

Table C.1.b. Physical Function: Association between physical activity and physical function among older adults (in alphabetical order by author)

[See the Supplementary materials](#) for description of evidence that informed the US PAGAC by outcome

Systematic review evidence Review credibility	No. of studies/ Study design No. of participants	Quality Assessment					Description of evidence Summary of findings	Certainty
		Risk of bias	Inconsistency	Indirectness †	Imprecision	Other		
Bruderer-Hofstetter 2018 (2) Moderate	17 RCTs N = 1,758	Serious risk of bias	Serious inconsistency	Serious indirectness	Serious imprecision	Possible publication bias	Included evidence evaluated the effect of multicomponent interventions (combining cognitive training and physical exercise) on IADL performance and/or physical capacity (e.g., muscle strength) compared with active control interventions or no interventions among community dwelling older adults aged ≥ 55 years. Six studies included adults with MCI or subjective cognitive decline and 11 studies included adults with normal cognition. Overall mean age was 71.4 years. Four studies (three among adults with MCI and one in those with NC) reported no difference in IADLs between those in the multicomponent interventions vs. control conditions. In participants with MCI, one study found multicomponent interventions to be superior to physical exercise alone on one measure of cardiorespiratory fitness and one other study found multicomponent interventions to be superior to physical exercise alone on balance . Among adults with NC, there was inconsistent results for measures of cardiorespiratory fitness, muscle strength, flexibility, and balance .	VERY LOW ^a
Bueno de Souza 2018 (3) Low	9 RCTs N=516	No serious risk of bias	No serious inconsistency	Serious indirectness	Serious imprecision	None	Evidence evaluated effects of mat Pilates on measures of physical functional performance among older adults (mean age = 68.5 years). Pilates training varied from 4 to 24 weeks from 2-4 times/week. Meta-analysis indicated a significant effect of mat Pilates on dynamic balance (SMD = 1.10 [95% CI, 0.29 to 1.90], 6 trials), muscle strength (SMD = 1.13 [95% CI, 0.30 to 1.96], 5 trials), flexibility (SMD = 1.22 [95% CI, 0.39 to 2.04], 3 trials) and cardiorespiratory fitness (SMD = 1.48 [95% CI, 0.42 to 2.54], 3 trials) compared with no intervention control groups.	LOW ^b
da Rosa Orsatto 2019 (5) Moderate	15 RCTs N=593	Serious risk of bias	No serious inconsistency	Serious indirectness	Serious imprecision	Possible publication bias	Studies evaluated the effects of resistance training performed with fast - intentional velocity vs. moderate velocity on measures of functional capacity among older adults (mean age range = 64 to 82 years). Measures of functional capacity were highly variable and included the SPPB, timed up and go test, 30-s chair stand, 5-times chair stand, short walk tests, long walk tests, and stair climb tests. Training frequency ranged from 1 to 3 sessions per week with intervention duration ranging from 6 to 36 weeks. Meta-analysis of 14 trials combining different function capacity tests indicated that fast-intended velocity resistance training may be superior compared with moderate-velocity resistance training for general functional capacity improvements (SMD = 0.41 [95% CI 0.18 to 0.65], 14 trials) and SPPB (SMD = 0.52 [95% CI 0.10 to 0.94]), 5 trials). No difference was seen between fast- and moderate-velocity resistance training on measures of time up and go, 30-s chair stand test, 5-times chair stand, stair climb, short walk or long walk measures.	VERY LOW ^c

Hita-Contreras 2018 (11) Low	7 RCTs N=558	No serious risk of bias	No serious inconsistency	Serious indirectness	Serious imprecision	None	<p>Trials evaluated the effect of <u>exercise interventions</u> (with or without dietary supplementation) on measures of adiposity and physical performance among older adults with sarcopenic obesity (mean age range, 67 to 81 years). Exercise interventions included aerobic exercise (3 studies), combined aerobic and resistance training (3 studies), and whole body electro-myostimulation (1 study). Four interventions also included dietary supplementation. Duration of interventions ranged from 8 to 26 weeks. Physical function was measured by grip strength (5 trials) or gait speed (5 trials).</p> <p>Exercise alone was significantly associated with improvement in grip strength (MD = 1.67 kg [95% CI 0.09 to 3.24] and gait speed (MD = 0.11 m/s [95% CI, 0.05 to 0.18]).</p>	MODERATE ^d
Kidd 2019 (13) Moderate	4 RCTs N=907	Serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	<p>Studies evaluated the effect of <u>physical activity interventions</u>^e on measures of physical performance among pre-frail and frail adults (mean age range 79 to 84 years). Interventions differed considerably and included weekly group physical activity classes in primary care, a mobility plan following hip surgery (2 studies), and tai chi vs. standard physiotherapy for older adults at risk for falls). Measures of frailty and physical performance were also highly variable.</p> <p>The primary care PA study reported significant improvements on measures of the Barthel index, rapid gait test, stand up test, balance, gait speed, and lower body strength. The two studies that evaluated mobility immediately post-hip surgery found that those receiving the intervention (vs. standard physiotherapy) had significantly greater upright time, number of upright events, "better physical performance," and 4 min gait speed and better gait characteristics. The tai chi trial experienced considerable drop-out in both groups and so results were not presented.</p>	LOW ^f
Labott 2019 (14) Moderate	24 RCTs N=3,018	No serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	<p>Review evaluated the effect of <u>exercise training on handgrip strength</u> in healthy, community-dwelling older adults (mean aged 73 years). Training types included aquatic exercise, walking, flexibility, TRX-training, home-trainer exercise, strength training in different forms, training on a vibration platform, dance Tai Chi, exergames balance training, calisthenics, and multidimensional training regimes. Most interventions lasted 8 to 15 weeks (range 4 weeks to 36 months).</p> <p>Pooled results showed small effects for handgrip strength in favour of the exercise training groups compared with control groups (SMD = 0.28 [95% CI 0.13 to 0.44]).</p>	MODERATE ^g
Sivaramakrishnan 2019 (18) Moderate	17 RCTs N=967	No serious risk of bias	Serious inconsistency	Serious indirectness	Serious imprecision	None	<p>Included evidence evaluation the effects of <u>yoga</u> vs. active or inactive controls on measures of physical function among older adults (mean age range 61 to 84 years). Eight types of yoga were tested.</p> <p>The meta-analysis revealed significant effects favouring the yoga group for the following physical function outcomes compared with inactive controls: balance (ES = 0.7, 95% CI 0.19 to 1.22, 7 trials), lower limb strength (ES = 0.45, 95% CI 0.22 to 0.68, 7 trials), and lower body flexibility (ES = 0.50, 95% CI 0.30 to 0.69, 7 trials) compared to inactive controls. No significant difference between yoga and inactive controls was found for body composition (ES = 0.16, 95% CI -0.06 to 0.38), upper body flexibility (ES = 0.28, 95% CI -0.02 to 0.58) or walking speed (ES = 0.38, 95% CI -0.02 to 0.78). Compared with active controls, there was a significant effect favouring yoga for lower limb strength (ES = 0.49, 95% CI 0.10 to 0.88, 3</p>	LOW ^h

							trials) and lower body flexibility (ES = 0.28, 95% CI 0.01 to 0.54, 3 trials). No significant difference between yoga and active controls was found for balance (ES = 0.32, 95% CI -0.02 to 0.66), mobility (ES = 0.31, 95% CI -0.25 to 0.87) or walking speed (ES = -0.29, 95% CI -0.79 to 0.22).	
Taylor 2018 (19) Low	18 RCTs N=765	Serious risk of bias	Serious inconsistency	Serious indirectness	Serious imprecision	None	Review evaluated the effect of active video games on measures of physical performance or balance among older adults (mean age 76 years). Except for one trial, all interventions were supervised. Measures of physical performance/mobility and balance varied across studies. A meta-analysis of timed up and go scores comparing active video games vs. conventional exercise or no intervention found no significant difference between groups (MD = -2.29 [95% CI, -5.20 to 0.64], 6 trials, n=206) whereas a significant association between active video games and 30-second chair stand scores was found (MD = 3.99 [95% CI, 1.92 to 6.05], 4 trials, n=188). Measures of balance were highly variable, and results were inconsistent within trials and between trials.	VERY LOW ⁱ

Abbreviations: CI = confidence interval; ES = effect size (Hedges' g); IADL = instrumental activities of daily living; m/s = meters per second; MCI = mild cognitive impairment; min = minutes; NC = normal cognition; RCT = randomized clinical trial; SPPB = short physical performance battery test; SMD = standardized mean difference

[†] Serious indirectness indicates measurement of intermediate/indirect outcomes or heterogeneity in exposures and comparisons assessed; certainty of evidence was not always downgraded for indirectness if it was not judged to impact the certainty in the findings for the outcome evaluated in the review

^a Certainty of evidence rated by review authors using GRADE methodology. The quality of evidence was rated as very low for the outcomes of IADL performance and physical capacity among adults with MCI and NC due to study limitations, inconsistency, indirectness, imprecision, and possible publication bias

^b Certainty of evidence downgraded due to serious imprecision in estimates of effects (95% CI crossed the line of no effect, and was wide, such that interpretation of the data would be different if the true effect were at one end of the CI or the other) and indirectness

^c Certainty of evidence downgraded due to serious risk of bias, serious imprecision in estimates of effect, and possible publication bias

^d Certainty of evidence downgraded due to serious imprecision in estimates of effects

^e Review also included evidence on nutrition interventions and physical activity plus nutrition interventions. The summary of evidence is limited to the physical activity only interventions.

^f Certainty of evidence downgraded given serious risk of bias of all studies and serious indirectness in the applicability and heterogeneity of the comparisons and outcomes

^g Certainty of evidence downgraded given serious indirectness in heterogeneity of intervention and directness of outcome measures

^h Certainty of evidence downgraded given serious inconsistency for most outcomes ($I^2 > 70\%$) and serious imprecision in most effect estimates

ⁱ Certainty of evidence downgraded given serious risk of bias (unclear selection bias and high risk of performance bias), serious inconsistency (in direction and magnitude of effects within and between studies), and serious imprecision in effect estimates