as medicine. *Annals of Internal Medicine*, 165(12), 880. <https://doi.org/10.7326/M16-2086>.
- Kinmonth, A.-L., Wareham, N. J., Hardeman, W., Sutton, S., Prevost, A. T., Fanshawe, T., et al. (2008). Efficacy of a theory-based behavioural intervention to increase physical activity in an at-risk group in primary care (ProActive UK): A randomised trial. *The Lancet*, 371(9606), 41–48. [https://doi.org/10.1016/S0140-6736\(08\)60070-7](https://doi.org/10.1016/S0140-6736(08)60070-7).
- Kouvonen, A., De Vogli, R., Stafford, M., Shipley, M. J., Marmot, M. G., Cox, T., et al. (2012). Social support and the likelihood of maintaining and improving levels of physical activity: The Whitehall II Study. *The European Journal of Public Health*, 22(4), 514–518. <https://doi.org/10.1093/eurpub/ckr091>.
- Lawton, B. A., Rose, S. B., Elley, C. R., Dowell, A. C., Fenton, A., & Moyes, S. A. (2008). Exercise on prescription for women aged 40–74 recruited through primary care: Two year randomised controlled trial. *BMJ*, 337(dec11_3), a2509. <https://doi.org/10.1136/bmj.a2509>.
- Lizcano, F., & Guzmán, G. (2014). Estrogen deficiency and the origin of obesity during menopause. *BioMed Research International*, 2014, 757461. <https://doi.org/10.1155/2014/757461>.
- López Sáez de Asteasu, M., Martínez-Velilla, N., Zambom-Ferraresi, F., Casas-Herrero, Á., & Izquierdo, M. (2017). Role of physical exercise on cognitive function in healthy older adults: A systematic review of randomized clinical trials. *Ageing Research Reviews*, 37, 117–134. <https://doi.org/10.1016/j.arr.2017.05.007>.
- Lubetkin, E. I., Jia, H., Franks, P., & Gold, M. R. (2005). Relationship among socio-demographic factors, clinical conditions, and health-related quality of life: Examining the EQ-5D in the U.S. general population. *Quality of Life Research*, 14(10), 2187–2196. <https://doi.org/10.1007/s11136-005-8028-5>.
- Lwow, F., Jedrzejuk, D., Dunajska, K., Milewicz, A., & Szmigiero, L. (2013). Cardiovascular disease risk factors associated with low level of physical activity in postmenopausal Polish women. *Gynecological Endocrinology*, 29(7), 683–686. <https://doi.org/10.3109/09513590.2013.797400>.
- Ministerio de Sanidad Servicios Sociales e Igualdad (2014). *Encuesta nacional de salud. España 2011/12*.
- Mulasso, A., Roppolo, M., & Rabaglietti, E. (2014). The role of individual characteristics and physical frailty on health related quality of life (HRQOL): A cross sectional study of Italian community-dwelling older adults. *Archives of Gerontology and Geriatrics*, 59(3), 542–548. <https://doi.org/10.1016/j.archger.2014.08.012>.
- Olsson, S. J., Börjesson, M., Ekblom-Bak, E., Hemmingsson, E., Hellénus, M.-L., & Kallings, L. V. (2015). Effects of the Swedish physical activity on prescription model on health-related quality of life in overweight older adults: A randomised controlled trial. *BMC Public Health*, 15(1), 687. <https://doi.org/10.1186/s12889-015-2036-3>.
- Picorelli, A. M. A., Pereira, L. S. M., Pereira, D. S., Felício, D., & Sherrington, C. (2014). Adherence to exercise programs for older people is influenced by program characteristics and personal factors: A systematic review. *Journal of Physiotherapy*, 60(3), 151–156. <https://doi.org/10.1016/j.jphys.2014.06.012>.
- Pintado Vázquez, S. (2007). *Disfunción sexual femenina en la menopausia. Impacto sobre la calidad de vida*. Revista Internacional de Andrología .
- Randomized, D. A., Trial, C., Peri, K., Robinson, E., Dowell, A., Kolt, G. S., et al. (2010). Home-based activity program for older people with depressive symptoms. *The Annals of Family Medicine*, 8(3), 214–223. <https://doi.org/10.1370/afm.1093>.
- INTRODUCTION.
- Rendas-Baum, R., White, M., Kosinski, M., Vietri, J., & Björner, J. (2016). A cross-national comparison of the effect of age and gender on health-related quality of life (Hrql). *Value in Health*, 19(7), A471. <https://doi.org/10.1016/j.jval.2016.09.724>.
- Richards, J., Foster, C., Thorogood, M., Hillsdon, M., Kaur, A., Wickramasinghe, K. K., et al. (2013). Face-to-face interventions for promoting physical activity. *Cochrane database of systematic reviews: Vol. 2013*.
- Román, B., Ribas, L., Ngo, J., & Serra, L. (2013). Validación en población catalana del cuestionario internacional de actividad física. *Gaceta Sanitaria*, 27(3), 254–257. <https://doi.org/10.1016/j.gaceta.2012.05.013>.
- Romero, M., Vivas-Consuelo, D., & Alvis-Guzman, N. (2013). Is health related quality of life (HRQoL) a valid indicator for health systems evaluation? *SpringerPlus* .
- Salinero-Port, M.Á., Gómez-Campelo, P., Bragado-Alvárez, C., Abánades-Herranz, J. C., Jiménez-García, R., & de Burgos-Lunar, C. (2015). Health-related quality of life of Latin-American immigrants and Spanish-born attended in Spanish primary health care: Socio-demographic and psychosocial factors. *PLoS One*, 10(4), e0122318. <https://doi.org/10.1371/journal.pone.0122318>.
- Sherwood, N. E., & Jeffery, R. W. (2000). The behavioral determinants of exercise: Implications for physical activity interventions. *Annual Review of Nutrition*, 20(1), 21–44. <https://doi.org/10.1146/annurev.nutr.20.1.21>.
- Søltøft, F., Hammer, M., & Kragh, N. (2009). The association of body mass index and health-related quality of life in the general population: Data from the 2003 health survey of England. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 18(10), 1293–1299. <https://doi.org/10.1007/s11136-009-9541-8>.
- Stojanovska, L., Apostolopoulos, V., Polman, R., & Borkoles, E. (2014). To exercise, or, not to exercise, during menopause and beyond. *Maturitas*. <https://doi.org/10.1016/j.maturitas.2014.01.006>.
- Sun, S., Chen, J., Johannesson, M., Kind, P., Xu, L., Zhang, Y., et al. (2011). Population health status in China: EQ-5D results, by age, sex and socio-economic status, from the national health Services survey 2008. *Quality of Life Research*, 20(3), 309–320. <https://doi.org/10.1007/s11136-010-9762-x>.
- Tiessen, A. H., Smit, A. J., Broer, J., Groenier, K. H., & van der Meer, K. (2012). Randomized controlled trial on cardiovascular risk management by practice nurses supported by self-monitoring in primary care. *BMC Family Practice*, 13(1), 90. <https://doi.org/10.1186/1471-2296-13-90>.
- Tourani, S., Behzadifar, M., Martini, M., Aryankhesal, A., Taheri Mirghaedi, M., Salemi, M., et al. (2018). Health-related quality of life among healthy elderly Iranians: A systematic review and meta-analysis of the literature. *Health and Quality of Life Outcomes*, 16(1), 18. <https://doi.org/10.1186/s12955-018-0845-7>.
- Urzúa, M. A. (2010). Calidad de vida relacionada con la salud: Elementos conceptuales. *Revista Médica de Chile*, 138(3), 358–365. <https://doi.org/10.4067/S0034-98872010000300017>.
- Vázquez-Morejon, A. J., Jiménez García-Bóveda, R., & Vázquez-Morejon Jiménez, R. (2004). Escala de autoestima de Rosenberg: Fiabilidad y validez en población clínica española. *Apuntes de Psicología*, 22(22), 247–255.
- Villalobos, F., Vinuesa, A., Pedret, R., Reche, A., Domínguez, E., Arija, V., et al. (2018). Efecto de un programa de actividad física sobre la autoestima en sujetos con enfermedades crónicas. Ensayo de intervención comunitaria “Pas-a-Pas. Atención Primaria .
- Walters, S. J., Munro, J. F., & Brazier, J. E. (2001). Using the SF-36 with older adults: A cross-sectional community-based survey. *Age and Ageing*, 30(4), 337–343. <https://doi.org/10.1093/ageing/30.4.337>.
- Wang, H. M., Beyer, M., Gensichen, J., & Gerlach, F. M. (2008). Health-related quality of life among general practice patients with differing chronic diseases in Germany: Cross sectional survey. *BMC Public Health*, 8, 1–12. <https://doi.org/10.1186/1471-2458-8-246>.
- Wang, R., Wu, C., Zhao, Y., Yan, X., Ma, X., Wu, M., et al. (2008). Health related quality of life measured by SF-36: A population-based study in shanghai, China. *BMC Public Health*, 8(1), 292. <https://doi.org/10.1186/1471-2458-8-292>.
- World Health Organization (2015). *Recomendaciones Mundiales sobre Actividad Física para la Salud*. Geneva: WHO Library Cataloguing-in-Publication.