Table F.1.e. People with history of stroke, relationship between physical activity and health-related outcomes

Questions: What is the association between **physical activity** and health-related outcomes?
Population: People with history of stroke
Exposure: Greater volume, duration, frequency, or intensity of physical activity
Comparison: No physical activity or lesser volume, duration, frequency, or intensity of physical activity
Outcome: Physical function, cognitive function

Outcome	Systematic review evidence Review credibility	No. of studies/ Study design No. of participants	Quality Assessment Risk of bias	Inconsistency	Indirectness †	Imprecision	Other	Description of evidence Summary of findings	Certainty	US PAGAC evidence *(39)*
Physical function[b]	Bonini-Rocha 2018 (23) Moderate	11 RCTs N = 750	Serious risk of bias	No serious inconsistency	Serious indirectness	Serious imprecision	None	Mean age was between 38 and 91 years old. Time of stroke diagnosis ranged from 1 to 157 months. Interventions included circuit-based exercises lasting from 4 to 19 weeks, with the frequency of exercise from 2 to 7 times per week for 30-90 minutes each session. Circuit-based training was associated with improvements in **gait speed** compared with other interventions (MD = 0.11 m/s [95% CI, 0.02 to 0.18; *p*=0.03; 7 trials; n=516). There was no effect of the intervention on **balance** or **functional mobility**.	LOW[c]	2 ESRs Moderate evidence indicates that that mobility-oriented physical activity improves walking function for individuals after a stroke. **PAGAC Grade: Moderate.**
Physical function[b]	Boyne 2017 (24) Low	16 RCTs 4 NRSIs N=882	Serious risk of bias	Serious inconsistency	Serious indirectness	Serious imprecision	None	Participants ranged from 0.4 to 70 months post—stroke. Few other details provided regarding participants. Aerobic exercise was associated with greater change in **cardiorespiratory fitness** (VO_2Peak) than control groups (pooled MD = 2.2 mL/kg/min [95% CI 1.3 to 3.1], 16 trials, 598) and **walking speed** (MD = 0.06 m/s [95% CI, 0.01 to 0.11); 13 studies; n=415), but there was substantial heterogeneity present.	VERY LOW[d]	
Physical function[b]	Cugusi 2017b *(9)* Moderate	2 RCTs N = 50	No serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	Mean age was 53 and 57 of two trial; stroke onset was >6 months in both studies. Both trials compared Nordic treadmill walking vs. standard treadmill training. Both studies found improvement in measures of **walking distance** and **walking endurance** in both groups, with only one trial reporting these improvements to be statistically significantly greater among the Nordic walking group.	MODERATE[e]	
Physical function[b]	Ge 2017 (26) Moderate	31 RCTs N=2,349	Serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	No evidence of a dose-response	Traditional Chinese exercise included Tai Chi (20 studies), Yijinjing (2 studies, Daoyin (3 studies), and Baduanjin (6 studies) ranging from 2 to 52 weeks duration.	MODERATE[f]	

							relation- ship	Traditional Chinese exercises compared with control groups were associated with **limb motor function** (SMD = 1.21 [95% CI, 0.66 to 1.77] *p*< 0.01), **balance function** (SMD = 2.07 [95% CI, 1.52 to 2.62, *p*< 0.01), **timed-up-and-go test** (MD = -1.77 [95%CI, -2.87 to -0.67], *p*< 0.01), and **ADLs** (MD = 15.60 [95% CI, 7.57 to 23.63, *p*< 0.01).		
	Li 2018 (29) Low	5 RCTs N = 346	Serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	Mean age ranged from 55 to 73 years old. All studies evaluated the effects of 6 to 12 weeks of tai chi on standing balance and gait ability. A significant association was found for participants of tai chi vs. control groups for **gait ability** (e.g., TUG) (SMD = -0.26 [95% CI, -0.50 to -0.03]; *p*=0.027; 5 trials), but not **standing balance** (SMD = 0.15 [95% CI, -0.26 TO==to -0.59]; *p*=0.475; 3 trials).	LOW[f]	
	Miranda 2018 (30) Low	2 RCTs N = 39	No serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	Mean age was 63 and 68 years. One study reported greater improvement in **functional status** (TUG) and **cardiorespiratory fitness** (VO_2max) among those in a Pilates intervention group vs. control. The other study reported greater improvement in **balance** among those in the Pilates vs. control.	MODERATE[g]	
	Patterson 2018 *(28)* Moderate	2 case reports 1 before-after N = 11	No serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	All 3 studies reported improvements in balance (BBS) 1 to 8 weeks following a dance intervention.	VERY LOW[h]	
Physical function[b]	Pogrebnoy 2019 (31) Low	8 RCTs N = 499	No serious risk of bias	No serious inconsistency	Serious indirectness	Serious imprecision	None	Participants were mostly male with a mean age of 69 years. Range of 2.5 to 71 months post-stroke with most not reporting severity of stroke score. All trials evaluated outpatient exercise programs, including aerobic and resistance training from 12 weeks to 6 months in duration. Meta-analysis found that combined aerobic and resistance training was associated with improved **habitual walking speed** (MD 0.07 m/s [95% IC -0.01 to 0.16], 5 trials, n=248) and **walking enduran**ce (MD = 39.2 [95% CI 17.2 to 61.2], 6 trials, n=320) compared with usual care. There was no difference between groups for the TUG test and stair climb.	LOW[i]	
	Schröder 2018 *(30)* Low	4 RCTs 2 case studies 1 case-control N = 120	Serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	Included stroke patients in the late sub-acute (3-6 months post-stroke) and chronic (>6 months post-stroke) phase. Most studies included persons at mild-to-moderate disability (BBS score>31). Interventions included tele-rehabilitation or virtual reality exercise interventions (e.g., Wii, PlayStation 2 EyeToy, Microsoft Kinect). All four RCTs found improvements in measures of **balance** (BBS), but there were no statistically significant differences between groups.	LOW[f]	

								Observational studies reported feasibility of interventions.		
	Wiener 2019 (33) Low	3 RCTs 3 before-after N = 140	No serious risk of bias	No serious inconsistency	Serious indirectness	Serious impression	None	HIIT protocols (treadmill or bicycle training) ranged 20 to 30 minutes per session, 2 to 5 times a week, for 2 to 8 weeks total. Significant improvements in **cardiorespiratory fitness** were seen among HIIT participants but were not statistically significantly different than those in moderate-intensity exercise groups. There was no consistent effect of HIIT on measures of **balance** or **functional mobility.**	LOW[j]	
	Zou 2018a *(37)* Low	20 RCTs N = 1,286	Serious risk of bias	No serious inconsistency	Serious indirectness	Serious imprecision	None	Mean age ranged from 43 to 78 years old; course of disease varied from 14.5 days to 82 months; stroke type was often not reported. Interventions included qigong (4 study), yoga (2 studies), and tai chi (14 studies) for a duration of 4 to 12 weeks. Only 1 study included longer term follow-up at 12 months. Mind-body exercises were associated with greater **sensorimotor function of the lower limb** (SMD = 0.79 [95% CI, 0.43 to 1.15]; *p*<0.01; 8 trials; n=371), **upper limb function** (SMD = 0.7 [95% CI, 0.39 to 1.01]; *p*<0.001; 6 trials; n=276), and **gait speed** (SMD = 0.24 [95% CI, 0.01 to 0.48]; *p*=0.04; 5 trials; n=288). Mind-body exercises were not statistically significantly associated with **overall motor function** (SMD = 0.26 [95% CI, -0.06 to 0.57]; *p*=0.011; 3 trials; n=198).	LOW[k]	
Physical function[b]	Zou 2018b (36) Low	16 RCTs N = 1,136	Serious risk of bias	Serious inconsistency	No serious indirectness	Serious imprecision	None	Course of stroke disease ranged from 2 weeks to 82 months. Interventions included qigong (1 study), toga (1 study), and tai chi (14 studies) for a duration of 4 to 12 weeks. Only 2 studies included longer term follow-up at 6 and 12 months. Mind-body exercises were associated with significantly improved **ADLs** (Hedge's g = 1.31 [95% CI, 0.85 to 1.77], *p*<0.001, 6 trials) and **mobility** (Hedge's g = 0.67 [95% CI, 0.25 to 1.09], *p*<0.001, 5 trials).	VERY LOW[l]	
Cognitive function	No systematic review identified[m]									1 ESR Moderate evidence indicates that moderate-to-vigorous physical activity can have beneficial effects on cognition in individuals with diseases or disorders that impair cognitive function, including attention deficit hyperactivity disorder, schizophrenia,

		multiple sclerosis, Parkinson's disease, and stroke. **PAGAC Grade: Moderate.**

Abbreviations: ADL = activities of daily living; BBS = Berg Balance Scale CI = confidence interval; ESR = existing systematic review; HIIT = high-intensity interval training; MD = mean difference; m/s = meters per second; NR = not reported; NRSI = non-randomized study of an intervention; PAGAC = Physical Activity Guidelines Advisory Committee; QOL = quality of life; RCT = randomized clinical trial; SMD = standardized mean difference; TUG = Timed Up and Go test

[†] 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 downgraded given serious risk of bias (lack of blinding of outcome assessors, missing data), serious inconsistency (substantial statistical heterogeneity), and serious imprecision (very wide CIs)
[b] Three additional reviews were identified *(18, 34, 36)* but were rated as critically low credibility and are not included
[c] Certainty of evidence downgraded given serious risk of bias, serious indirectness (variable and distally measured outcomes), and serious imprecision (wide CIs, small n's)
[d] Certainty of evidence downgraded given serious risk of bias, serious inconsistency (substantial statistical heterogeneity, I^2>70%), and serious imprecision (wide CIs, small n's)
[e] Certainty of evidence downgraded given considerable indirectness in interventions and outcome measures
[f] Certainty of evidence downgraded given serious risk of bias and serious indirectness of measures
[g] Certainty of evidence downgraded given considerable indirectness in interventions and outcome measures
[h] Certainty of evidence not upgraded
[i] Certainty of evidence assigned by review authors as High for habitual walking speed and Low for walking endurance given serious imprecision. Further downgraded here given serious indirectness of outcome measures and comparators
[j] Certainty of evidence downgraded given serious indirectness (intervention protocols and outcome measures) and serious imprecision
[k] Certainty of evidence downgraded given serious risk of bias (lack of blinding of outcome assessors, missing data), serious indirectness (variable distal outcome measures), and serious imprecision (very wide CIs)
[l] Certainty of evidence downgraded given serious risk of bias (lack of blinding of outcome assessors, missing data), serious inconsistency (substantial statistical heterogeneity), and serious imprecision (very wide CIs)
[m] One additional review was identified *(18, 34, 36)* but was rated as critically low credibility and was not included