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Impact of a public open-access community-based physical activity and fall prevention program on physical performance in older adults

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Background: In older adults, physical activity (PA) is important in maintaining physical performance. Data on the effectiveness of public open-access community-based programs on physical performance and fall prevention are scarce. **Methods:** Prospective observational controlled study in community centers providing an open-access public prevention program. Retirees aged ≥60 years who chose to participate in weekly PA workshops for 3 months were compared to those who chose the cognitive stimulation (CS) workshops. Collected data: handgrip strength, five times sit-to-stand, single-leg stance, Timed Up and Go tests, gait speed, short physical performance battery (SPPB) and frailty status at baseline (M0) and at 3 months (M3). The proportion of participants reporting a history of falls was assessed at baseline and using follow-up telephone interviews (F-Up). **Results:** Two hundred eighty-eight participants (age 73.8 years, 87% women) were included. The sit-to-stand test, single-leg stance and SPPB scores improved significantly between M0 and M3 in both groups. A greater SPPB increase was observed in the PA than in the CS group (+0.39 vs. +0.32 points, $P = 0.02$) after adjustment for age, sex, number of sessions attended, fall history and SPPB at baseline. During F-Up (median 22 months), the proportion of participants reporting at least one fall decreased from 55% to 31% ($P = 0.01$) in the PA group and from 27% to 19% ($P = 0.12$) in the CS group. **Conclusion:** In a public open-access community-based program participants improved physical performance and reduced fall incidence when participating in the PA or the CS workshops. Older adults may benefit most from multifaceted prevention programs.

Introduction

Regular physical activity (PA) is mandatory for maintaining mobility, independence and quality of life in older adults while preventing sarcopenia, frailty and falls.[1–7] Thus, the World Health Organization promotes the development of community-based PA programs,[8] especially among older people. National guidelines slightly differ regarding the duration and intensity of PA per week and not all mention balance training.[9–11] Most guidelines do recommend strength training, as numerous clinical trials have shown that it has a strong positive effect on muscle strength and physical performance in older adults.[5] Yet, many older adults internationally do not meet guidelines suggested by their governments.[12] Both individuals and healthcare professionals may lack awareness of expected benefits of PA.[13,14] Furthermore, older individuals often report self-related or environmental barriers to PA.[15,16]

It is difficult to fully incorporate high-intensity programs that have been developed and tested in previously mentioned research trials into public health community-based programs due to concerns surrounding feasibility, acceptability and financing.[17,18] The programs are therefore usually of lower intensity and heterogeneous in design. Nevertheless, community-based intervention programs can improve self-reported time participants spend on PA each week, resulting in increased muscle strength.[19] Likewise, results from community-based interventions for the prevention of falls in older people are encouraging.[20,21] However, these studies target older subjects who are frail, sedentary, suffer from specific chronic diseases or are at risk for falls, thus restricting participant eligibility.

'Open-access' community-based programs are intended for unrestricted use and are available to all, regardless of membership, residency or medical conditions. Contrary to targeted interventions focused on selected populations, very little data are available regarding the efficacy of non-targeted open-access programs. The design and results of these studies are heterogeneous, but a number of authors have reported positive outcomes, including an increase in strength, balance and functional mobility and a reduction in falls.[22]

An public open-access community-based 'aging well' program developed in France proposes seven different prevention workshops focusing on PA, nutrition, home adaptation and cognitive stimulation (CS). Workshops other than that specifically based on PA provide general counseling on PA, as part of an overview of prevention, but do not include strength or balance training.

Our objective was to determine the specific effect of physical training once weekly as compared to general counseling on PA. We aimed

to compare changes in muscle strength, physical performance and reported falls in older adults participating in the PA workshop (with strength and balance exercises during weekly workshops) and in the CS workshop (with general counseling on PA and healthy lifestyle, but no training).

Methods

Participants and study design

As part of an ongoing public health action, local health authorities invite all their registered retirees by postal mail to participate in an open-access community-based aging prevention program, free of charge. Seven workshops are proposed: (i) physical exercise and balance, (ii) 'more walking', (iii) nutrition, (iv) CS, (v) home adaptation, (vi) personal and social projects and (vii) multifaceted prevention of aging. 'Physical exercise and balance' and 'cognitive stimulation' have the same number of workshops: 2 h weekly for 12 weeks. The other workshops propose three to seven weekly sessions. Retirees are not advised on which workshop to go into. They choose the workshop that they think best suits their needs. The only condition to participate in a workshop is to be willing and able to go to the community center that hosts the prevention program.

We conducted a multicenter prospective observational study between March 2016 and June 2019 across 38 community centers. Each participant that participated spontaneously in the PA workshops (PA group) and CS workshops (CS group) was reviewed for inclusion. Participants under the age of 60 years, unable to walk 6 m unaided (thus unable to perform baseline muscle strength and physical performance tests), not willing or lacking capacity to consent to the study, under legal protection or living in a nursing home were not included. In-person questionnaire responses, weight, muscle strength and physical performance were assessed at the first (baseline, M0) and 12th group workshop (3 months later, M3). Participants who failed to attend the final group workshop and those whose participation in the program was poor ($\leq$9 workshops attended) were excluded from the study. Participants who had been assessed at M0 and M3 were contacted by telephone for a post-workshop follow-up (F-Up) interview, minimum 9 months and no later than 2 years after the end of the program. This study protocol was approved by local ethic committee.

PA program

The PA program is divided into 12 weekly 2-h group (8–15 participants) workshops, each with specific objectives within a standardized framework (mix and sequence of exercises), and supervised by a specialized by a trained PA instructor. The workshops are multimodal PA intervention. The exercises are designed to improve postural stability, muscle extensibility and joint flexibility (e.g. hip flexor and calf stretches), balance (e.g. knee bends, tandem stance, backward walking, sit to stand), reaction time (e.g. group ball play), coordination (e.g. side leg swings, forward leg swings), muscle strength crucial to posture and balance (e.g. hip abductor, knee extensor, ankle plantar flexor muscles) and internal sense of spatial awareness (perception of limb and trunk position and movement). Resistance and aerobic training were low to moderate in intensity: no heavy strength-training machines were needed, but small devices as resistance training straps or dumbbells were used. No aerobic exercises (walking, cycling or running) were performed during the workshops. Participants were encouraged to perform resistance or aerobic exercises between the sessions.

CS program

The CS program consists of interactive group (8–15 participants) workshops (one 2-h session per week for 12 weeks), supervised by a trained neuropsychologist. The neuropsychologist uses playful tools designed to train memory, reinforce time and space frames of reference and to stimulate curiosity, with focus on concentration, attention, observation and memorization. The workshop also offers general advice on eating habits and PA conducive to good cognitive ability.

Data collection

Data collection included: sociodemographic characteristics; previous history of diabetes; hypertension or cardiovascular disease; number of medicines per day; general health perception; feeling of exhaustion; history of falls in previous 12 months; and fear of falling. It also included difficulty reported in getting down and, getting up from the floor, climbing one flight of stairs or walking 400 m. Walking, PA (housework or gardening for example) and sporting activity were collected as time per day in 15-min increments. Maximum distance traveled in the previous month was categorized as own neighborhood, city, country and foreign country.

Muscle strength and physical performance were assessed at M0 and M3. Handgrip strength was assessed by means of an approved isometric dynamometer taking into account the highest strength (in kilograms) of three consecutive measures. The five times sit-to-stand test was used to measure the time required to rise five times from a chair arms folded across the chest to assess lower limb strength. Gait speed was measured over a straight 4-m course, at the normal pace, aided by a walking device if required. The single-leg stance test took into account the maximum length of time balance was maintained on the right or left leg. The Timed Up and Go (TUG) test was used to measure the time required to rise from a chair, walk 3 m, turn around and return to the chair. The short physical performance battery (SPPB) combines the single-leg stance, gait speed and five times sit-to-stand test results. In line with the revised European consensus on definition and diagnosis of sarcopenia,[23] grip strength $<$27 kg in men or $<$16 kg in women or time $>$15 s to perform 5 chair stands reflected low muscle strength; gait speed of under $<$0.8 m/s, TUG $\geq$20 s or SPPB $\leq$8/12 reflected poor physical performance.

Nutritional assessment included weight, body mass index, calf circumference and the mini nutritional assessment–short form (MNA-SF).

Frailty status was determined in accordance with criteria adapted from the Fried frailty index[24]: exhaustion; weight loss $\geq$3 kg in three previous months; gait speed $<$0.8 m/s; low energy expenditure if walking time fell short of 15 min/day; diminished grip strength. Participants were regarded as frail if they presented with $\geq$3 criteria, pre-frail with 1 or 2 criteria and non-frail with no criteria.

The F-Up telephone interview recorded mobility and PA; participants also reported whether falls had occurred after completion of the program.

Statistical analysis

Continuous variables were expressed in terms of mean and standard deviation and categorical variables as counts (percentages). Participant characteristics in both groups were compared at baseline using the Chi-square or Student's *t*-test as appropriate. Included and excluded participants from the two groups were compared. A comparison was made between M0 and assessment at M3 using the paired Student's *t*-test and the McNemar test applied to continuous and categorical variables respectively. In each group, a comparison was drawn between muscle strength and function at M0 and at M3. The mean difference and the 95% confident interval between M0 and M3 were calculated for each variable and compared across the two groups using regression modeling adjusted on age, sex, fall history at baseline, number of workshops attended and value of corresponding variable at baseline. F-Up analysis was applied to participants who had provided data at all three assessments (M0, M3 an F-Up). The proportion of participants who reported at least one fall over the follow-up period was compared to the proportion of participants

with a history of falls at baseline using the McNemar test. A *P*-values <0.05 was regarded as significant. Statistical analysis was conducted using JMP software.

Results

Participant characteristics at baseline (M0)

Among 518 participants, 288 were included in the study (figure 1). The baseline characteristics of the excluded participants (131 from the PA and 97 from the CS group) were compared to those of the included participants (161 from the PA and 127 from the CS group). In the PA group, no difference in baseline characteristics was found between included and excluded participants (Supplementary table S1). In the CS group, the excluded participants were more often women who had more often sustained a fall in the preceding year, struggled getting down and getting up from the floor, took longer to perform five chair stands and had lower SPPB scores (Supplementary table S2).

The baseline characteristics of the 288 included participants (73.8 ± 7.5 years, 87% women) are summarized in table 1. Most of the participants reported good self-perceived health. However, 43% were pre-frail, 47% had a history of falls and 24% were at risk for malnutrition. By comparison with the CS group, the participants included in the PA group more frequently reported having sustained a fall and struggled getting down and getting up from the floor. It also took them longer to complete the TUG test and they had lower SPPB scores at baseline.

Changes in muscle strength, physical performance and frailty status between baseline (M0) and 3 months (M3)

Five chair stands, TUG, gait speed, single-leg stance and SPPB scores improved between M0 and M3 in both groups (table 2). No change in nutritional status or handgrip strength was observed in either group. After adjustment for age, sex, fall history, number of workshops attended and initial SPPB score, improvement in SPPB score was greater in the PA group than in the CS group ($P = 0.02$).

From M0 to M3, neither group exhibited change in frailty distribution ($P = 0.42$ and $P = 0.85$ in the PA and CS groups, respectively).

F-Up telephone interview

Two hundred participants (103 from the PA and 97 from the CS group) took part in the F-Up interview. The median (Q1–Q3) time lapse between program completion and the F-Up interview was 19.1 (11.7–21.0) months. The PA group reported a higher fall incidence at M0 and at F-Up than the CS group (57% vs. 34%; $P < 0.001$ at M0 and 31% vs. 19%; $P = 0.045$ at F-Up, respectively). The proportion of participants reporting falls between M0 and F-Up decreased from 55% to 31% ($P = 0.01$) in the PA group and from 27% to 19% ($P = 0.12$) in the CS group.

In the PA group, the proportion of participants reporting difficulty in getting up from the floor and climbing one flight of stairs decreased significantly between M0 and M3 that continued into F-Up. In the CS group, no change was detected between M0 and M3 but a trend for reduction was observed at F-Up ($P = 0.07$) (table 3).

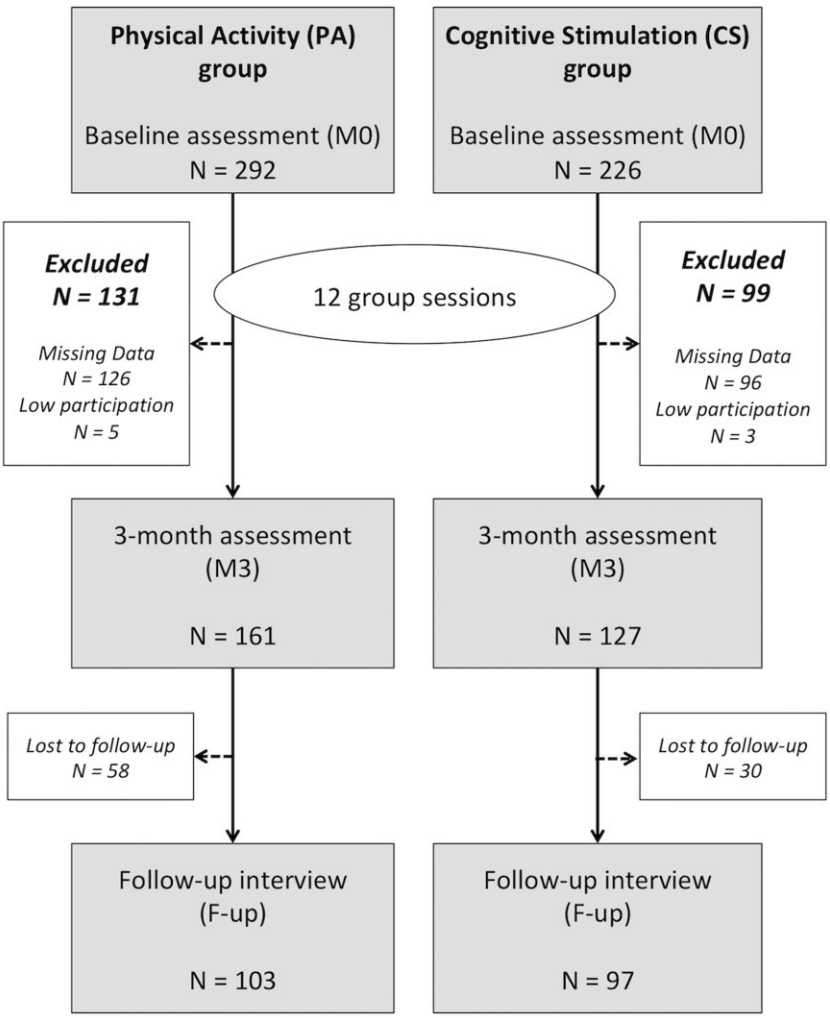

Figure 1 Flow chart

Table 1 Characteristics of participants from physical activity (PA) and cognitive stimulation (CS) groups at baseline

	All ($n = 288$)	PA ($n = 161$)	CS ($n = 127$)	*P*
Socio-demographic factors				
Age (years)	73.8 ± 7.5	74.6 ± 7.6	73.0 ± 7.3	0.08
Female	250 (87)	142 (88)	108 (85)	0.43
Living alone	150 (62)	92 (64)	58 (59)	0.37
Socio-economic status				
High	52 (22)	30 (23)	22 (22)	0.49
Medium	147 (64)	79 (62)	68 (68)	
Low	29 (13)	19 (15)	10 (10)	
General health				
Good self-perceived health (vs. *bad*)	242 (91)	132 (91)	110 (92)	0.86
Exhaustion *(yes)*	73 (27)	47 (30)	26 (22)	0.12
History of				
Hypertension	123 (43)	70 (43)	53 (42)	0.77
Diabetes mellitus	26 (09)	11 (07)	15 (12)	0.14
Cardiovascular disease	46 (16)	29 (18)	17 (13)	0.28
Number of medicines	2.8 ± 2.4	2.9 ± 2.2	2.7 ± 2.7	0.51
Mobility and physical activity				
History of fall(s) in preceding year	125 (47)	85 (57)	40 (34)	<0.001
Fear of falling	120 (43)	73 (47)	47 (39)	0.18
Reported difficulty in				
Getting down on the floor	86 (30)	55 (35)	31 (25)	0.09
Getting up from floor	118 (42)	78 (49)	40 (33)	0.009
Climbing 1 flight of stairs	44 (16)	29 (18)	15 (12)	0.19
Walking >400 m	16 (06)	10 (06)	6 (05)	0.65
Daily walking time >30 min/day	161 (59)	95 (62)	67 (56)	0.33
Daily physical activity time >30 min/day	181 (67)	101 (66)	80 (68)	0.70
Daily sporting activity time >30 min/day	74 (29)	40 (28)	34 (31)	0.66
Maximum distance traveled over preceding month				
Own neighborhood or city	139 (51)	87 (56)	52 (44)	0.049
Other city or other country	132 (49)	67 (44)	65 (56)	
Muscle strength and function				
Handgrip (kg)				
Men	35.7 ± 7.2	34.7 ± 7.6	36.7 ± 6.9	0.40
Women	20.9 ± 5.4	20.8 ± 5.3	21.1 ± 5.0	0.73
5 chair stands (s)	11.1 ± 3.7	11.5 ± 3.7	10.7 ± 3.6	0.07
TUG (s)	8.8 ± 3.2	8.4 ± 3.0	9.3 ± 3.4	0.02
Gait speed (m/s)	1.23 ± 0.31	1.21 ± 0.29	1.25 ± 0.33	0.28
Single-leg stance[a] (s)	16.2 ± 10.2	15.5 ± 10.5	17.1 ± 10.0	0.21
SPPB (/12)	11.0 ± 1.3	10.8 ± 1.3	11.1 ± 1.2	0.02
Nutrition				
Body mass index	26.6 ± 5.0	26.6 ± 5.1	26.6 ± 4.7	0.96
Calf circumference (cm)	36.6 ± 3.3	36.8 ± 3.4	36.3 ± 3.1	0.25
Weight loss ≥3 kg in previous 3 months	16 (06)	8 (05)	8 (07)	0.58
Good appetite (vs. *moderate or low*)	212 (77)	119 (76)	93 (78)	0.65
Nutritional status (MNA-SF)				
Normal (12–14)	200 (73)	110 (71)	90 (75)	0.58
At risk (8–11)	67 (24)	40 (26)	27 (23)	
Malnourished (0–7)	7 (03)	5 (03)	2 (02)	
Frailty status[b]				
Non-frail	147 (55)	77 (51)	70 (60)	0.11
Pre-frail	115 (43)	69 (45)	46 (40)	
Frail	6 (02)	6 (04)	0 (00)	

Results are expressed as mean ± SD or *n* (percentage).

a: Highest score regardless of leg.

b: Frailty status was adapted from Fried frailty index criteria (exhaustion, weight loss ≥3 kg in previous 3 months, gait speed <0.8 m/s, inactivity if walking time <15 min/day, weakened grip strength, i.e. 27 kg in men and <16 kg in women). Data were missing for 20 participants. Pre-frail and frail were pooled and distribution compared between PA and CS groups using Chi-square test.

TUG, Timed Up and Go test; SPPB, short physical performance battery.

The number of participants reporting daily walking time >30 min rose significantly between M0 and F-Up in both groups.

Discussion

This study shows that participation in weekly workshops in a public open-access 'aging well' program brought about improvement in muscle strength, physical performance, balance, mobility, daily time spent on walking and PA and falls. The participants' characteristics differed between groups at baseline, but, interestingly, these improvements were observed both the 'physical activity and balance' group, where low to moderate-intensity resistance and balance training are performed in each of the 12 weekly workshops and in the 'cognitive stimulation' group, where participants are only provided with general counseling about PA and healthy lifestyle improved. Only the change in the SPPB score was significantly better in the PA group than in the CS group at 12 weeks, after adjustment on confounding variables.

Table 2 Changes in muscle strength, physical performance and nutritional status between baseline (M0) and 3 months (M3) in physical activity (PA) and cognitive stimulation (CS) groups

	PA ($n = 161$)			CS ($n = 127$)			
	M0	M3	Mean difference 95% CI	M0	M3	Mean difference 95% CI	P^a
Handgrip (kg)	22.2	22.5	0.32 (−0.30, 0.93)	23.2	23.1	−0.11 (−0.80, 0.58)	0.71
5 chair stands (s)	11.5	10.2	−1.31 (−1.83, −0.80)	10.7	10.0	−0.70 (−1.21, −0.18)	0.29
TUG (s)	8.5	8.1	−0.34 (−0.70, 0.02)	9.3	8.5	−0.81 (−1.39, −0.22)	0.31
Gait speed (m/s)	1.21	1.27	0.06 (0.02, 0.10)	1.26	1.31	0.05 (−0.00, 0.10)	0.14
Single-leg stance (s)	15.6	20.0	4.41 (2.82, 6.00)	17.2	20.0	2.80 (1.36, 4.23)	0.12
SPPB (/12)	10.8	11.2	0.39 (0.18, 0.59)	11.1	11.5	0.32 (0.11, 0.54)	0.02
Weight (kg)	68.8	68.6	−0.13 (−0.39, 0.13)	68.0	68.0	−0.08 (−0.43, 0.18)	0.78
Calf circumference (cm)	36.8	36.7	−0.07 (−0.26, 0.13)	36.3	36.3	0.09 (−0.16, 0.34)	0.20
MNA-SF (/14)	12.2	12.2	0.01 (−0.30, 0.31)	12.3	12.3	−0.02 (−0.34, 0.31)	0.84

The mean difference between M0 and M3 is accompanied with the 95% confident interval (95% CI) in both groups.
a: Mean differences between M0 and M3 were compared across both groups via regression modeling that included age, sex, fall history at baseline, number of workshops completed and value of corresponding variable at baseline.

Table 3 Changes in self-reported difficulty with mobility and physical activity parameters in the physical activity (PA) and cognitive stimulation (CS) groups between baseline (M0), 3 months (M3) and Follow-up (F-Up) phone call

	PA ($n = 103$)					CS ($n = 97$)					PA vs. CS		
	M0	M3	F-Up	*P* M0 vs. M3	*P* M0 vs. F-Up	M0	M3	F-Up	*P* M0 vs. M3	*P* M0 vs. F-Up	*P* at M0	*P* at M3	*P* at F-Up
Fear of falling	47 (46)	36 (36)	52 (50)	0.12	0.46	37 (39)	35 (37)	37 (39)	1.0	1.0	0.29	0.95	0.09
Difficulty in													
Getting down on the floor	35 (34)	26 (26)	34 (33)	0.14	1.0	24 (25)	28 (30)	24 (25)	0.42	1.0	0.18	0.55	0.21
Getting up from floor	48 (47)	27 (27)	35 (34)	<0.01	0.01	32 (34)	32 (34)	23 (24)	1.0	0.07	0.06	0.31	0.12
Climbing 1 flight of stairs	16 (16)	6 (06)	5 (05)	0.02	0.02	12 (13)	9 (10)	5 (05)	0.72	0.07	0.58	0.35	0.91
Daily time >30 min spent on													
Walking activity	65 (69)	70 (74)	81 (91)	0.40	<0.01	50 (54)	54 (60)	81 (89)	0.52	<0.01	0.053	0.04	0.29
Physical activity	62 (65)	72 (76)	40 (48)	0.03	<0.01	61 (69)	67 (76)	36 (40)	0.31	<0.01	0.53	0.91	0.99
Sporting activity	24 (29)	32 (38)	22 (25)	0.12	0.57	23 (29)	35 (45)	20 (24)	<0.01	0.50	0.89	0.38	0.81

The number of participants (percentages) for all reported data are only provided in relation to participants from both groups who completed three assessments at M0, M3 and F-Up ($n = 200$). M0/M3 and M0/F-Up were compared using the McNemar test. Comparisons between the two groups at M0, M3 and F-up are shown in the last three columns (Chi-square test).

The efficacy of open-access community-based PA and fall prevention programs has seldom been assessed. In 2018, 16 studies were reviewed[18]: they are heterogeneous in terms of design, methodology, intervention, population size, inclusion criteria and outcomes. The results are encouraging, although data reporting changes in muscle strength and physical performance are scarce. There is some similarity between our study and that of Belza *et al.*[25] in that a 4-month intervention program with focus on aerobic conditioning, strength training, flexibility and balance that brought about improvement in muscle strength and TUG. However, this program consisted of three weekly sessions, implying a high degree of motivation and commitment that is not necessarily within the reach of all older adults. Another program proposed twice-weekly balance-focused workshops and resulted in an improvement in gait speed, TUG and dynamic balance, but no assessment was made of the program's efficacy at preventing falls.[26] It is of note that neither of these studies had a control group. In a randomized study designed to assess the effectiveness of a twice-weekly moderate-intensity resistance exercise 1-year training program. Trained subjects had better gait speed and muscle strength than controls. There was no difference in fall incidence across groups and no assessment was made of self-reported mobility difficulties or PA.[27]

Fall prevention programs that revolve around PA and balance exercises may reduce the incidence and severity of falls, although their heterogeneous design has given rise to controversial results.[5] Our program bears some resemblance to a randomized 3-month fall prevention program involving selected participants at risk for falls whereby older adults participated in 10 weekly group workshops focusing on balance. After 3 months, balance test scores had all significantly improved in the intervention group, but the number of self-reported falls at 1-year follow-up had not significantly diminished and no assessment was made of physical performance.[28] In another randomized trial regarding a 2-year balance-training program offering weekly exercises designed to improve postural stability, balance and muscle strength in selected 75- to 85-year-old women with balance and gait disorders, physical performance improved and the number of injurious falls decreased, but the total number of falls was comparable to controls.[29] In our study, the PA group displayed a greater increase in the SPPB score than the CS group and, consistently, a significant reduction in the proportion of participants reporting falls. Indeed, the SPPB assessment consisting of balance, muscle strength and physical performance tests has previously proven strongly predictive of falls.[30]

We compared the changes in muscle strength and physical performance between the PA and CS groups. Subjects who had chosen of their own accord to attend the CS program had higher physical performance as assessed by the TUG and SPPB tests, less trouble getting up from the floor, less often reported falls than those who had chosen to attend the PA program. This suggests that a subject's motivation for attending one or the other type of prevention program have been guided by their own perception of their needs. Surprisingly, muscle strength, physical performance and balance improved significantly in the subjects in CS group. This suggests that general counseling about PA and healthy lifestyle had a strong impact on the behavior of the subjects who chose to attend a cognitive decline prevention program. Attending a cognitive decline

prevention program is associated with having a family history of Alzheimer's disease (AD) and a higher perceived risk of AD.[31] In our study, the fear of dementia may have prompted the participants in the CS group to follow the advice on PA closely. Indeed, exercise training and combined cognitive and physical training do benefit cognitive function[32,33] and may also reduce falls.[34] However, to the best of our knowledge, our study is the first to report an increase in muscle strength and physical performance in older community-dwelling older adults attending an open-access cognitive decline prevention program. The relationships between changes in cognitive function and that of physical performance and strength remain to be studied.

In conclusion, this study showed that a public open-access community-based PA program supported by community health and social organisms has a beneficial effect on PA, mobility, muscle strength, physical performance and fall incidence. It also highlighted that participating in CS workshops and receiving counseling on PA and healthy lifestyle may also improve these outcomes. Public health policy should place more emphasis on expanding overarching programs to promote multicomponent interventions in aging adults.

Supplementary data

Supplementary data are available at *EURPUB* online.

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Conflicts of interest: None declared.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

Key points

- Open-access community-based physical activity (PA) programs aim to implement interventions that showed efficacy in randomized controlled trials.
- The effect of such programs on muscle function remained poorly assessed.
- We showed that an open-access community-based PA program has a beneficial effect on PA, mobility, muscle strength, physical performance and fall incidence.
- Interestingly, participating in a cognitive stimulation workshops and receiving counseling on healthy lifestyle may also improve these outcomes.
- Public health policy should support overarching programs to promote multicomponent interventions in aging adults.

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