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SYSTEMATIC REVIEW AND META-ANALYSIS

Associations Between Time After Stroke and Exercise Training Outcomes: A Meta-Regression Analysis

Susan Marzolini, R.Kin, PhD*; Che-Yuan Wu, BSc*; Rowaida Hussein, BSc; Lisa Y. Xiong, MPH; Suban Kangatharan, R.Kin; Ardit Peni, R.Kin; Christopher R. Cooper, MPK; Kylie S.K. Lau, HBSc; Ghislaine Nzodjou Makhdoom, MSc; Maureen Pakosh, MISt; Stephanie A. Zaban, R.Kin, MPK; Michelle M. Nguyen, MSc; Mohammad Amin Banihashemi, MD; Walter Swardfager, PhD

BACKGROUND: Knowledge gaps exist regarding the effect of time elapsed after stroke on the effectiveness of exercise training interventions, offering incomplete guidance to clinicians.

METHODS AND RESULTS: To determine the associations between time after stroke and 6-minute walk distance, 10-meter walk time, cardiorespiratory fitness and balance (Berg Balance Scale score [BBS]) in exercise training interventions, relevant studies in post-stroke populations were identified by systematic review. Time after stroke as continuous or dichotomized (≤3 months versus >3 months, and ≤6 months versus >6 months) variables and weighted mean differences in postintervention outcomes were examined in meta-regression analyses adjusted for study baseline mean values (pre-post comparisons) or baseline mean values and baseline control-intervention differences (controlled comparisons). Secondary models were adjusted additionally for mean age, sex, and aerobic exercise intensity, dose, and modality. We included 148 studies. Earlier exercise training initiation was associated with larger pre-post differences in mobility; studies initiated ≤3 months versus >3 months after stroke were associated with larger differences (weighted mean differences [95% confidence interval]) in 6-minute walk distance (36.3 meters; 95% CI, 14.2–58.5), comfortable 10-meter walk time (0.13 m/s; 95% CI, 0.06–0.19) and fast 10-meter walk time (0.16 m/s; 95% CI, 0.03–0.3), in fully adjusted models. Initiation ≤3 months versus >3 months was not associated with cardiorespiratory fitness but was associated with a higher but not clinically important Berg Balance Scale score difference (2.9 points; 95% CI, 0.41–5.5). In exercise training versus control studies, initiation ≤3 months was associated with a greater difference in only postintervention 6-minute walk distance (baseline-adjusted 27.3 meters; 95% CI, 6.1–48.5; fully adjusted, 24.9 meters; 95% CI, 0.82–49.1; a similar association was seen for ≤6 months versus >6 months after stroke (fully adjusted, 26.6 meters; 95% CI, 2.6–50.6).

CONCLUSIONS: There may be a clinically meaningful benefit to mobility outcomes when exercise is initiated within 3 months and up to 6 months after stroke.

Key Words: balance ■ cardiorespiratory fitness ■ exercise training ■ mobility ■ rehabilitation ■ stroke recovery

Stroke is the leading cause of adult neurological disability, and the aging population and accumulating risk factors lead some countries to project marked increases in stroke prevalence.[1,2] At least one-third of those who suffer a stroke will be left with functional impairment and disability.[3] Therefore, it is not surprising that following a stroke, physical activity falls well below recommended levels within the first 2 weeks after stroke and persists into the chronic phases of stroke >6 months later.[4] This pattern of

Correspondence to: Susan Marzolini, 347 Rumsey Road, Toronto M4G1R7, Canada. E-mail: Susan.marzolini@uhn.ca

*S. Marzolini and C. Y. Wu contributed equally.

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CLINICAL PERSPECTIVE

What Is New?

- Given that early initiation of exercise after stroke is often advocated, and there is little clinical evidence to support this, we conducted the first meta-regression analysis with the primary objective of examining the association between time elapsed after stroke to initiation of exercise training and clinical outcomes.
- In fully adjusted randomized studies, there was a clinically important benefit to 6-minute walk distance when starting exercise training within 3 months, with a similar weighted mean difference when starting within 6 months of stroke compared with later, with no significant time effect on cardiorespiratory fitness, balance, or 10-meter walking speed.

What Are the Clinical Implications?

- The time window for improved outcome in 6-minute walk distance related to exercise training may span longer time periods than previously thought, and may fall within distinct post-stroke phases, with no time association for other outcomes; yet the number of adverse events in studies that were started within the first month after stroke was concerning, suggesting careful application of exercise training in the early phases.

Nonstandard Abbreviations and Acronyms

CRF	cardiorespiratory fitness
ET	exercise training
6MWD	6-minute walk distance
10MWT	10 meter walk time

inactivity leads to cardiorespiratory deconditioning that is half of age- and sex-predicted normative values for sedentary adults, falling below the necessary criterion for independent living.[4,5] This deconditioning can compound the effects of stroke impairments affecting independence in carrying out activities of daily living[6,7] and is also associated with increased risk of morbidity, mortality, and stroke hospitalizations.[8–12] A recent Cochrane review of randomized controlled studies that included aerobic and circuit training interventions (published up to 2018) revealed that exercise training (ET) not only results in improved cardiorespiratory fitness (CRF) but also yields gains in other important domains of stroke recovery, including functional mobility measured by 6-minute walk distance (6MWD) and fast and comfortable short-distance gait speed and balance.[12] Improving walking capacity (endurance and independence) is one of the most frequently stated goals of people following stroke,[13] and poor balance is associated with a greater risk of falls,[14] which can lead to hip fracture and other injuries. Therefore, determining strategies to optimize CRF is of great importance from both a functional and quality-of-life perspective.[6,12]

While guidelines endorse physical activity and exercise across all phases of stroke recovery,[15] the optimal time between stroke and initiation of ET to support improvements in CRF, functional mobility, gait speed, and balance has not been well established. The Stroke Roundtable Consortium advocated to focus recovery trials on the first week to the first month after stroke (acute and early subacute phases).[16] The rationale for early interventions is that rapid changes and most behavioral recovery is reported to occur within this time frame, which is a critical time for neural plasticity and brain repair processes, and patients are most responsive to treatment. Specifically, evidence from preclinical studies indicates that key molecular, genetic, and cellular changes occur in this window, triggering elevated dendritic sprouting, changes in gene expression, and the suppression of neuronal apoptosis.[17,18] However, there is some evidence that time-dependent recovery may fall within distinct post-stroke phases. For example, some studies report that most patients reach their peak walking function between 2 and 3 months after stroke.[19–21] Other studies report no further improvements after 6 months, and others have estimated it to extend beyond a year following the stroke event.[6,22] Yet there is little clinical evidence to show that starting an exercise intervention earlier yields an advantage.

There is a dearth of controlled studies introducing ET at different initiation points with direct comparisons that would inform best-practice guidelines on timely initiation. However, there have been numerous observational and controlled studies that initiated ET, each at different points in the recovery period. These studies can be combined quantitatively through meta-regression analyses. This study used meta-regression analyses to determine whether time elapsed from stroke to the start of ET was associated with the pre- versus postintervention outcomes in CRF, balance, 6MWD, and 10-meter comfortable and fast walk time (10MWT), and with greater differences in those outcomes between ET versus control groups. Time since stroke was examined as a continuous variable with log-transformation to estimate the general trend and dichotomized to consider whether the magnitudes of those differences at 3- or 6-month thresholds might be clinically meaningful. Examining the data in distinct phases may provide a more clinically useful measure to guide healthcare professionals as to when to initiate ET throughout the continuum of care. Specifically, while the transitions in care after a stroke are variable, patients are in acute care/inpatient and outpatient rehabilitation for up to 3 months.[23,24] This also coincides with the timing (3 months) of when neurobiological protective mechanisms have recovered sufficiently to allow for higher-intensity ET at or above the anaerobic threshold.[25] After the 3-month period, some patients will be referred to cardiac rehabilitation[26] for a further 3 months of treatment (up to 6 months after stroke), and others are discharged into the community.

METHODS

This meta-analysis was conducted according to our predefined protocol, and the reporting of findings followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.[27] The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines compliance check list is presented in Table S1. All data and supporting materials have been provided with the published article.

Study Eligibility Criteria

Studies were included that were (1) original research articles studying patients following stroke, (2) consisting of at least 1 study group receiving an exercise intervention with an aerobic component but without external stimuli or robotic assistance (For the purpose of this study, aerobic training was defined as planned, structured, and repetitive exercise [excluding incidental exercise that occurs during physical therapy] that is progressed in duration or intensity or both. Examples of aerobic training include walking, stationary cycling [arm or leg], stepping machine, and treadmill exercise. Examples of activities that are not considered aerobic training include sensorimotor or task-related training for the purpose of improving function [excluding therapeutic activities that would not induce an appropriate aerobic stimulus]; (3) reporting time since stroke or defining an interval of time since stroke in their subject inclusion; and (4) measuring the outcomes of interest. Articles that performed secondary analyses from other studies or reused data from previous studies were excluded.

Literature Search

Seven electronic databases were searched from inception to June 30, 2020: Medline (Ovid), Embase (Ovid), APA PsycINFO (Ovid), PubMed (non-Medline), Cochrane Controlled Trials Register, Cochrane Database of Systematic Reviews, and CINAHL (EbscoHost).

The search strategies were developed in collaboration with an information specialist using a modified population intervention comparison outcome (PICO) framework. The Population comprised stroke (any type); the Intervention was aerobic exercise; and the Outcomes included varied functional mobility measures. These results were limited to the specific study types and humans. No date or language restrictions were applied. The reference lists of included studies were also checked for relevant materials not identified through database searching. The Medline search strategy is shown in Table S2.

Methodological Quality Assessment and Risk of Bias

Risk of bias was evaluated on the basis of criteria adapted from the Newcastle Ottawa Scale and the Cochrane Collaboration's Risk of Bias Assessment Tool.[28,29] Each paper was assessed by 2 independent raters, and disagreement was resolved by consensus or by a third rater.

Data Extraction and Characteristics of the Exercise Intervention

Means and SDs of preintervention and postintervention outcomes were extracted. Means and SDs were estimated when descriptive statistics were reported in other formats.[30] The mean time after stroke was extracted or estimated as the main independent variable of interest. Other relevant study characteristics, including study group age, sex, adverse event proportion, stroke severity/motor recovery level, proportion of intervention completers, and data spread (eg, SD or quantiles) of post-stroke time were also extracted.

Characteristics of the intervention were also extracted. Exercise modality was stratified into walking/ambulatory or non–weight bearing/seated, as walking is more likely to improve walking speed and endurance than non–weight bearing modalities because of task specificity.[31] Exercise dose was calculated by the number of training sessions per week×minutes per session×total weeks. When a range was given, the higher value was used. Dose was stratified as 1000 or less versus more than 1000 "units" as previously described.[32] Intensity was stratified into *moderate* (40%–59% heart rate reserve or VO_2R (oxygen uptake reserve) or 46%–63% of VO_{2max} (maximal oxygen uptake), or 64%–76% of HRmax (maximal heart rate) or rating of perceived exertion of 12–13/20) or *at least vigorous* (greater than or equal to the following: 60%–89% heart rate reserve or VO2R or 64%–90% of maximal oxygen uptake (VO_{2max}) and 77% to 95% of maximal heart rate (HRmax) or rating of perceived exertion of 14–17/20).[33]

Statistical Analysis

To investigate the relationship between exercise outcomes and time elapsed between stroke and intervention, meta-regression analyses were conducted. Outcome estimates from each study included in the meta-regression were obtained as weighted mean differences and 95% CIs using random-effects models with Knapp-Hartung adjustment.[34] We chose a priori a random-effects model because of methodological differences between studies that were expected to contribute to different underlying true effects, and we used a restricted maximum likelihood estimator to minimize the influence of nuisance parameters. A set of analyses compared postintervention outcomes with preintervention outcomes, adjusted for the preintervention outcome measure, since it may influence post-stroke improvement. A second set of analyses compared postintervention outcomes between intervention and control groups (reference group), adjusting for the preintervention mean difference between groups and preintervention performance in the intervention group. Time after stroke was modeled as a logarithmically transformed continuous variable. To provide estimates for specific time frames, analyses were conducted dichotomizing time after stroke into binary variables, using a 3-month or 6-month cutoff. The reference levels in each analysis were >3 months and >6 months, respectively. Where the number of included studies permitted, additional models were further adjusted for age, female proportion, exercise intensity (binary), exercise dose (binary), and whether exercise was ambulatory (binary). Unstandardized meta-regression coefficients (B) and their 95% CIs were obtained using the metafor package in R 3.5.1.[35] Bubble plots were depicted using the ggplot2 package.[36] Risk of publication bias was assessed using Begg's rank correlation test.[37]

RESULTS

Overall, 148 studies and 5987 patients with stroke were included in this meta-regression analysis.[6,38–183] The flow diagram, study characteristics, and risk of bias assessment table are presented in Figure S1 and Tables S3 and S4. Of 148 studies, 86 studies had an appropriate control group and were included in the analyses comparing postintervention outcomes between intervention and control groups. Ambulatory exercise as an intervention was prescribed in 118 studies. In addition, 53 studies reported vigorous intensity or greater was prescribed, and 73 studies had an exercise dose >1000 units. Only 70 studies reported on adverse events, and 96 reported stroke severity/motor recovery level using a diversity of scales.

Time After Stroke and Differences Between Intervention Versus Control

When time to start ET was a continuous variable (Table S5), there were no significant associations with greater benefit of the intervention versus control over time in 6MWD, 10MWT (comfortable or fast), Berg Balance Scale score, or peak oxygen uptake in baseline-adjusted or in 6MWD fully adjusted analyses (Figures 1A, 2A and 2C, 3A and 3C, and Table S6).

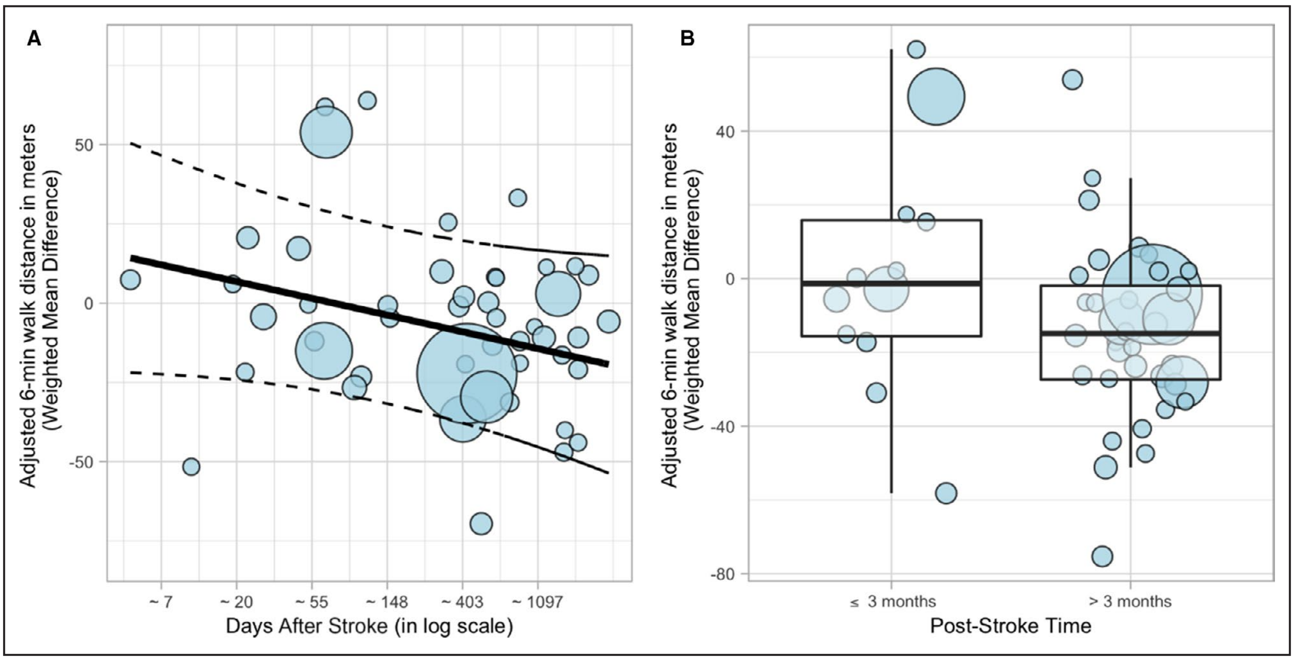

Figure 1. Meta-regression of 6-minute walk distance (meters) by time after stroke of controlled comparisons. **A**, Time as a continuous variable (in log scale±95% CI). **B**, ≤3 months vs >3 months after stroke.

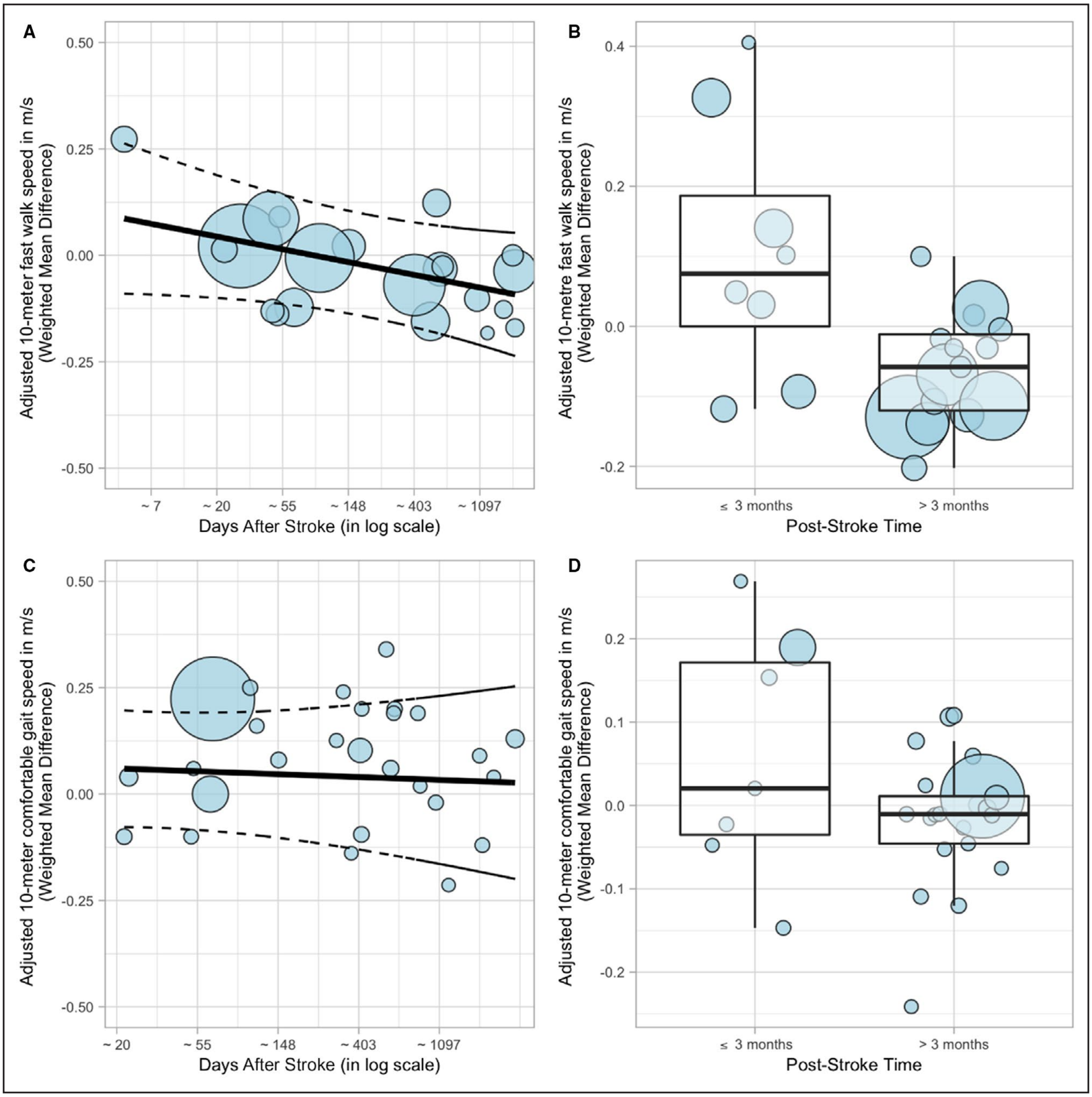

Figure 2. Meta-regression of 10-meter walk time (m/s) by time after stroke of controlled comparisons (A and B = 10-meter fast walk speed and C and D = 10-meter comfortable walk speed (m/s)).
A and **C**, Time as a continuous variable (in log scale±95% CIs). **B** and **D**, ≤3 months vs >3 months after stroke.

ET initiated within 3 months versus >3 months after stroke showed a greater difference in postintervention 6MWD between ET and controls (baseline-adjusted B=27.289 meters; 95% CI, 6.065–48.513; t=2.59; *P*=0.013; fully adjusted B=24.942 meters; 95% CI, 0.820–49.064; t=2.10; *P*=0.043) (Tables 1 and 2, Figure 1B). No other significant associations in other outcomes were observed (Figure 2B and 2D and Figure 3B and 3D).

Considering a 6-month post-stroke time cutoff, a similar trend was seen for ET initiated ≤6 months versus >6 months after stroke for 6MWD (baseline-adjusted B=21.89 meters; 95% CI, 1.660–42.119; t=2.18; *P*=0.035; fully adjusted B=26.608 meters; 95% CI, 2.644–50.572; t=2.25, *P*=0.031) (Tables S7 and S8). There were no significant associations in other outcomes (Table S8 and Figure S2).

Time After Stroke and Postintervention Versus Preintervention Differences

When time to start ET was a continuous variable (Table S5), with respect to preintervention performance,

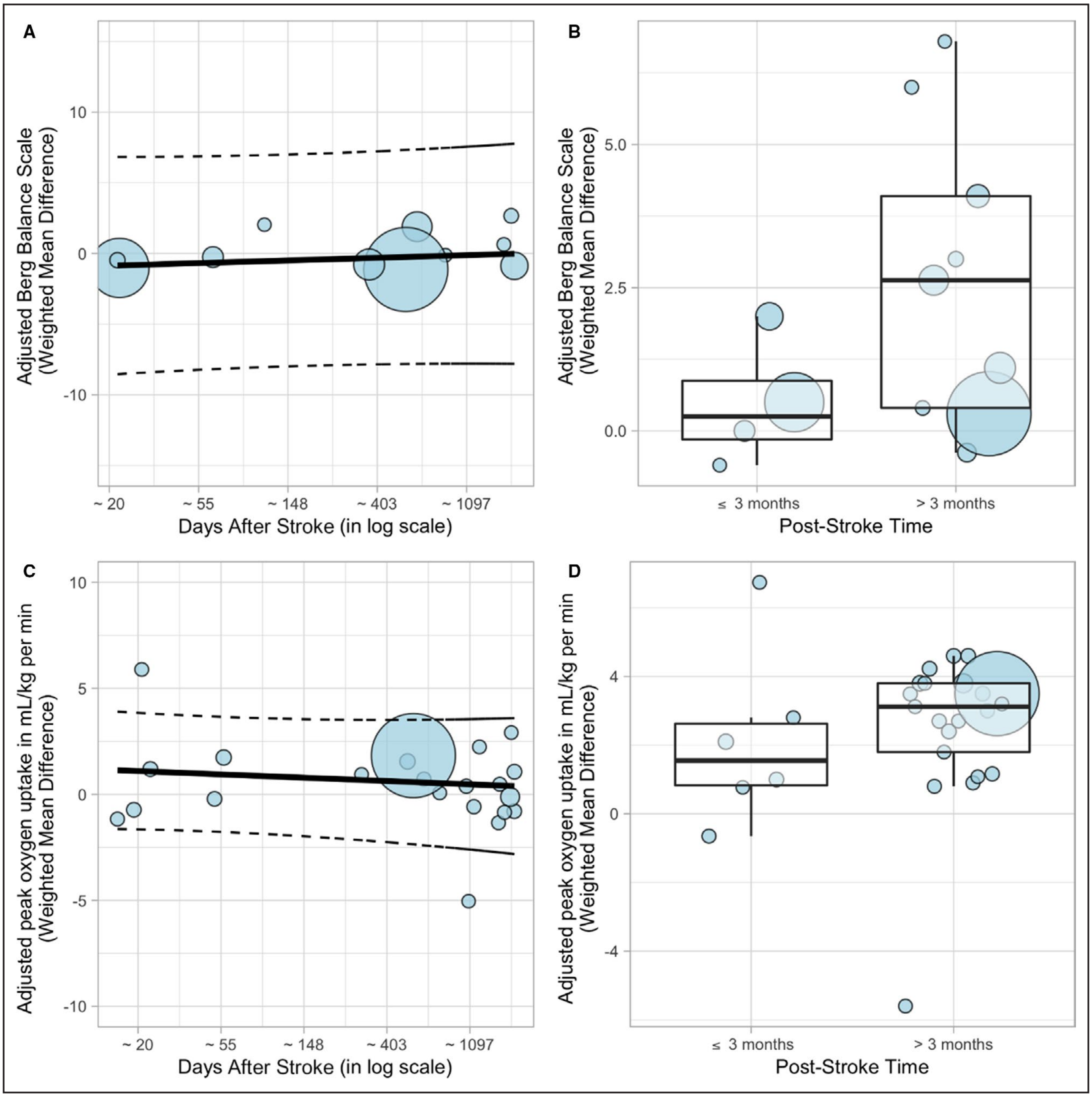

Figure 3. Meta-regression of balance and cardiorespiratory fitness outcomes by time after stroke of controlled comparisons. (A and B = Berg Balance Scale, and C and D = Cardiorespiratory Fitness, mL·kg^{-1}·min^{-1}).
A and **C**, Time as a continuous variable (in log scale±95% CI). **B** and **D**, ≤3 months vs >3 months after stroke.

earlier post-stroke ET intervention was associated with a greater difference in postintervention 6MWD (B=10.55 meters per log unit of time; 95% CI, 5.72–15.44; t=4.32, *P*<0.001; Figure S3A), 10MWT with a comfortable speed (B=0.04 m/s per log unit of time; 0.02–0.06; t=4.02; *P*<0.001; Figure S3G), fast-speed 10MWT (B=0.036 m/s per log unit of time; 95% CI, 0.007–0.065; t=2.47; *P*=0.016; Figure S3D) and Berg Balance Scale score (B=0.896 units per log unit of time; 95% CI, 0.023–1.769; t=2.07; *P*=0.045; Figure S4A); however, an association was not observed with peak oxygen uptake (Figure S4D).

When intervention time post-stroke was dichotomized at ≤3 months versus >3 months, studies initiated within 3 months after stroke showed an association favoring greater improvement in 6MWD (B=34.456 meters; 95% CI, 18.08–50.835; t=4.17; *P*<0.0001; Table 1 and Figure S3B) and 10MWT with a comfortable speed (B=0.102 m/s; 95% CI, 0.051–0.153; t=3.96; *P*<0.001; Figure S3H) with respect to baseline performance. A similar trend was observed in fast 10MWT (B=0.171 m/s; 95% CI, 0.079–0.264; t=3.71; *P*<0.001; Figure S3E) and Berg Balance

Table 1. Summary of Meta-Regressions Between Time After Stroke ≤3 vs >3 Months and Change in Outcome Measures (Pre-Post and Intervention vs Control)*

Outcome						Begg's rank test†	
Weighted mean difference	Number of studies	Estimate [95% CI]	t-value	DF	*P* value	tau	*P* value
Post- vs preintervention‡							
6-minute walk distance, m	111	−34.456 [−50.835 to −18.077]	−4.17	108	<0.001	0.15	0.018
10-meter walk test, comfortable speed, m/s	75	−0.102 [−0.153 to −0.051]	−3.96	72	<0.001	0.15	0.057
10-meter walk test, fast speed, m/s	63	−0.171 [−0.264 to −0.079]	−3.71	60	<0.001	−0.01	0.953
$\dot{V}O_{2peak}$, mL·kg^{-1}·min^{-1}	57	−0.943 [−2.129 to 0.242]	−1.60	54	0.116	0.14	0.125
Berg Balance Scale score	47	−3.549 [−6.579 to −0.519]	−2.36	44	0.023	0.20	0.052
Intervention vs control§							
6-minute walk distance, m	48	−27.289 [−48.513 to −6.065]	−2.59	44	0.013	0.20	0.043
10-meter walk test, comfortable speed, m/s	28	−0.062 [−0.185 to 0.062]	−1.03	24	0.312	0.10	0.465
10-meter walk test, fast speed, m/s	23	−0.125 [−0.252 to 0.003]	−2.05	19	0.054	0.15	0.346
$\dot{V}O_{2peak}$, mL·kg^{-1}·min^{-1}‖	27	0.052 [−1.629 to 1.732]	0.06	23	0.950	0.07	0.620
Berg Balance Scale score¶	13	0.761 [−2.216 to 3.738]	0.58	9	0.577	0.33	0.129

DF indicates degrees of freedom; and $\dot{V}O_{2peak}$eak oxygen uptake.
*The reference group is ≤3 months.
†Significance in Begg's rank test indicates significant risk of publication bias.
‡Estimate was controlled for baseline value.
§Estimate was controlled for baseline between-group difference and baseline value in the intervention group.
‖There were only 6 studies in the group of ≤3 months.
¶There were only 4 studies in the group of ≤3 months.

Scale (B=3.549 score units; 95% CI, 0.519–6.579; t=2.36; *P*=0.023; Figure S4B). Associations between time and improvement were not observed in peak oxygen uptake (Figure S4E). Adjustment for additional covariates did not change the main results (Table 2).

Considering a 6-month post-stroke time cutoff, similar results were seen for all outcomes, except for comfortable 10MWT and Berg Balance Scale scores (Tables S7 and S8 and Figures S3 and S4).

DISCUSSION

To our knowledge, this is the first study to be conducted with the primary objective of examining the

Table 2. Summary of Meta-Regressions Between Time After Stroke ≤3 vs >3 months and Change in Outcome Measures (Pre-Post and Intervention vs Control) With Additional Covariates*

Outcome						Begg's rank test†	
Weighted mean difference	Number of studies	Estimate [95% CI]	t-value	DF	*P* value	tau	*P* value
Post- vs preintervention‡							
6-minute walk distance, m	103	−36.331 [−58.499 to −14.162]	−3.25	95	0.002	0.14	0.042
10-meter walk test, comfortable speed, m/s	67	−0.128 [−0.193 to −0.063]	−3.92	59	<0.001	0.15	0.067
10-meter walk test, fast speed, m/s	59	−0.163 [−0.299 to −0.026]	−2.40	51	0.02	0.00	0.958
$\dot{V}O_{2peak}$, mL·kg^{-1}·min^{-1}	51	−0.823 [−1.96 to 0.313]	−1.46	43	0.141	0.14	0.149
Berg Balance Scale score	40	−2.940 [−5.472 to −0.408]	−2.37	32	0.024	0.20	0.075
Intervention vs control§							
6-minute walk distance, m	44	−24.942 [−49.064 to −0.820]	−2.10	35	0.043	0.15	0.155

DF indicates degrees of freedom; and $\dot{V}O_{2peak}$, peak oxygen uptake.
*The reference group is ≤3 months
†Significance in Begg's rank test indicates significant risk of publication bias.
‡Estimate was controlled for baseline value, age, female proportion, exercise intensity (binary), exercise dose (binary), and ambulatory exercise (binary).
§Estimate was controlled for baseline between-group difference, baseline value, age, female proportion, exercise intensity (binary), exercise dose (binary), and ambulatory exercise (binary).

associations between elapsed time to initiate ET after stroke and CRF, mobility, or balance using meta-regression analyses. In randomized studies, there was a moderate and clinically important additional benefit to 6MWD observed when starting ET within 3 months, with a similar weighted mean difference when starting within 6 months of stroke compared with later. However, there was no significant time association for CRF, balance, or short-distance walking speed when compared with control conditions. When time to initiate ET following stroke was treated as a continuous variable, there were no significant associations with any of the outcome measures. This suggests that time-dependent recovery of functional mobility may fall within distinct post-stroke phases. Nevertheless, the augmented outcome in 6MWD is of clinical importance, given that improving mobility and walking capacity represent the biggest unmet physical activity needs of people following stroke.[13,184]

Subsequent meta-regression analyses were conducted to examine the association of time to initiate ET on outcome measures in single group pre-post studies. Results revealed that there was an augmented improvement associated with ET when initiated earlier for 6MWD, 10MWT, and balance but not CRF ≤3 months versus later and when time was expressed as a continuous variable. Extending the time threshold to 6 months, the weighted mean differences were less favorable than at ≤3 months except for comfortable 10WMT, which was similar. As in controlled studies, time had no association with CRF. Yet given the finding that when compared with a control condition there was no advantage of earlier training, except for 6MWD, the additional benefit of early ET for short-distance walking speed and balance may be accounted for, at least in part, by spontaneous recovery and concomitant usual care rehabilitation in the pre-post studies. However, regarding usual care rehabilitation, a recent Cochrane review of studies examining effects of aerobic and circuit training following stroke[12] reported slightly higher effect sizes when ET was introduced after usual care than when initiated during usual care for change in CRF, balance, gait speed, and 6MWD. This suggests that spontaneous recovery may be a more influential driver of the earlier initiation advantage in all but 6MWD outcomes in pre-post studies, requiring further investigation.

Meta-Regression of Randomized Studies Demonstrated an Association Between Time and 6-Minute Walk Distance Outcome

Six-Minute Walk Distance

The augmented outcome in 6MWD translated into a weighted mean difference advantage of 24.9 meters (95% CI, 0.82–49.1 when starting ET within 3 months of a stroke compared with later (P=0.04) and a 26.6 meter (95% CI, 2.6–50.6 difference when starting ET within 6 months compared with later (P=0.03). The similar augmented outcome in 6MWD at 3 and 6 months suggests that the time window for enhanced recovery from an ET intervention can extend past 3 months when considering the potential effect on 6MWD. The magnitude of the augmented outcome represents a moderate difference given that the minimal clinically important difference has been estimated at 20 to 50 meters.[185,186] Similar results from a previous meta-analysis conducted by Boyne et al, of 16 studies (published up to 2015) were reported, where there was a larger effect size for 6MWD when ET was started <6 months after stroke compared with ≥6 months of 25 meters (95% CI, −4 to 53).[31] The results were not adjusted for covariates, while the current meta-regression included more studies, and adjusted for 3 exercise parameters (intensity, dose, and modality), as well as age, sex, and the control intervention baseline mean differences.

Short-Distance Walking Speeds

Meta-regression analyses revealed a clinically meaningful advantage for fast 10MWT when ET was initiated ≤3 months compared with >3 months after stroke (0.125 m/s; 95% CI, −0.003 to 0.25; P=0.054) but not within 6 months compared with later (0.079 m/s; 95% CI, −0.024 to 0.182; P=0.13). While the 3-month analysis was not statistically significant, the estimate was clinically meaningful given that the minimal clinically important difference for gait speed has been estimated at 0.1 m/s to 0.175 m/s.[185,187,188] There was no association between time and 10MWT at comfortable speed. These results are similar to results from the meta-analysis conducted by Boyne et al; despite combining fast and comfortable 10MWT speed data (n=13 studies). Specifically, there was a nonsignificant but borderline clinically important difference of 0.09 m/s (95% CI, −0.00 to 0.18) when ET was started <6 months versus ≥6 months after the stroke event. Collectively, these results indicate a weaker association between time to start ET and 10MWT than between time and 6MWD outcome. This may be related to previous reports of a stronger positive correlation between CRF and 6MWD than between CRF and 10MWT,[189] but a lack of a time-CRF association suggests a complex series of factors accounting for the association between time and mobility observed in this study, that requires further investigation.

The underlying mechanisms for these earlier improvements in function have not been fully elucidated. While some of the neurotrophic effects mentioned previously in people following stroke are thought to benefit cognition, brain-derived neurotrophic factor has been shown to contribute in part to post-stroke improvements in mobility. Brain-derived neurotrophic factor has been linked to neuroplastic changes, such as dendritic growth.[17,18] Aerobic exercise interventions following stroke in rodents can enhance brain-derived neurotrophic factor levels in the brain,[190] likely contributing to improvements in mobility function. Thus, starting ET during this critical period may enhance spontaneously occurring regenerative processes and yield greater gains in mobility than exercise initiated in the later phases.

Balance and CRF

Finally, there was no association between time to start ET and postintervention CRF or balance when ET groups were compared with controls. Boyne et al, also reported no time association with change in CRF when introduced <6 months versus ≥6 months (−0.1 mL·kg^{-1}·min^{-1}; 95% CI, −3.2 to 2.9) similar to the 0.052 mL·kg^{-1}·min^{-1} (95% CI, −1.6 to 1.7) difference in the current study (≤3 months versus >3 months). There were no studies conducted >3 to 6 months that measured balance.

Association Between Time and 6MWD but Not Between Time and CRF or Balance

Given that balance and CRF are predictors of 6MWD and 10MWT outcomes, it was unexpected that the association of early training with improved 6MWD and 10MWT did not occur concurrently with improved CRF and balance.[5,189,191,192] The underlying reasons for this may be multifactorial. During measurement of CRF, patients in the earlier phase following stroke may have failed to reach a physiological maximum or reached a lower percentage of their physiological maximum on the exercise stress test than patients later in recovery. In a study of 98 consecutively enrolled patients in the chronic stroke phase (22±44 months after stroke), only 18.4% reached a true physiological maximum, with most discontinuing early for noncardiovascular reasons such as leg weakness or pain.[193] For studies that included patients earlier following stroke, the addition of elevated blood pressure, cardiac arrhythmia, deconditioning, or other issues that can be more common early after stroke may also lead to earlier test termination.[194–196] If the tests were stopped because of motor performance and not cardiorespiratory end points, including meeting sufficient respiratory exchange ratio values, then VO_{2peak} may not be capturing the true effect of the intervention. Although oxygen uptake achieved at the anaerobic threshold may be a more metabolically uniform measure, fewer studies reported these data or the proportion of patients who reached an appropriate respiratory exchange ratio value. It is also possible that ET resulted in earlier improved gait economy so that patients required less oxygen when walking at the same speed, allowing a faster sustained walking pace. However, in a recent well-designed, multicenter, randomized study conducted by Nave et al,[146] 4 weeks of aerobic exercise initiated a median of 28 days after stroke resulted in no difference in gait economy versus relaxation sessions after intervention, or at 3- and 6-months follow-up.

Clinical Implications: Evaluating Risks and Benefits of Early Initiation of ET

Given the magnitude and clinical importance of the additional gain in 6MWD, initiation of ET should be considered within 3 and up to 6 months after stroke to take advantage of the augmented priming effect of ET. However, several barriers to including ET during inpatient and outpatient stroke rehabilitation have been identified previously and would need to be addressed. These include insufficient time during the therapy session, insufficient length of stay in rehabilitation, interference with other therapy schedules, and comorbid cardiac conditions.[197,198] This is not surprising given the significant time requirement reported in the earlier intervention studies of 20 to 30 minutes, 5 session/wk of treadmill exercise.[146,168,199]

Medical complexity of patients, such as cardiac conditions, may be associated with increased risk during ET. Therefore, when evaluating when to initiate an exercise intervention, the type and rate of adverse events with respect to elapsed time from stroke should be evaluated against clinical benefits. Unfortunately, only 47% (70/148) of the studies included in this meta-regression analysis reported on adverse events, prohibiting a meaningful risk-benefit analysis. However, it is important to explore this issue, at least qualitatively. There was a concerning number of adverse events reported in studies that were started within the first month following stroke. A single group study was conducted in 20 people with mild to no disability.[168] Over half of the participants developed nonserious adverse events (noninjurious falls, dizziness, pain in lower extremities, tiredness) occurring in 14% of all 224 treadmill training sessions; however, no neurological deterioration was detected. Participants attained the target exercise intensity in only 31% of sessions. Nave et al[146] randomized 200 patients a median of 28 days after moderate to severe stroke, to either 4 weeks of relaxation sessions or body weight–supported treadmill aerobic exercise (25 minutes, 5 times/wk at 50%–60% of the predicted maximal heart rate). Adverse events were higher in the exercise compared with the control condition. Specifically, there were increased falls during the treatment period and a higher number of acute hospital admissions and recurrent strokes in the ET group compared with the control group. The authors stated, “For clinical practice, the results of this pragmatic trial do not support the use of aerobic physical fitness training in moderately or severely affected adults in the subacute phase of stroke." Moreover, ET when compared with relaxation control, did not result in additional benefit to maximal walking speed, Barthel index, but a moderate nonsignificant benefit was noted for the 6MWD after intervention (19 meters; 95% CI, −8 to 46) and persisted at the 6-month follow-up at 26 meters (95% CI, −1 to 53). A subsequent safety analysis of this study revealed that the association of aerobic training with serious adverse event incidence rates were related to comorbid atrial fibrillation and diabetes.[200] A review from our group have advocated for delaying moderate to higher intensity exercise for people with diabetes/hyperglycemia, given the higher mortality rates in those with hyperglycemia at the time of stroke, the altered time course of recovery of blood-brain barrier function, the potential effect on orthostatic hypotension, and that impaired cerebral autoregulation may intensify risk in people with type 2 diabetes.[201–204] Specifically, we suggested delaying higher intensity exercise for those with a blood glucose level of ≥160 mg/dL measured within the first 48 hours of stroke and including this as part of the preparticipation screening criteria.[25] Furthermore, atrial fibrillation may reduce cardiac output that has the potential to result in cerebral hypoperfusion episodes associated with activity,[205,206] especially in the presence of impaired cerebral autoregulation, which could lead to symptoms such as dizziness. Therefore, it is recommended that light-intensity exercise should be maintained in these patients until the expected recovery of cerebral autoregulation.[25]

Early mobilization studies not included in the current meta-regression analysis have introduced sitting, standing, and walking within 24 hours of a stroke. These studies have raised safety concerns while revealing little evidence of a favorable functional outcome.[207–210] The results of the most influential study, A Very Early Rehabilitation Trial After Stroke, demonstrated deleterious effect of mobilization initiated within 24 hours.[207,208] Specifically, there was an increased risk of death in the intervention group at 14 days after stroke.[209] This is largely consistent with the preclinical evidence indicating greater risk when ET is initiated very early following stroke.[211–214] The underlying mechanisms for these adverse events are unknown but may be related to neurobiological protective mechanisms such as cerebral autoregulation, which take up to 2 to 3 months to recover sufficiently to fully protect the brain from the increase or fluctuations in blood pressure that occur with exercise (see review[25]). Safety, preparticipation screening, and exercise prescription guidelines for early exercise interventions should be a priority. Future studies should include a risk-benefit analysis given that cerebral protective mechanisms may not have fully recovered in the subacute stages of stroke.

Limitations

Some study quality issues and risk of publication bias were detected, but it is unclear how this might affect the meta-regression analyses. Some studies had small sample sizes, unbalanced groups related to recovery potential, or a lack of nonactive controls. Because of inconsistency in reporting, anthropometric and disability/stroke severity measurements (eg, Fugl-Meyer score) could not be included as covariates in the study. Some studies that started remotely from stroke may have had different cohort characteristics that may have contributed to heterogeneity and widened CIs. For completeness, we opted to include these data. Several studies did not report time since stroke or report data in a usable manner, which may reduce the comprehensiveness of the meta-analysis. We were not able to differentiate between compensation, true motor recovery, and/or therapy-induced recovery and could not control for the cumulative dose of usual care rehabilitation. Although several outcomes showed an association with timing of ET initiation following stroke, causality cannot be inferred in the current study. There were few studies randomized on the basis of time after stroke[72]; further controlled studies introducing ET at different initiation points with groups balanced for recovery potential would be needed to establish precise estimates of timing effects to initiate ET to optimize outcomes and their true benefits.

CONCLUSIONS

The results of this study reflect the complex relationship between time to initiate ET and postintervention physiological outcomes. There may be varying time windows for augmented responses and no time association for some outcomes. The time windows for augmented outcomes related to ET may span longer time periods for 6MWD than previously thought. Initiating exercise earlier (within 6 months) appears to be associated with a greater improvement in 6MWD and to a lesser extent in fast-speed 10MWT (within 3 months), but not with CRF, balance, or comfortable 10MWT. Spontaneous recovery and accompanying usual care rehabilitation may account in part for the advantage of earlier ET initiation in pre-post 10MWT and balance outcomes, requiring further investigation. The early phases after stroke are a dynamic and volatile time, necessitating careful application of ET.

ARTICLE INFORMATION

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Affiliations

KITE Research Institute, Toronto Rehabilitation Institute - University Health Network, Toronto, ON, Canada (S.M., S.K., A.P., W.S.); Healthy Living for Pandemic Event Protection (HL–PIVOT) Network (S.M.); (S.M.); Faculty of Kinesiology and Physical Education (S.M., C.R.C., S.A.Z.); and Department of Pharmacology and Toxicology (C.W., L.Y.X., M.M.N., W.S.), University of Toronto, ON, Canada; Hurvitz Brain Sciences Program, Sunnybrook Research Institute, Toronto, ON, Canada (C.W., L.Y.X., M.M.N., M.A.B., W.S.); Department of Human Biology (R.H., K.S.K.L.); and Physical and Environmental Sciences Department (G.N.M.), University of Toronto, ON, Canada; Library & Information Services, University Health Network, Toronto Rehabilitation Institute, Toronto, ON, Canada (M.P.); and Institute of Medical Science, University of Toronto, Toronto, ON, Canada (M.A.B.).

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Disclosures

None.

Supplementary Material

Tables S1–S8
Figures S1–S4

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SUPPLEMENTAL MATERIAL

Table S1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Checklist.

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	6-8
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	6-9
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	6-9
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	9
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5-7 Table S2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	8-9
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	10-11
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and	6-9

		simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	10
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	11-12
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	11-12
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	10
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	11-12
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	48 Figure S1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	6-8 Table S3 8-31
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	33-43 Table S4
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-31 Table S3
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	48-54 Fig S2-S4 Fig 1-3
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	33-43 Table S4
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	48-54 Fig S2-S4 Figures 1-3

DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	14-22
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	22
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	23
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	23

Table S2. **Search Strategy: Ovid MEDLINE(R) ALL <1946 to June 29, 2020>.**

1	[Population: Stroke & Post-Stroke Patients]
2	exp Stroke/
3	exp Brain Ischemia/
4	exp Intracranial Hemorrhages/
5	Cerebrovascular Disorders/
6	exp "Intracranial Embolism and Thrombosis"/
7	exp intracranial arterial diseases/
8	exp Paresis/
9	Hemiplegia/
10	(stroke* or apoplex* or poststroke* or post-stroke* or hemiplegi* or hemipar* or paresis* or paretic*).tw,kw.
11	((brain* or cerebr* or cerebell* or intracran* or intracerebral* or vascular) adj3 (accident* or apoplex* or ischemi* or ischaemi* or infarct* or thrombo* or emboli* or occlus* or hemorrhage* or haemorrhage* or haematoma* or hematoma* or bleed* or attack* or insufficien* or arrest* or failure* or injur* or trauma* or microbleed*)).tw,kw.
12	or/2-11
13	[Intervention: Therapeutic Aerobic Exercises]
14	exp Exercise/
15	exp Exercise Therapy/
16	exercis*.tw,kw.
17	((body-weight* or body weight*) adj3 treadmill*).tw,kw.
18	((training or conditioning or fitness) adj3 (therap* or prescri* or regim* or program* or intervention* or protocol*)).tw,kw.
19	((training or therap* or prescri* or regimen* or program* or conditioning*) adj3 (exercise* or aerobic* or cardio* or treadmill* or physical* or endurance*)).tw,kw.
20	(walk* or jog* or treadmill* or bicycl* or cycl* or running or swim* or rowing or circuit train*).tw,kw.
21	or/14-20
22	[Outcomes: Timing & Selected Other]
23	Time-to-Treatment/
24	Time Factors/
25	((time or timing or day* or week* or month* or year*) adj3 (from stroke* or since stroke* or after stroke* or post-stroke or post stroke)).tw,kw.
26	((time or timing) adj3 (elapsed* or effect* or affect* or delay* or prefer* or schedul* or regimen* or training or intervention* or exercis* or therap* or relati* or mean or earl* or late*)).tw,kw.
27	((treatment* or therap* or intervention*) adj3 (begin* or began* or start* or time* or timing* or schedul* or initiat* or introduc* or commenc*)).tw,kw.
28	Exercise Test/

29	(test* adj3 (walk* or fitness* or gait* or mobilit* or function* or exercis* or treadmill* or step* or flexibility* or endurance* or agility or balanc* or motor* or stamina* or cardio* or stand* or ergometr*)).tw,kw.
30	(("sit-to-stand" or stair climb* or stair-climb*) adj3 (perform* or test* or time or timing* or measur*)).tw,kw.
31	exp Oxygen Consumption/
32	(VO2 or oxygen uptak* or oxygen consum* or lung capacity).tw,kw.
33	((aerobic* or anaerobic*) adj3 (capacit* or threshold* or power* or fitness*)).tw,kw.
34	(rate* adj3 (heart or pulse or blood pressure)).tw,kw.
35	physical fitness/
36	(fitness* adj3 (physical* or cardiovascular or cardio*)).tw,kw.
37	exp physical endurance/
38	Postural Balance/
39	(balanc* adj3 (scale* or abilit* or postur* or Berg or deficit* or impair*)).tw,kw.
40	exp Gait Disorders, Neurologic/
41	mobility limitation/
42	((gait* or walk*) adj3 (speed* or econom* or symmetr* or velocit* or capacit* or distanc* or enduranc*)).tw,kw.
43	(function* adj3 (mobilit* or fitness* or ambulat* or capacit* or walk* or gait*)).tw,kw.
44	(stroke* adj3 (questionnaire* or scale* or survey* or inventory or assess* or test* or instrument*)).tw,kw.
45	"Recovery of Function"/
46	(recover* adj3 (function* or motor or neurobehavior* or neurobehaviour*)).tw,kw.
47	(assessment* adj3 (stroke* or motor* or disabilit* or function* or physical*)).tw,kw.
48	(motor adj3 (recover* or control* or function* or index or abilit* or limit* or impair* or dysfunction*)).tw,kw.
49	(NIHSS or Chedoke* or Berg or Rankin* or Fugl-Meyer* or FIM*).tw,kw.
50	((balanc* or disabilit* or motricit* or mobilit*) adj3 (questionnaire* or scale* or survey* or assess* or inventor* or test* or instrument*)).tw,kw.
51	or/23-50
52	12 and 21 and 51
53	[Limit to Specified Study Types]
54	observational study/
55	evaluation studies/
56	validation studies/
57	random*.tw.
58	Random Allocation/
59	exp clinical trial/
60	exp case-control studies/
61	exp cohort studies/
62	tu.xs.

63	clinical trial.mp.
64	clinical trial.pt.
65	random:.mp.
66	(clinical and trial).tw.
67	"research support, non us gov't".pt.
68	or/54-67
69	52 and 68
70	animals/ not (animals/ and humans/)
71	69 not 70

Table S3. Study Characteristics.

Study	Outcomes	Intervention	Modality	Exercise Type	Duration of Intervention	Total Dose or Volume	Intensity	Sample Size: Baseline	Sample Size: Post-Intervention	Completers (%)	Adverse Events Reported (%)	Mean Post-Stroke Months (SD)	Mean Age (SD)	Females (%)	Stroke Severity or MR Score/Level*
Randomized Control Trial (RCT) Studies															
Ada 2003	6MWT; 10MWT (normal)	*Intervention:* Treadmill and overground walking program *Control:* Low intensity home exercise program	Ambulatory	AT	4 weeks total, 3 Sessions per week, 30-mins per session	360	Moderate	*Intervention:* 13 *Control:* 14	*Intervention:* 11 *Control:* 14	*Intervention:* 92.9% *Control:* 93.3%	NR	*Intervention:* 28.0 (17) *Control:* 26.0 (20)	*Intervention:* 66.0 (11.0) *Control:* 66.0 (11.0)	*Intervention:* 30.7% *Control:* 28.6%	*3† Intervention: 12.1±5.5 Control: 15.2±5.2*
DePaul 2014	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention:* BWS treadmill training *Control:* Overground walking	Ambulatory	AT	5 weeks total, 3 Sessions per week, 60-mins per session	900	Moderate	*Intervention:* 36 *Control:* 35	*Intervention:* 34 *Control:* 30	*Intervention:* 97.2% *Control:* 97.1%	*Intervention:* 31.3% *Control:* 36.7%	Intervention: 18.5 (7.3-34.0) Control: 18 (10.0-30.0) *median (IQR) *in weeks	*Intervention:* 69.0 (12.3) *Control:* 66.4 (11.0)	*Intervention:* 40.0% *Control:* 38.9%	*2 Intervention: 4.28±1.63 Control: 4.27±1.68*
Ada 2013	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention:* Treadmill training and overground walking *Control:* No intervention	Ambulatory	AT	2 months total, 3 sessions per week, 30-mins per session	720	Moderate	*Intervention:* 34 *Control:* 34	*Intervention:* 34 *Control:* 31	*Intervention:* 97.1% *Control:* 91.2%	NR	*Intervention:* 20.0 (15.0) *Control:* 19.0 (13.0)	*Intervention:* 64.0 (12.0) *Control:* 63.0 (13.0)	*Intervention:* 17.6% *Control:* 44.1%	*NR*
Aidar 2018	BBS	*Intervention:* Aquatic exercise program *Control:* Began activity after 4 months	Non-ambulatory	AT	12 weeks total, 2 sessions per week, 45-60-mins per session	1080-1440	Unclear	*Intervention:* 22 *Control:* 21	*Intervention:* 19 *Control:* 17	*Intervention:* 86.3% *Control:* 80.9%	NR	*Intervention:* > 12.0 months *Control:* > 12.0 months	*Intervention:* 51.8 (8.5) *Control:* 52.7 (6.7)	*Intervention:* 47.3% *Control:* 47.0%	*4 Intervention:* C) 17.6% *Control: E) 15.8%*
Askim 2018	6MWT; 10MWT (fast)	*Intervention:* Individualized coaching on physical activity and exercise *Control:* Standard care	Mixed	AT	18 months total, 7 sessions per week, 30-mins per session	15120	At least vigorous	*Intervention:* 186 *Control:* 194	*Intervention:* 153 *Control:* 162	*Intervention:* 82.3% *Control:* 83.5%	*Intervention:* 36.0% *Control:* 45.4%	Intervention: 111.3 (24.5) Control: 112.0 (17.2) *in days	*Intervention:* 71.7 (11.9) *Control:* 72.3 (11.3)	*Intervention:* 44.1% *Control:* 34.5%	*1 Intervention: 1.45±1.08 Control: 1.44±1.1*

Awad 2016	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention:* Locomotor training at fast speed *Control:* Locomotor training at comfortable speed	Ambulatory	AT	12 weeks total, 3 sessions per week, 36-mins per session	1296	At least vigorous	*Intervention:* 16 *Control:* 14	*Intervention:* 16 *Control:* 14	*Intervention:* 100% *Control:* 82.4%	NR	Intervention: 1.7 (2.5) Control: 1.5 (1.1) *median (IQR) *in years	*Intervention:* 55.3 (5.8) *Control:* 61.4 (5.9) *median (IQR)	*Intervention:* 44.0% *Control:* 43.0%	*NR*
Bang 2016	6MWT; 10MWT (normal)	*Intervention:* Intensive aerobic exercise (cycling) *Control:* Self-selective intensity exercise (cycling)	Non-ambulatory	AT	4 weeks total, 5 sessions per week, 30-mins per session	6000	Moderate	*Intervention:* 6 *Control:* 6	*Intervention:* 6 *Control:* 6	*Intervention:* 100% *Control:* 100%	NR	*Intervention:* 13.7 (1.5) *Control:* 14.3 (1.5)	*Intervention:* 56.8 (6.5) *Control:* 63.7 (5.8)	*Intervention:* 50.0% *Control:* 33.3%	*NR*
Chu 2004	Peak VO_2; BBS	*Intervention:* Exercise in chest-deep water with walking, running, side stepping *Control:* Arm and hand exercises while sitting	Non-ambulatory	AT	8 weeks total, 3 sessions per week, 60-mins per session	1440	At least vigorous	*Intervention:* 7 *Control:* 5	*Intervention:* 7 *Control:* 5	*Intervention:* 100% *Control:* 83.3%	*Intervention:* 0% *Control:* 16.7%	Intervention: 3.0 (2.0) Control: 4.2 (2.1) *in years	*Intervention:* 61.9 (9.4) *Control:* 63.4 (8.4)	*Intervention:* 14.3% *Control:* 0%	*5* *Intervention: 5/2* *Control: 3/2*
Combs-Miller 2014	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention:* BWS treadmill training *Control:* Overground walking	Ambulatory	AT	2 weeks total, 5 sessions per week, 30-mins per session	300	Moderate	*Intervention:* 10 *Control:* 10	*Intervention:* 10 *Control:* 10	*Intervention:* 100% *Control:* 100%	NR	*Intervention:* 62.3 (48.6) *Control:* 60.0 (51.7)	*Intervention:* 56.2 (7.6) *Control:* 65.5 (6.2)	*Intervention:* 60.0% *Control:* 30.0%	*6* *Intervention: 21.6±4.6* *Control: 23.1±3.7*
da Cunha Filho 2001	Peak VO_2	*Intervention:* BWS treadmill training *Control:* Regular rehabilitation	Ambulatory	AT	5 weeks total, 2-3 Sessions per week, 20-mins per session	200-300	Moderate	*Intervention:* 6 *Control:* 6	*Intervention:* 6 *Control:* 6	*Intervention:* 85.7% *Control:* 75.0%	NR	*Intervention:* 15.7 (7.7) *Control:* 14.3 (6.1) *in days	*Intervention:* 57.8 (5.6) *Control:* 59.7 (13.6)	*Intervention:* 0% *Control:* 0%	*7* *Intervention: 3.83±2.7* *Control: 2.83±1.6*
Duncan 2011	6MWT; 10MWT (normal); BBS	*Intervention 1:* BWS treadmill training 2 months post-stroke *Intervention 2:* BWS treadmill training 6 months post-stroke *Control:* Home-based exercise	Ambulatory	AT	12-16 weeks total, 3 sessions per week 90-mins per session	3240-4320	Moderate	*Intervention 1:* 139 *Intervention 2:* 143 *Control:* 126	*Intervention 1:* 139 *Intervention 2:* 143 *Control:* 126	*Intervention 1:* 87.1% Intervention *2:* 83.2% *Control:* 96.8%	*Intervention 1:* 41.0% *Intervention 2:* 32.9% *Control:* 27.8%	*Intervention 1:* 2.0 *Intervention 2:* 6.9 *Control:* 2.9	*Intervention 1:* 60.3 (12.3) *Intervention 2:* 63.8 (12.5) *Control:* 62.8 (13.3)	*Intervention 1:* 38.8% *Intervention 2:* 48.2% *Control:* 48.4%	*8* *Intervention 1:* 8.6% *Intervention 2:* 16.1% *Control: 16.7%*
Eich 2004	6MWT; 10MWT (fast)	*Intervention:* Treadmill and physiotherapy *Control:* physiotherapy	Ambulatory	AT	6 weeks total, 5 sessions per week, 60-mins per session	1800	Moderate	*Intervention:* 25 *Control:* 25	*Intervention:* 24 *Control:* 25	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 6.1 (2.2) *Control:* 6.3 (2.5) *in weeks	*Intervention:* 62.4 (4.8) *Control:* 64.0 (6.0)	*Intervention:* 32.0% *Control:* 36.0%	*9* *Intervention:* 32% *Control: 36%*

Frimpong 2014	6MWT; 10MWT (normal)	*Intervention:* Tasked-oriented circuit training *Control:* Usual conventional therapy	Mixed	AT + RT	8 weeks total, 3 Sessions per week, 35-min sessions	560	Moderate	*Intervention:* 10 *Control:* 10	*Intervention:* 10 *Control:* 10	Unclear	NR	*Intervention:* 2.2 (0.8) *Control:* 2.4 (0.9)	*Intervention:* 57.6 (3) *Control:* 55.8 (6.7)	*Intervention:* 15.0% *Control:* 20.0%	*10* *Intervention:* 3.3±.05 *Control:* *3.4±.5*
Gama 2017	6MWT; 10MWT (normal)	*Intervention:* BWS treadmill training *Control:* Overground gait training	Ambulatory	AT	6 weeks total, 3 sessions per week, 45-min per session	810	Moderate	*Intervention:* 14 *Control:* 14	*Intervention:* 14 *Control:* 14	*Intervention:* 87.5% *Control:* 87.5%	*Intervention:* 0% *Control:* 0%	*Intervention:* 60.2 (55.4) *Control:* 53.8 (42.2)	*Intervention:* 58.7 (8.4) *Control:* 57.7 (10.1)	*Intervention:* 50.0% *Control:* 57.1%	*11* *Intervention:* 69.2±6.7 *Control:* *70.9±8.6*
Gezer 2019	6MWT; Peak VO_2	*Intervention:* Cycle ergometer *Control:* Conventional exercise	Non-ambulatory	AT	6 weeks total, 5 sessions per week, 60-mins per session	1800	Moderate	*Intervention:* 22 *Control:* 20	*Intervention:* 22 *Control:* 20	*Intervention:* 81.5% *Control:* 87%	NR	*Intervention:* 56.5 (10.3) *Control:* 65.9 (8.3) *in days	*Intervention:* 52.6 (2.9) *Control:* 56.3 (3.3)	*Intervention:* 31.8% *Control:* 40.0%	*12* *Intervention:* 66.9±17.9 *Control:* *64.4±18/9*
Gjellesvik 2020	Peak VO_2	*Intervention:* High-intensity interval training on treadmill *Control:* Standard care	Ambulatory	AT	8 weeks total, 3 Sessions per week, 40-min sessions	960	At least vigorous	*Intervention:* 36 *Control:* 34	*Intervention:* 33 *Control:* 31	*Intervention:* 91.7% *Control:* 100%	*Intervention:* 11.1% *Control:* 11.8%	*Intervention:* 25.4 (14.5) *Control:* 27.4 (14.7)	*Intervention:* 57.6 (9.2) *Control:* 58.7 (9.2)	*Intervention:* 41.7% *Control:* 41.2%	*8* *Intervention:* 75% *Control:* *76.5%*
Globas 2012	6MWT; 10MWT (normal); 10MWT (fast); Peak VO_2; BBS	*Intervention:* Progressive graded, high-intensity aerobic treadmill exercise *Control:* Conventional care physiotherapy	Ambulatory	AT	12 weeks total, 3 sessions per week, 30-50 min per session	1080-1800	At least vigorous	*Intervention:* 18 *Control:* 18	*Intervention:* 18 *Control:* 18	*Intervention:* 90.0% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 60.2 (46.6) *Control:* 70 (67.4)	*Intervention:* 68.6 (6.7) *Control:* 68.7 (6.1)	*Intervention:* 22.2% *Control:* 16.7%	*1* *Intervention:* 4.2±2.5 *Control:* *4.7±2.9*
Gordon 2013	6MWT	*Intervention:* Overground walking *Control:* Massage	Ambulatory	AT	12 weeks total, 3 sessions per week, 30 min per session	1080	Moderate	*Intervention:* 64 *Control:* 64	*Intervention:* 57 *Control:* 59	Intervention: 89.1% Control: 92.2%	*Intervention:* 0% *Control:* 0%	*Intervention:* 12.8 (3.6) *Control:* 11.8 (3.6)	*Intervention:* 63.4 (9.4) *Control:* 64.9 (11.1)	*Intervention:* 54.7% *Control:* 54.7%	13 *Intervention:* 94.3±8.1 *Control:* *91.5±9.7*
Grau-Pellicer 2020	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention:* High intensity interval training *Control:* Standard care	Mixed	AT + RT	8 weeks total, 2 Sessions per week, 60-min sessions	960	Moderate	*Intervention:* 24 *Control:* 17	*Intervention:* 21 *Control:* 13	Unclear	*Intervention:* 0% *Control:* 0%	*Intervention:* 18.9 (27.6) *Control:* 20.9 (59.7)	*Intervention:* 623.0 (11.9) *Control:* 68.5 (11.5)	*Intervention:* 45.8% *Control:* 52.9%	*14* *Intervention:* 29% *Control:* *41.2%*

Hornby 2016	6MWT; 10MWT (normal); BBS	*Intervention:* High-intensity variable step training *Control:* Conventional training	Ambulatory	AT + RT	10 weeks total, 4-5 sessions per week, 60-min per session (40 total sessions)	2400	At least vigorous	*Intervention:* 16 *Control:* 17	*Intervention:* 15 *Control:* 17	*Intervention:* 100% *Control:* 100%	*Intervention:* 50.0% *Control:* 52.0%	*Intervention:* 114.0 (56.0) *Control:* 89.0 (44.0) *in days	*Intervention:* 57.0 (12.0) *Control:* 60.0 (9.20)	*Intervention:* 20.0% *Control:* 29.4%	*6* *Intervention:* 20.0±.58 *Control:* *21.0±6.2*
Hoyer 2012	6MWT; 10MWT (fast)	*Intervention:* BWS treadmill training *Control:* Traditional walking training	Ambulatory	AT	30 sessions, 30 min per session	900	Unclear	*Intervention:* 30 *Control:* 30	*Intervention:* 30 *Control:* 30	*Intervention:* 100% *Control:* 100%	NR	Intervention: 96.0 (42.0) Control: 99.0 (39.4) *in days	*Intervention:* 52.3 (10.4) *Control:* 52.0 (13.1)	*Intervention:* 33.3% *Control:* 40.0%	*15* *Intervention:* 1.5(1-2) *Control:* *1 (1-2)*
Hsu 2019	6MWT	*Intervention:* Cycle ergometer *Control:* Traditional rehabilitation	Non-ambulatory	AT	4 weeks total, 5 Sessions per week, 30-45-min sessions	600-900	Moderate	*Intervention:* 15 *Control:* 15	*Intervention:* 15 *Control:* 15	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 21.0 (11.6) *Control:* 23.0 (15.5)	*Intervention:* 55.7 (11.6) *Control:* 57.8 (15.1)	*Intervention:* 20.0% *Control:* 13.3%	*16* *Intervention:* 25% *Control:* *27%*
Ivey 2010	Peak VO_2	*Intervention:* Treadmill training *Control:* Conventional physical therapy	Ambulatory	AT	24 weeks total, 3 sessions per week, 40-min per session	2880	At least vigorous	*Intervention:* 29 *Control:* 24	*Intervention:* 29 *Control:* 24	*Intervention:* 74.0% *Control:* 59.0%	*Intervention:* 0% *Control:* 0%	*Intervention:* > 6.0 months *Control:* > 6.0 months	*Intervention:* 62.0 (8.0) *Control:* 60.0 (8.0)	*Intervention:* 37.9% *Control:* 54.2%	*NR*
Ivey 2011	6MWT; Peak VO_2	*Intervention:* Treadmill training *Control:* Conventional physical therapy	Ambulatory	AT	24 weeks total, 3 sessions per week, 40-min per session	2880	At least vigorous	*Intervention:* 19 *Control:* 19	*Intervention:* 19 *Control:* 19	Unclear	NR	*Intervention:* > 6.0 months *Control:* > 6.0 months	*Intervention:* 61.0 (8.0) *Control:* 62.0 (10.0)	NR	*1* *Intervention:* 7.7±5.2 *Control:* 8.9±4.3
Ivey 2015	6MWT; 10MWT (normal); 10MWT (fast); Peak VO_2	*Intervention:* High-intensity treadmill training *Control:* Low-intensity treadmill training	Ambulatory	AT	24 weeks total, 2 sessions per week, 30 min per session	1440	At least vigorous	*Intervention:* 18 *Control:* 16	*Intervention:* 18 *Control:* 16	*Intervention:* 75.0% *Control:* 59.3%	*Intervention:* 0% *Control:* 0%	*Intervention:* 41.0 (51.0) *Control:* 37.0 (56.0)	*Intervention:* 61.0 (6.8) *Control:* 63.0 (9.6)	*Intervention:* 44.4% *Control:* 31.3%	*NR*
Jin 2012	6MWT; Peak VO_2; BBS	*Intervention:* Cycling training *Control:* Low-intensity overground walking	Non-ambulatory	AT + RT	8 weeks total, 5 sessions per week, 40 min per session	1600	At least vigorous	*Intervention:* 68 *Control:* 65	*Intervention:* 68 *Control:* 65	Unclear	NR	*Intervention:* 18.5 (5.2) *Control:* 17.9 (4.8)	*Intervention:* 57.0 (6.0) *Control:* 56.0 (7.0)	*Intervention:* 29.4% *Control:* 29.2%	*17* *Intervention:* 10.3±1.4 *Control:* *10.2±1.4*

Kang 2012	6MWT; 10MWT (fast)	*Intervention:* Treadmill training *Control:* General stretching and range-of-motion exercises	Ambulatory	AT	4 weeks total, 3 sessions per week, 30-min per day	360	Unclear	*Intervention:* 10 *Control:* 10	*Intervention:* 10 *Control:* 10	*Intervention:* 90.9% *Control:* 100%	NR	*Intervention:* 13.5 (4.0) *Control:* 15.1 (7.4)	*Intervention:* 56.3 (7.6) *Control:* 56.1 (7.8)	*Intervention:* 60.0% *Control:* 40.0%	18 *Intervention:* 3/10 *Control:* *4/10*
Kim 2015	10MWT (normal); BBS	*Intervention:* Stationary cycling *Control:* Standard rehabilitation program	Non-ambulatory	AT	6 weeks total, 5 sessions per week, 30-mins per session	900	Unclear	*Intervention:* 16 *Control:* 16	*Intervention:* 16 *Control:* 16	Unclear	NR	*Intervention:* > 6.0 months *Control:* > 6.0 months	*Intervention:* 65.2 (6.4) *Control:* 61.7 (6.1)	*Intervention:* 25.0% *Control:* 18.8%	*NR*
Koch 2020	6MWT	*Intervention:* Aerobic (treadmill and cycle ergometer) and resistance training *Control:* Stretching and range-of-motion exercises	Mixed	AT + RT	12 weeks total, 3 Sessions per week, 40-60-min sessions	1440-2160	Moderate	*Intervention:* 86 *Control:* 45	*Intervention:* 86 *Control:* 45	*Intervention:* 63.0% *Control:* 42.0%	*Intervention:* 47.7% *Control:* 40.0%	*Intervention:* 154.0 *Control:* 148.0 *median *in days	*Intervention:* 59.0 (11.0) *Control:* 58.0 (12.0)	*Intervention:* 30.2% *Control:* 53.3%	*19* *Intervention:* 3 (1:4) *Control:* 2(1:4)
Kuys 2011	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention:* High-intensity treadmill training and physiotherapy *Control:* Physiotherapy	Ambulatory	AT	6 weeks total, 3 sessions per week, 30 min per session	540	Moderate	*Intervention:* 15 *Control:* 15	*Intervention:* 13 *Control:* 15	*Intervention:* 86.7% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 52.0 (32.0) *Control:* 49.0 (30.0) *in months	*Intervention:* 63.0 (14.0) *Control:* 72.0 (17.0)	*Intervention:* 50.0% *Control:* 66.7%	*20* *Intervention:* 76±18 *Control:* *80±9*
Kwon 2015	6MWT	*Intervention:* Task-oriented treadmill walking training *Control:* Conventional gait training	Ambulatory	AT	8 weeks total, 5 sessions per week, 30 min per session	1200	Moderate	*Intervention:* 20 *Control:* 20	*Intervention:* 20 *Control:* 20	*Intervention:* 90.9% *Control:* 90.9%	NR	*Intervention:* 14.3 (6.3) *Control:* 15.3 (6.5)	*Intervention:* 50.7 (15.2) *Control:* 47.2 (18.7)	*Intervention:* 30.0% *Control:* 40.0%	*21* *Intervention:* 25% *Control:* *35%*
Lamberti 2017	6MWT; 10MWT (fast); BBS	*Intervention:* Treadmill walking and strength training *Control:* Overground intermittent walking and muscle power training	Ambulatory	AT + RT	8 weeks total, 3 sessions per week, 60 min per session	1440	At least vigorous	*Intervention:* 17 *Control:* 18	*Intervention:* 17 *Control:* 18	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 40.0 (51.0) *Control:* 34.0 (46.0)	*Intervention:* 67.0 (10.0) *Control:* 69.0 (9.0)	*Intervention:* 24.0% *Control:* 22.0%	*NR*

Langhammer 2010	6MWT; 10MWT (normal)	*Intervention:* Treadmill walking *Control:* Outdoor walking	Ambulatory	AT	2.5 weeks total, 5 sessions per week, 30 min per session	375	Moderate	*Intervention:* 21 *Control:* 18	*Intervention:* 21 *Control:* 18	*Intervention:* 85.7% *Control:* 88.9%	NR	*Intervention:* 419.0 (1034.0) *Control:* 349.0 (820.0) *in days	*Intervention:* 74.0 (13.3) *Control:* 75.0 (10.4)	*Intervention:* 52.0% *Control:* 67.0%	*22* *Intervention:* 5.4 *Control: 5.3*
Lee 2008	6MWT; 10MWT (fast); Peak VO_2	*Intervention:* Cycling *Control:* Sham control	Non-ambulatory	AT	12 weeks total, 3 sessions per week, 30 min per session	1080	Moderate	*Intervention:* 12 *Control:* 12	*Intervention:* 12 *Control:* 12	*Intervention:* 85.7% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 52.4 (2.2) *Control:* 65.8 (42.3)	*Intervention:* 67.2 (10.6) *Control:* 65.3 (6.0)	*Intervention:* 50.0% *Control:* 50.0%	*NR*
Lee 2015	6MWT; 10MWT (normal)	*Intervention:* Combined aerobic (walking) and resistance exercise *Control:* Usual care	Ambulatory	AT + RT	16 weeks total, 3 sessions per week, 60 min per session	2880	Moderate	*Intervention:* 14 *Control:* 12	*Intervention:* 14 *Control:* 12	*Intervention:* 93.3% *Control:* 80.0%	NR	*Intervention:* 6.0 (3.3) *Control:* 5.8 (2.5) *in years	*Intervention:* 64.0 (7.4) *Control:* 63.0 (5.5)	NR	*NR*
Lee 2019	6MWT; 10MWT (normal)	*Intervention:* Treadmill walking training *Control:* General physical therapy	Ambulatory	AT	4 weeks total, 3 sessions per week, 30-mins per session	360	Moderate	*Intervention:* 15 *Control:* 15	*Intervention:* 15 *Control:* 15	Unclear	NR	*Intervention:* 7.8 (2.7) *Control:* 6.7 (2.6) *in years	*Intervention:* 53.2 (9.8) *Control:* 53.8 (12.2)	*Intervention:* 20.0% *Control:* 33.3%	*10* *Intervention:* 4.2±.14 *Control: 4.0±.54*
Lennon 2008	Peak VO_2	*Intervention:* Cycle ergometry *Control:* Usual care	Non-ambulatory	AT	10 weeks total, 2 sessions per week, 30-min sessions	600	Moderate	*Intervention:* 24 *Control:* 24	*Intervention:* 23 *Control:* 23	*Intervention:* 96.0% *Control:* 96.0%	NR	*Intervention:* 237.3 (110.7) *Control:* 245.3 (169.8) *in weeks	*Intervention:* 59.0 (10.3) *Control:* 60.5 (10.0)	*Intervention:* 42.0% *Control:* 42.0%	*21* *Intervention:* 62.5% *Control: 54.2%*
Letombe 2010	Peak VO_2	*Intervention:* Cardiorespiratory exercise, muscle strengthening, and gait training *Control:* Conventional therapy	Non-ambulatory	AT + RT	4 weeks total, 4 sessions per week, 40-60 mins per session	640-960	At least vigorous	*Intervention:* 9 *Control:* 9	*Intervention:* 9 *Control:* 9	Unclear	NR	*Intervention:* 21.0 (3.0) *Control:* 20.0 (2.0) *in days	*Intervention:* 59.1 (9.4) *Control:* 60.6 (8.2)	*Intervention:* 33.0% *Control:* 44.0%	*13* *Intervention:* 42.5±17.3 *Control: 39.5±16.2*

Linder 2017	Peak VO_2	*Intervention:* Voluntary exercise and repetitive task practice *Control:* Time-matched repetitive task practice	Non-ambulatory	AT + RT	8 weeks total, 3 sessions per week, 90-mins per session	2160	At least vigorous	*Intervention:* 6 *Control:* 5	*Intervention:* 6 *Control:* 5	*Intervention:* 100% *Control:* 100%	*Intervention:* 16.7% *Control:* 0%	*Intervention:* 9.9 (1.5) *Control:* 9.1 (2.1)	*Intervention:* 60.7 (12.1) *Control:* 61.6 (8.3)	*Intervention:* 16.7% *Control:* 0%	*11* *Intervention:* 30.5±12.9 *Control: 25.4±7.8*
Liu-Ambrose 2015	6MWT; BBS	*Intervention:* Fitness and mobility exercise program *Control:* Usual care	Ambulatory	AT + RT	24 weeks total, 2 Sessions per week, 60-min sessions	2880	Moderate	*Intervention:* 11 *Control:* 14	*Intervention:* 10 *Control:* 14	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 2.4 (1.0) *Control:* 2.9 (1.1) *in years	*Intervention:* 62.9 (12.1) *Control:* 66.9 (9.0)	*Intervention:* 63.7% *Control:* 21.4%	*NR*
Luft 2008	6MWT; 10MWT (fast); Peak VO_2	*Intervention:* Progressive task-repetitive treadmill exercise *Control:* Stretching	Ambulatory	AT	24 weeks total, 3 sessions per week, 40-mins per session	2880	Moderate	*Intervention:* 37 *Control:* 34	*Intervention:* 37 *Control:* 34	*Intervention:* 94.9% *Control:* 60.7%	NR	*Intervention:* 62.5 (36.0-88.9) *Control:* 44.6 (18.8-70.5) *mean (IQR)	*Intervention:* 63.2 (8.7) *Control:* 63.6 (10.0)	*Intervention:* 48.6% *Control:* 58.8%	*1* *Intervention:* 3.5±3 *Control: 3.6±2.9*
Mackay-Lyons 2013	6MWT; 10MWT (normal); Peak VO_2	*Intervention:* BWS treadmill *training* *Control:* Usual care	Ambulatory	AT	12 weeks total, 3-5 sessions per week, 60-mins per session	2160-3600	Moderate	*Intervention:* 24 *Control:* 26	*Intervention:* 24 *Control:* 26	*Intervention:* 91.7% *Control:* 88.5%	*Intervention:* 0% *Control:* 0%	*Intervention:* 23.3 (5.7) *Control:* 23.1 (4.4) *in days	*Intervention:* 61.5 (15.4) *Control:* 59.0 (12.7)	*Intervention:* 37.5% *Control:* 46.2%	*23* *Intervention:* 38% *Control: 42%*
Macko 2005	6MWT; 10MWT (normal); 10MWT (fast); Peak VO_2	*Intervention:* BWS treadmill training *Control:* Conventional therapy	Ambulatory	AT	24 weeks total, 3 sessions per week, 40-mins per session	2880	At least vigorous	*Intervention:* 32 *Control:* 29	*Intervention:* 32 *Control:* 29	*Intervention:* 78.0% *Control:* 69.0%	*Intervention:* 0% *Control:* 0%	*Intervention:* 35.0 (29.0) *Control:* 39.0 (59.0)	*Intervention:* 63.0 (10.0) *Control:* 64.0 (8.0)	*Intervention:* 31.3% *Control:* 27.5%	*17* *Intervention:* 11.3±0.4 *Control: 11.7±0.4*
Mainka 2018	10MWT (fast);	*Intervention:* Treadmill training *Control:* Neurodevelopmental treatment	Ambulatory	AT	4 weeks total, 5 sessions per week, 15-20min per session	300-400	Moderate	*Intervention:* 15 *Control:* 15	*Intervention:* 13 *Control:* 11	*Intervention:* 86.7% *Control:* 73.3%	NR	*Intervention:* 46.9 (23.3) *Control:* 36.0 (16.7)	*Intervention:* 65.5 (8.5) *Control:* 61.1 (8.6)	*Intervention:* 15.3% *Control:* 27.2%	*NR*
Mao 2015	10MWT (normal)	*Intervention:* BWS treadmill training *Control:* Overground gait training	Ambulatory	AT	3 weeks total, 5 Sessions per week, 30-min sessions	450	Moderate	*Intervention*: 12 *Control:* 12	*Intervention*: 12 *Control:* 12	*Intervention:* 80.0% *Control:* 85.7%	NR	*Intervention:* 49.3 (19.5) *Control:* 47.7 (16.8) *in days	*Intervention:* 59.6 (9.2) *Control:* 60.8 (10.7)	*Intervention:* 83.0% *Control:* 75.0%	*NR*

Middleton 2014	6MWT	*Intervention:* BWS treadmill training *Control:* Overground gait training	Ambulatory	AT	2 weeks total, 5 sessions per week, 60-mins per session	600	Moderate	*Intervention:* 23 *Control:* 20	*Intervention:* 19 *Control:* 19	*Intervention:* 85.2% *Control:* 87.0%	NR	*Intervention:* 50.4 (56.8) *Control:* 29.0 (23.9)	*Intervention:* 61.4 (15.7) *Control:* 60.7 (11.4)	*Intervention:* 39.1% *Control:* 20.0%	*NR*
Moore 2015	6MWT; 10MWT (normal); Peak VO_2; BBS	*Intervention:* Community-based exercise (includes stepping and walking) *Control:* Home stretching program	Ambulatory	AT + RT	19 weeks total, 3 sessions per week, 45-60-mins per session	2565-3420	Moderate	*Intervention:* 20 *Control:* 20	*Intervention:* 20 *Control:* 20	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 21.0 (34.0) *Control:* 16.0 (12.0)	*Intervention:* 68.0 (8.0) *Control:* 70.0 (11.0)	*Intervention:* 10.0% *Control:* 20.0%	*1* *Intervention:* 3.0±3 *Control: 2.0±2.0*
Mustafaoglu 2018	10MWT (normal); BBS	*Intervention 1:* BWS treadmill training *Intervention 2:* BWS treadmill training and conventional training *Control:* Conventional training	Ambulatory	AT	6 weeks total, 2 Sessions per week, 45-min sessions	540	Moderate	*Intervention 1:* 15 *Intervention 2:* 15 *Control:* 15	*Intervention 1:* 15 *Intervention 2:* 15 *Control:* 15	*Intervention 1:* 100% *Intervention 2:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention 1:* 12.0 (7.0-18.0) *Intervention 2:* 11.0 (4.0-28.0) *Control:* 12.5 (3.0-36.0) *median (range)	*Intervention 1:* 53.7 (11.6) *Intervention 2:* 52.8 (13.8) *Control:* 52.6 (14.7)	*Intervention 1:* 26.7% *Intervention 2:* 33.3% *Control:* 26.7%	*10* *Intervention:* 3.9±0.6 *Control: 3.6±0.6*
Nave 2019	6MWT; 10MWT (fast)	*Intervention:* BWS treadmill training *Control:* Relaxation	Ambulatory	AT	5 weeks total, 4 Sessions per week, 25-min sessions	500	Moderate	*Intervention:* 105 *Control:* 95	*Intervention:* 85 *Control:* 82	*Intervention:* 80.6% *Control:* 86.3%	*Intervention:* 21.0% *Control:* 9.5%	*Intervention:* 30.0 (17.0-39.0) *Control:* 27.0 (17.0-41.0) *median (IQR) *in days	*Intervention:* 69.0 (12.0) *Control:* 70.0 (11.0)	*Intervention:* 42.9% *Control:* 37.9%	*19* *Intervention:* 9(5-12) *Control: 7(5-11)*
Nilsson 2001	10MWT (normal); BBS	*Intervention:* BWS treadmill training *Control:* Physiotherapy	Ambulatory	AT	1-4 months total, 5 sessions per week, 30-mins per session MEDIAN OF 10 WEEKS	1,500	Moderate	*Intervention:* 36 *Control:* 37	*Intervention:* 36 *Control:* 37	*Intervention:* 77.8% *Control:* 86.5%	NR	*Intervention:* 22.0 (10.0–56.0) *Control:* 17.0 (8.0–53.0) *median (range) *in days	*Intervention:* 54.0 (24.0-67.0) *Control:* 56.0 (24.0-66.0) *median (range)	*Intervention:* 44.4% *Control:* 45.9%	*1* *Intervention:* 9.5 *Control: 8.0*
Ofori 2019	6MWT	*Intervention:* Cycle ergometer *Control:* Conventional physical therapy	Non-ambulatory	AT	8 weeks total, 3 sessions per week, 60-mins per session	1440	Moderate	*Intervention:* 10 *Control:* 10	*Intervention:* 10 *Control:* 10	Unclear	NR	*Intervention:* 3.5 (2.6) *Control:* 4.1 (3.0)	*Intervention:* 58.8 (8.3) *Control:* 62.4 (8.8)	NR	*24* *Intervention:* 2.8±0.6 *Control:* 2.9±0.7

Olawale 2011	6MWT; 10MWT (normal)	*Intervention:* Treadmill training *Control:* Conventional therapy	Ambulatory	AT	12 weeks total, 3 sessions per week, 60-mins per session	2160	Moderate	*Intervention:* 20 *Control:* 20	*Intervention:* 20 *Control:* 20	*Intervention:* 90.9% *Control:* 87.0%	NR	*Intervention:* 10.2 (6.9) *Control:* 10.3 (5.9)	*Intervention:* 56.8 (6.4) *Control:* 57.2 (5.9)	*Intervention:* 40.0% *Control:* 45.0%	*NR*
Outermans 2010	6MWT; 10MWT (fast); BBS	*Intervention:* High-intensity task-oriented training *Control:* Low-intensity physiotherapy	Ambulatory	AT + RT	4 weeks total, 3 sessions per week, 45-mins per session	540	At least vigorous	*Intervention:* 22 *Control:* 21	*Intervention:* 22 *Control:* 21	*Intervention:* 73.9% *Control:* 71.4%	*Intervention:* 0% *Control:* 0%	Intervention: 22.5 (8.2) Control: 23.5 (7.8) *in days	*Intervention:* 56.8 (8.6) *Control:* 56.3 (8.6)	*Intervention:* 13.6% *Control:* 19.0%	*NR*
Pang 2005	6MWT; Peak VO_2; BBS	*Intervention:* Fitness and mobility exercise program (walking and stepping) *Control:* Seated upper extremity program	Ambulatory	AT	19 weeks total, 3 sessions per week, 60-mins per session	3420	At least vigorous	*Intervention:* 32 *Control:* 31	*Intervention:* 32 *Control:* 31	*Intervention:* 93.6% *Control:* 96.8%	NR	Intervention: 5.2 (5.0) Control: 5.1 (3.6) *in years	Intervention: 65.8 (9.1) Control: 64.7 (8.4)	Intervention: 40.6% Control: 41.9%	NR
Peurala 2005	6MWT; 10MWT (normal)	*Intervention:* BWS treadmill training *Control:* Overground walking	Ambulatory	AT	3 weeks total, 7 sessions per week, 20-mins per session	420	Moderate	*Intervention:* 15 *Control:* 15	*Intervention:* 15 *Control:* 15	Unclear	NR	Intervention: 2.4 (2.6) Control: 4.0 (5.8) *in years	*Intervention:* 51.2 (7.9) *Control:* 52.3 (6.8)	*Intervention:* 13.3% *Control:* 26.7%	*25* *Intervention:* 44.0±7.3 *Control: 40.1±6.2*
Ploughman 2019	Peak VO_2	*Intervention:* BWS treadmill training *Control:* Physical activity	Ambulatory	AT	10 weeks total, 3 sessions per week, 50-70-mins per session	1500-2100	At least vigorous	*Intervention:* 25 *Control:* 27	*Intervention:* 25 *Control:* 26	*Intervention:* 83.3% *Control:* 90.0%	*Intervention:* 0% *Control:* 0%	*Intervention:* 38.4 (44.2) *Control:* 43.5 (36.1)	*Intervention:* 60.2 (12.8) *Control:* 66.5 (9.0)	*Intervention:* 36.0% *Control:* 25.9%	*1* *Intervention:* 4.2±4.2-5.5±3.5 *Control: 4.4±3.3-5.5±5.3*
Pohl 2002	10MWT (fast)	*Intervention 1:* Speed- dependent treadmill training *Intervention 2:* Progressive treadmill training *Control:* Conventional gait training	Ambulatory	AT	4 weeks total, 12 sessions total, 30-mins per session	1440	At least vigorous	*Intervention:* 40 *Control:* 20	*Intervention:* 40 *Control:* 20	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* > 1.0 month *Control:* > 1.0 month	*Intervention:* 57.7 (12.2) *Control:* 61.6 (10.6)	*Intervention:* 25.0% *Control:* 35.0%	*10* *Intervention:* 3.7±0.8 *Control: 3.9±0.7*
Potempa 1995	Peak VO_2	*Intervention:* Cycle ergometer *Control:* Passive exercise	Non-ambulatory	AT	10 weeks total, 3 sessions per week, 30-mins per session	900	Moderate	*Intervention:* 19 *Control:* 23	*Intervention:* 19 *Control:* 23	Unclear	NR	*Intervention:* > 6.0 months *Control:* > 6.0 months	NR	Intervention: 58% Control: 35%	11 *Intervention:* 172±9.3 *Control: 182±7.9*

Quaney 2009	Peak VO_2; BBS	*Intervention:* Stationary bicycle *Control:* Stretching	Non-ambulatory	AT	8 weeks total, 3 sessions per week, 45-mins per session	1080	Moderate	*Intervention:* 19 *Control:* 19	*Intervention:* 19 *Control:* 19	Unclear	NR	Intervention: 4.6 (3.2) Control: 5.1 (3.5) *in years	*Intervention:* 64.1 (12.3) *Control:* 59.0 (14.7)	*Intervention:* 47.4% *Control:* 63.2%	11 *Intervention:* 75.6±35 *Control:* 79.4±.54
Rimmer 2009	Peak VO_2	*Intervention:* Intensity-oriented exercise program (cycle and/or stepper) *Control:* Conventional therapy	Mixed	AT	14 weeks total, 3 sessions per week, 30-mins per session	1260	Moderate	*Intervention:* 18 *Control:* 18	*Intervention:* 14 *Control:* 13	*Intervention:* 77.8% *Control:* 72.2%	NR	*Intervention:* > 6.0 months *Control:* > 6.0 months	*Intervention:* 55.7 (12.6) *Control:* 63.7 (9.1)	*Intervention:* 66.7% *Control:* 55.6%	*NR*
Sandberg 2016	6MWT; 10MWT (fast)	*Intervention:* Group aerobic exercise (cycle ergometer) *Control:* No intervention	Non-ambulatory	AT	12 weeks total, 2 sessions per week, 60-mins per session	1440	At least vigorous	*Intervention:* 29 *Control:* 27	*Intervention:* 29 *Control:* 27	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	Intervention: 4.9 (5.8) Control: 6.3 (7.3) *in days	*Intervention:* 71.3(7.0) *Control:* 70.4 (8.1)	*Intervention:* 51.7% *Control:* 48.1%	*NR*
Serra 2019	Peak VO_2	*Intervention:* Treadmill exercise *Control:* Stretching	Ambulatory	AT	24 weeks total, 3 Sessions per week, 50-min sessions	3600	Moderate	*Intervention:*17 *Control:* 8	*Intervention:*17 *Control:* 8	Unclear	NR	*Intervention:* > 6.0 months *Control:* > 6.0 months	*Intervention:* 58.1 (4.9) *Control:* 61.5 (3.7)	*Intervention:* 18.0% *Control:* 25.0%	*NR*
Severinsen 2014	6MWT; 10MWT (fast); Peak VO_2	*Intervention:* High-intensity aerobic training (cycle ergometer) *Control:* Sham control	Non-ambulatory	AT	12 weeks total, 3 sessions per week, 60-mins per session	2160	At least vigorous	*Intervention:* 13 *Control:* 16	*Intervention:* 13 *Control:* 16	*Intervention:* 76.5% *Control:* 94.1%	NR	*Intervention:* 14.0 (11.0-29.0) *Control:* 16.0 (9.0-38.0) *median (range)	*Intervention:* 69.0 (50.0-80.0) *Control:* 66.0 (52.0-80.0) *median (range)	*Intervention:* 30.8% *Control:* 31.3%	6 *Intervention:* 28(13-33) *Control: 29(17-34)*
Srivastava 2016	10MWT (normal)	*Intervention:* Treadmill gait training *Control:* Overground task-oriented gait training	Ambulatory	AT	4 weeks total, 5 sessions per week, 30-mins per session	600	Moderate	*Intervention:* 30 *Control:* 15	*Intervention:* 25 *Control:* 15	*Intervention:* 93.3% *Control:* 86.7%	*Intervention:* 0% *Control:* 0%	Intervention: 416.9 (363.9) Control: 652.2 (579.0) *in days	*Intervention:* 46.1 (10.8) *Control:* 44.4 (12.3)	*Intervention:* 20.0% *Control:* 20.0%	25 *Intervention1:* 39.8±7.94 Intervention2: 39.6±7.7 *Control: 43.07±4.35*

Takatori 2012	10MWT (fast)	*Intervention:* Muscle strengthening, aerobic training (treadmill walking), and gait training *Control:* Standard rehabilitation program	Ambulatory	AT + RT	12 weeks total, 2 sessions per week, 120-mins per session	2880	Moderate	*Intervention:* 22 *Control:* 22	*Intervention:* 22 *Control:* 22	*Intervention:* 100% *Control:* 100%	NR	*Intervention:* > 6.0 months *Control:* > 6.0 months	*Intervention:* 66.0 (6.9) *Control:* 71.1 (10.1)	NR	13 *Intervention:* 90(80-95) *Control:* *92.5(85-100)*
Tang 2009	6MWT; Peak VO_2	*Intervention:* Individualized aerobic training on a semi-recumbent cycle ergometer *Control:* Conventional inpatient rehabilitation	Non-ambulatory	AT	Approx. 4-5 weeks, 3 sessions per week, 30-mins per session	360-450	Moderate	*Intervention:* 18 *Control:* 18	*Intervention:* 18 *Control:* 18	*Intervention:* 71.9% *Control:* 88.0%	*Intervention:* 0% *Control:* 0%	Intervention: 19.1 (3.8) Control: 14.9 (2.3) *in days	*Intervention:* 64.7 (3.6) *Control:* 65.7 (2.3)	*Intervention:* 38.9% *Control:* 38.9%	1 *Intervention:* 4.9±.5 *Control:* *4.5±.7*
Tang 2013	6MWT; Peak VO_2	*Intervention:* Aerobic exercise (overground walking, cycle ergometer, or stepper) *Control:* Balance and flexibility	Mixed	AT	24 weeks total, 3 sessions per week, 60-mins per session	4320	At least vigorous	*Intervention:* 25 *Control:* 25	*Intervention:* 22 *Control:* 25	*Intervention:* 88.0% *Control:* 100%	*Intervention:* 0% *Control:* 4.0%	Intervention: 4.3 (2.9) Control: 4.0 (3.0) *in years	*Intervention:* 65.9 (6.4) *Control:* 66.9 (7.8)	*Intervention:* 44.0% *Control:* 40.0%	1 *Intervention:* 2.0±2.6 *Control:* *1.0±1.5*
Tanne 2008	6MWT; 10MWT (fast)	*Intervention:* Supervised exercise-training program (treadmill, stair machine, or bicycle) *Control:* No exercise	Mixed	AT	12 weeks total, 2 Sessions per week, 45-min sessions	1080	Moderate	*Intervention:* 41 *Control:* 7	*Intervention:* 41 *Control:* 7	*Intervention:* 95.3% *Control:* 100%	*Intervention:* 2.4% *Control:* 0%	Intervention: 65.0 (37.0) Control: 93.0 (60.0) *in days	*Intervention:* 61.0 (10.0) *Control:* 58.0 (5.0)	*Intervention:* 7.3% *Control:* 28.6%	12 *Intervention:* 123±5 *Control:* *122±5*
Toledano-Zarhi 2011	6MWT	*Intervention:* Exercise-training program (treadmill, hand-bike, stationary bike) *Control:* Usual care	Mixed	AT	6 weeks total, 2 sessions per week, 35-55-mins per session	420-660	Moderate	*Intervention:* 14 *Control:* 14	*Intervention:* 14 *Control:* 14	*Intervention:* 92.9% *Control:* 100%	*Intervention:* 0% *Control:* 0%	Intervention: 11.0 (5.0) Control: 11.0 (4.0) *in days	*Intervention:* 65.0 (10.0) *Control:* 65.0 (12.0)	*Intervention:* 21.4% *Control:* 28.6%	8 *Intervention:* 92.9% *Control:* *64.3%*
Vanroy 2017	10MWT (normal); 10MWT (fast); Peak VO_2	*Intervention:* 3-month active cycling group and education *Control:* Passive mobilization therapy	Non-ambulatory	AT + RT	3 months total, 3 sessions per week, 30-mins per session	1080	At least vigorous	*Intervention:* 33 *Control:* 26	Intervention: 31 Control: 25	*Intervention:* 93.9% *Control:* 96.2%	*Intervention:* 0% *Control:* 0%	Intervention: 50.5 (19.8) Control: 48.5 (19.2) *in days	*Intervention:* 66.7 (8.8) *Control:* 63.8 (11.8)	*Intervention:* 39.3% *Control:* 30.7%	19 *Intervention:* 5(3-7) *Control:* *5(3-7)*

Yang 2014	6MWT; 10MWT (normal)	*Intervention:* Stationary bike *Control:* Conventional rehabilitation	Non-ambulatory	AT	4 weeks total, 5 Sessions per week, 30-mins per session	600	Moderate	*Intervention:* 15 *Control:* 15	*Intervention:* 15 *Control:* 15	Intervention: 93.8% Control: 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 11.1 (8.1) *Control:* 11.1 (9.7)	*Intervention:* 53.9 (10.5) *Control:* 54.5 (8.0)	*Intervention:* 40.0% *Control:* 13.3%	6 *Intervention:* 20.5±10.2 *Control:* *24.1±7.2*
Yeh 2019	6MWT	*Intervention:* Aerobic CYCLE exercise (stationary bike) and cognitive training *Control:* Usual care	Non-ambulatory	AT	12-18 weeks total, 2-3 Sessions per week, 30-mins per session	720-1620	Moderate	*Intervention:* 15 *Control:* 15	*Intervention:* 15 *Control:* 15	*Intervention:* 100% *Control:* 100%	*Intervention:* 0% *Control:* 0%	*Intervention:* 47.8 (11.5) *Control:* 94.3 (40.8)	*Intervention:* 50.6 (4.0) *Control:* 60.2 (3.1)	*Intervention:* 46.7% *Control:* 13.3%	26 *Intervention:* 4.73(1.35) *Control:* *4.07(0.8)*
Zedlitz 2012	6MWT	*Intervention:* Cognitive therapy and graded activity training (treadmill) *Control:* Cognitive therapy	Ambulatory	AT + RT	12 weeks total, 1-2 Sessions per week, 2-hour sessions	720-1440	At least vigorous	*Intervention:* 38 *Control:* 45	*Intervention:* 38 *Control:* 45	*Intervention:* 89.5% *Control:* 86.7%	NR	Intervention: 3.3 (3.9) Control: 4.4 (4.2) *in years	*Intervention:* 54.8 (9.1) *Control:* 55.6 (8.8)	*Intervention:* 44.7% *Control:* 51.1%	*NR*
Intervention-Only Studies															
Alabdulwahab 2015	10MWT (normal); 10MWT (fast)	Task-oriented exercise on treadmill	Ambulatory	AT	4 weeks total, 3-4 Sessions per week, 60-mins per session	720-960	Moderate	13	13	100%	NR	> 6.0 months	45.3 (12.3)	NR	NR
Andersen 2011	6MWT; 10MWT (fast)	Strength training with near-maximal BWS treadmill training and other aerobic activities (cycling)	Mixed	AT + RT	12 weeks total, 5 Sessions per week, 90-mins per session	5400	At least vigorous	11	11	Unclear	NR	1.0 (0.2) *in years	51.0 (3.9)	18.2%	NR
Askim 2014	6MWT; Peak VO_2	High-intensity aerobic interval training	Ambulatory	AT	6 weeks total, 2 sessions per week, 40-50mins per session	480-600	At least vigorous	15	14	93.3%	20.0%	5.8 (1.7)	70.0 (7.7)	35.7%	25 55.3±3.3
Awad 2015	6MWT	High-intensity locomotor training	Ambulatory	AT	12 weeks total, 3 Sessions per week, 36 mins per session	1296	At least vigorous	44	29	Unclear	NR	1.7 (0.7) *median (IQR) *in years	60.1 (2.5) *median (IQR)	38.6%	NR

Barbeau 2003	10MWT (normal)	*Intervention 1:* Locomotor training with BWS *Intervention 2:* Locomotor training without BWS	Ambulatory	AT	6 weeks total, 4 Sessions per week, 20-mins per session	480	Moderate	*Intervention 1:* 50 *Intervention 2:* 50	*Intervention 1:* 29 *Intervention 2:* 23	*Intervention 2:* 86.0% *Intervention 2:* 72.0%	NR	*Intervention 1:* 68.0 (126.5) *Intervention 2:* 78.4.0 (30.0) *in days	*Intervention 1:* 66.5 (12.8) *Intervention 2:* 66.7 (10.1)	*Intervention 1:* 38.0% *Intervention 2:* 44.0%	*27* *Intervention1 24.5±12.1* *Intervention2 22.4±14.7*
Batcho 2013	6MWT; BBS	Regular brisk walking	Ambulatory	AT	3 months total, 3 sessions per week	Unclear	Moderate	34	34	81.8%	2.9%	37.7 (31.7)	58.0 (11.0)	29.4%	28 56.5(37-74)
Betschart 2018	6MWT; 10MWT (normal); 10MWT (fast);	Repeated split-belt treadmill walking	Ambulatory	AT	2-3 weeks total, 6 sessions total, 20-mins per session	240-360	Moderate	12	12	83.3%	8.3%	25.1 (23.5)	53.3 (8.7)	16.6%	2 6±1.2
Billinger 2012	Peak VO_2	Aerobic exercise intervention	Unclear	AT	8 weeks total, 3 Sessions per week, 20-30-mins per session	480-720	At least vigorous	10	9	90.0%	0%	68.6 (40.1) *in days	61.2 (4.7)	40.0%	6 27.4±8.8
Blanchet 2016	Peak VO_2	Aerobic training (treadmill or cycling)	Mixed	AT	8 weeks total, 2 sessions per week, 20-30-mins per session	320-480	At least vigorous	14	13	100%	0%	51.5 (38.2)	61.9 (9.9)	35.7%	2 5.31±1.38
Boyne 2016	6MWT; 10MWT (normal); 10MWT (fast); Peak VO_2	*Intervention 1:* High-intensity interval training *Intervention 2:* Moderate- intensity continuous aerobic training	Ambulatory	AT	4 weeks total, 3 sessions per week, 25 mins per session	300	*intervention 1:* At least vigorous *Intervention 2:* Moderate	*Intervention 1:* 11 *Intervention 2:* 5	*Intervention 1:* 11 *Intervention 2:* 5	*Intervention 1:* 84.6% *Intervention 2:* 100%	*Intervention 1:* 0% *Intervention 2:* 0%	*Intervention 1:* 3.8 (2.9) *Intervention 2:* 6.3 (2.0) *in years	*Intervention 1:* 59.0 (9.0) *Intervention 2:* 57.0 (12.0)	*Intervention 1:* 36.4% *Intervention 2:* 60.0%	*6* *Intervention1: 24.2±4.8* *Intervention2" 23.2±7.3*
Broderick 2019	6MWT; 10MWT (normal)	*Intervention 1:* Mirror therapy and treadmill training *Intervention 2:* Treadmill training	Ambulatory	AT	4 weeks total, 3 sessions per week, 30-mins per session	360	Moderate	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 15 *Intervention 2:* 15	Unclear	NR	*Intervention 1:* 75.1 (88.0) *Intervention 2:* 34.3 (30.6)	*Intervention 1:* 61.2 (9.5) *Intervention 2:* 67.1 (19.5)	*Intervention 1:* 31.3% *Intervention 2:* 6.7%	*6* *Intervention1: 23.53±6.12* *Intervention2: 22.53±7.58*

Carda 2013	6MWT; 10MWT (normal)	*Intervention 1:* Physical therapy and treadmill with ascending slope (UP) *Intervention 2:* Physical therapy and treadmill with descending slope (DOWN)	Ambulatory	AT	6 weeks total, 5 sessions per week, 75-mins per session	2250	Moderate	*Intervention 1:* 19 *Intervention 2:* 19	*Intervention 1:* 15 *Intervention 2:* 15	100%	*Intervention 1:* 0% *Intervention 2:* 0%	*Intervention 1:* 823.3 (878) *Intervention 2:* 970.4 (1271) *in days	*Intervetion 1:* 58.3 (8.4) *Intervention 2:* 54.2 (12.5)	NR	13 Intervention1: 84.2±12.2 Intervention2: 87.4±10.2
Chen 2014	BBS	*Intervention 1:* Turning-based treadmill training *Intervention 2:* Regular treadmill training	Ambulatory	AT	4 weeks total, 3 sessions per week, 40-min per session	480	Moderate	*Intervention 1:* 15 *Intervention 2:* 16	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 100% *Intervention 2:* 93.8%	*Intervention 1:* 20.0% *Intervention 2:* 13.3%	*Intervention 1:* 2.9 (1.8) *Intervention 2:* 2.2 (2.0) *in years	*Intervention 1:* 53.7 (11.1) *Intervention 2:* 54.8 (8.1)	*Intervention 1:* 13.3% *Intervention 2:* 6.6%	*29 Intervention1: 4.3±0.7 Intervention2: 4.5±0.8*
Cheng 2019	6MWT; Peak VO_2; BBS	Cycle ergometer	Non-ambulatory	AT	8 weeks total, 3 Sessions per week, 40-min sessions	960	At least vigorous	*Group 1:* 9 *Group 2:* 9	*Group 1:* 9 *Group 2:* 9	90.0%	0%	*Group 1:* 39.7 (27.6) *Group 2:* 36.5 (29.1)	*Group 1:* 58.8 (7.1) *Group 2:* 56.8 (10.1)	*Group 1:* 22.2% *Group 2:* 22.2%	*8 Group1: 2.2±0.4 Group2: 1.8±0.4*
Cho 2014	BBS	Intervention 1: Treadmill training based real-world video recording Intervention 2: Treadmill walking training	Ambulatory	AT	6 weeks total, 3 sessions per week, 30-mins total	540	Moderate	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 15 *Intervention 2:* 15	Unclear	NR	*Intervention 1:* 414.5 (150.4) *Intervention 2:* 460.3 (186.8) * in days	*Intervention 1:* 65.9 (5.7) *Intervention 2:* 63.5 (5.5)	*Intervention 1:* 53.3% *Intervention 2:* 46.7%	*16 Intervention1: 46.7% Intervention2: 40%*
Choi 2015	10MWT (normal)	Stepper exercise	Not ambulatory nor non-ambulatory	AT	6 weeks total, 3 sessions per week, 30-mins total	540	Unclear	13	13	100%	NR	13.8 (7.0)	71.9 (6.92)	76.9%	NR
Choi 2017	6MWT	*Intervention 1:* Whole body vibration and treadmill training *Intervention 2:* Treadmill training	Ambulatory	AT	6 weeks total, 3 sessions per week, 20-min per session	360	Moderate	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 93.3% *Intervention 2:* 100%	NR	*Intervention 1:* 25.1 (9.3) *Intervention 2:* 22.5 (10.3)	*Intervention 1:* 51.9 (8.4) *Intervention 2:* 53.7 (7.4)	*Intervention 1:* 46.6% *Intervention 2:* 26.6%	*NR*

Chua 2015	6MWT; 10MWT (normal); BBS	Training on variable automated speed and sensing treadmill	Ambulatory	AT	4 weeks total, 3 sessions per week, 60-min per session	720	Moderate	10	10	100%	0%	2.2 (1.5) *in years	55.5 (9.8)	20.0%	NR
Combs 2012	10MWT (normal)	BWS treadmill training	Ambulatory	AT	8 weeks total, 3 sessions per week, 20-mins per session	480	Moderate	19	15	84.2%	NR	3.8 (3.2) *in years	59.9 (11.2)	73.7%	NR
Daly 2011	6MWT	BWS treadmill training without stimulation	Ambulatory	AT	12 weeks total, 4 Sessions per week, 90-min sessions	4320	Moderate	24	24	88.9%	0%	> 6.0 months	62.0	29.2%	30 30(8.5)
Danks 2016	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention 1:* Fast walking *Intervention 2:* Fast walking plus step activity monitoring	Ambulatory	AT	12 weeks total, 3 sessions per week, 30-mins per session	1080	At least vigorous	*Intervention 1:* 17 *Intervention 2:* 17	*Intervention 1:* 14 *Intervention 2:* 13	*Intervention 1:* 82.3% *Intervention 2:* 76.5%	*Intervention 1:* 0% *Intervention 2:* 0%	*Intervention 1:* 50.8 (44.1) *Intervention 2:* 29.4 (21.4)	*Intervention 1:* 58.2 (12.4) *Intervention 2:* 59.1 (8.7)	*Intervention 1:* 42.9% *Intervention 2:* 46.2%	*6 Intervention1: 18.6±4.6 Intervention2: 16.8±7.1*
Dawes 2008	10MWT (normal)	Partial BWS treadmill training	Ambulatory	AT	4 weeks total, 3 Sessions per week, 20-mins per session	240	Moderate	18	18	100%	NR	29.0 (13.0-62.0) *median (IQR)	59.0 (13.0)	44.4%	31 13(11-14)
Dite 2015	6MWT	Multimodal exercise (cycling, treadmill, overground walking)	Mixed	AT + RT	12 weeks total, 3 sessions per week (30-138 minutes of walking per week) and 58 to 153 minutes on RT	>1,000	Moderate	6	6	100%	16.7%	38.6	56.8	16.7%	NR
Druzbicki 2018	10MWT (normal)	BWS treadmill training without biofeedback	Ambulatory	AT	5 weeks total, 3 Sessions per week, 30-min sessions	450	Moderate	15	15	100%	0%	8.0 (5.0-19.0) *mean (range) *in days	61.8 (11.1)	46.7%	NR

Dunn 2017	6MWT; 10MWT (normal); Peak VO_2	HowFITTS	Ambulatory	AT + RT	12 weeks total (in protocol paper) meeting the guidelines at least 30 minutes per day moderate intensity most days of the week.	1800	Unclear	20	19	Unclear	5.0%	5.3 (3.5)	60.1 (19.2)	60.0%	21 90%
Enzinger 2009	10MWT (normal)	BWS treadmill training	Ambulatory	AT	4 weeks total, 3 Sessions per week, 45-min sessions	540	Moderate	18	18	Unclear	NR	37.3 (36.8)	59.8 (13.5)	44.4%	24 4.4±0.6
Fishbein 2019	10MWT (normal); BBS	Single task treadmill walking	Ambulatory	AT	4 weeks total, 2 Sessions per week, 20-min sessions	160	At least vigorous	11	11	100%	NR	9.6 *in years	66.0 (9.4) *mean	36.4%	NR
Franciulli 2019	BBS	*Intervention 1:* Treadmill training *Intervention 2:* Pool aerobic training	Intervention 1: Ambulatory Intervention 2: Non-ambulatory	AT	9 weeks total, 3 Sessions per week, 40-min sessions	1080	Moderate	*Intervention 1:* 6 *Intervention 2:* 6	*Intervention 1:* 6 *Intervention 2:* 6	Unclear	NR	*Intervention 1:* 56.7 (32.9) *Intervention 2:* 67.7 (51.1)	*Intervention 1:* 54.8 (7.7) *Intervention 2:* 61.67 (10.02)	*Intervention 1:* 83.3% *Intervention 2:* 83.3%	*11* *Intervention1: 144±38.02* *Intervention2: 140±10.5*
Gama 2015	BBS	*Intervention 1:* BWS treadmill training with inclination *Intervention 2:* BWS treadmill training without inclination	Ambulatory	AT	4 weeks total, 3 sessions per week, 20-min per session	240	At least vigorous	*Intervention 1:* 14 *Intervention 2:* 14	*Intervention 1:* 14 *Intervention 2:* 14	100%	NR	*Intervention 1:* 35.8 (37.0) *Intervention 2:* 35.4 (26.9)	*Intervention 1:* 52.9 (9.5) *Intervention 2:* 57.6 (8.2)	NR	1 Intervention1: 4.71±2.16 Intervention2: 5.14±4.29
Gjellesvik 2012	6MWT; 10MWT (fast); Peak VO_2	Uphill treadmill training	Ambulatory	AT	6 weeks total, 2 sessions per week, 45-min per session	540	At least vigorous	8	8	100%	0%	7.2 (7.5) *in years	48.9 (10.6)	50.0%	NR

Graham 2018	6MWT; 10MWT (normal); 10MWT (fast); BBS	Hands-free BWS treadmill training	Ambulatory	AT	6 weeks total, 3 sessions per week 30-mins per session	540	At least vigorous	*Group 1:* 19 *Group 2:* 20	*Group 1:* 15 *Group 2:* 14	*Group 1:* 79.0% *Group 2:* 70.0%	*Group 1:* 0% *Group 2:* 0%	*Group 1:* 47.7 (64.7) *Group 2:* 52 (71.4)	*Group 1:* 60.3 (12.8) *Group 2:* 48.9 (14.4)	*Group 1:* 53.3% *Group 2:* 42.9%	*32* *Group1: 53.3%* *Group2: 57.1%*
Grau-Pellicer 2019	10MWT (normal); 10MWT (fast);	Multimodal rehabilitation program	Mixed	AT	12 weeks total, 2 sessions per week, 60-min per session	1440	Moderate	25	25	80.7%	0%	7.0 (5.6)	66 (11)	23.1%	33 4%
Han 2018	6MWT; Peak VO_2	*Intervention 1:* Aquatic treadmill exercise *Intervention 2:* Land-based exercise	Non-ambulatory	AT	6 weeks total, 5 sessions per week, 30-mins total	9000	At least vigorous	*Intervention 1:* 10 *Intervention 2:* 10	*Intervention 1:* 10 *Intervention 2:* 10	100%	*Intervention 1:* 0% *Intervention 2:* 0%	*Intervention 1:* 35.3 (20.7) *Intervention 2:* 37.5 (25.8) *in days	*Intervention 1:* 59.4 (14.3) *Intervention 2:* 62.4 (12.7)	*Intervention 1:* 40.0% *Intervention 2:* 40.0%	*34* *Intervention1: 78.3±14.87* *Intervention2: 83.5±10.8*
Hesse 1994	10MWT (fast)	BWS treadmill training	Ambulatory	AT	4 weeks total, 5 sessions per week, 30-mins per session	600	Moderate	9	9	Unclear	NR	4.2 (3.7)	60.6 (11.1)	33.3%	NR
Hesse 1995	10MWT (fast)	BWS treadmill training	Ambulatory	AT	3 weeks total, 5 Sessions per week, 30-min sessions	450	Moderate	7	7	Unclear	NR	60.3 (8.7)	176.8 (96.5) days	14.3%	NR
Holleran 2014	6MWT	Stepping practice in variable contexts (task and environment)	Ambulatory	AT + RT	10 weeks total, 5 sessions per week, 60-mins per session	3000	At least vigorous	*Chronic:* 10 *Subacute:* 12	*Chronic:* 10 *Subacute:* 12	*Chronic:* 76.9% *Subacute:* 100%	*Total:* 22.7%	*Chronic:* 42.0 (58.0) *Subacute:* 3.2 (1.8)	*Chronic:* 55.0 (8.8) *Subacute:* 52.0 (13.0)	*Chronic:* 40.0% *Subacute:* 33.3%	*NR*
Hornby 2008	6MWT; 10MWT (normal); 10MWT (fast); BBS	Therapist-assisted locomotor training	Ambulatory	AT	12 sessions in total, 30-min sessions	360	Moderate	24	24	58.9%	NR	73.0 (87.0)	57.0 (11.0)	37.5%	NR

Hsu 2020	Peak VO_2	*Intervention 1:* High-intensity interval training *Intervention 2:* Moderate- intensity continuous training	Non-ambulatory	AT	36 sessions total, 30-min sessions	1080	*Intervention 1:* At least vigorous *Intervention 2:* Moderate	*Intervention 1:* 10 *Intervention 2:* 13	*Intervention 1:* 10 *Intervention 2:* 13	*Intervention 1:* 76.9% *Intervention 2:* 86.7%	*Intervention 1:* 0% *Intervention 2:* 0%	*Intervention 1:* 38.5 (27.1) *Intervention 2:* 28.8 (42.1)	*Intervention 1:* 58.5 (12.2) *Intervention 2:* 53.1 (11.4)	*Intervention 1:* 20.0% *Intervention 2:* 7.7%	*35 Intevention1: 60% Intervention2: 53%*
In 2017	10MWT (fast)	*Intervention 1:* Treadmill training with Thera-Band *Intervention 2:* Regular treadmill training	Ambulatory	AT	4 weeks total, 5 sessions per week, 30 min per session	600	Moderate	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 100% *Intervention 2:* 100%	NR	*Intervention 1:* 6.1 (2.5) *Intervention 2:* 6.8 (2.1)	*Intervention 1:* 53.2 (9.3) *Intervention 2:* 53.5 (12.1)	*Intervention 1:* 46.7% *Intervention 2:* 40.0%	*29 Intervention1: 2.87±.52 Intervention2: 2.8±2.23*
Janssen 2008	6MWT; BBS	Cycling without electrical stimulation evoking muscle contractions	Non-ambulatory	AT	6 weeks total, 2 Sessions per week, 30-min sessions	360	Moderate	6	6	Unclear	0%	18.3 (9.9)	55.3 (10.4)	50.0%	10 4.7±0.5
Jeong 2016	6MWT; 10MWT (fast); BBS	*Intervention 1:* Treadmill walking training with obstacle-crossing *Intervention 2:* Treadmill walking training	Ambulatory	AT	4 weeks total, 5 sessions per week, 30 min per session	600	Moderate	*Intervention 1:* 15 *Intervention 2:* 14	*Intervention 1:* 15 *Intervention 2:* 14	*Intervention 1:* 100% *Intervention 2:* 93.3%	NR	*Intervention 1:* 9.2 (2.3) *Intervention 2:* 10.0 (2.9)	*Intervention 1:* 9.2 (2.3) *Intervention 2:* 10.0 (2.9)	*Intervention 1:* 33.3% *Intervention 2:* 57.1%	*21 Intervention1: 33.3% Intervention2: 42.9%*
Jorgensen 2010	6MWT; 10MWT (fast)	High-intensity, BWS treadmill training, progressive resistance strength training, and aerobic exercise	Ambulatory	AT + RT	12 weeks total, 5 sessions per week, 90 min per session	5400	At least vigorous	14	14	Unclear	NR	24.6 (23.1)	60.4 (5.7)	7.1%	NR
Kang 2016	6MWT; 10MWT (fast); BBS	*Intervention 1:* Nordic treadmill training *Intervention 2:* Treadmill training	Ambulatory	AT	6 weeks total, 5 sessions per week, 30-mins per session	900	Moderate	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 15 *Intervention 2:* 15	Unclear	NR	*Intervention 1:* 11.8 (4.2) *Intervention 2:* 11.6 (3.3)	*Intervention 1:* 57.4 (8.0) *Intervention 2:* 57.4 (6.8)	*Intervention 1:* 46.7% *Intervention 2:* 40.0%	*6 Intervention1: 24.8±4.34 Intervention2: 25±1.66*

Kim 2017	6MWT; 10MWT (normal)	*Intervention 1:* Progressive backward BWS treadmill training *Intervention 2:* Treadmill training	Ambulatory	AT	4 weeks in total, 5 sessions a week, 30-min per session	600	At least vigorous	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 88.2% *Intervention 2:* 83.3%	NR	*Intervention 1:* 10.9 (3.7) *Intervention 2:* 11.3 (4.1)	*Intervention 1:* 48.3 (16.1) *Intervention 2:* 50.7 (13.5)	*Intervention 1:* 26.7% *Intervention 2:* 53.3%	*21* *Intervention1: 73.2%* *Intervention2: 60%*
Kim 2018	6MWT; 10MWT (normal)	*Intervention 1:* Treadmill training with lower-leg taping *Intervention 2:* Treadmill training	Ambulatory	AT	6 weeks total, 5 sessions per week, 50-mins per session	1500	Moderate	*Intervention 1:* 14 *Intervention 2:* 13	*Intervention 1:* 14 *Intervention 2:* 13	Unclear	NR	*Intervention 1:* 20.2 (4.0) *Intervention 2:* 20.5 (3.1)	*Intervention 1:* 51.4 (2.6) *Intervention 2:* 51.5 (2.9)	Intervention 1: 42.9% Intervention 2: 46.2%	NR
Kim 2018	10MWT (normal); 10MWT (fast)	*Intervention 1:* Dual task gait treadmill training *Intervention 2:* Treadmill gait training	Ambulatory	AT	4 weeks total, 5 Sessions per week, 30-min sessions	600	Moderate	*Intervention 1:* 13 *Intervention 2:* 13	*Intervention 1:* 13 *Intervention 2:* 13	*Intervention 1:* 86.7% *Intervention 2:* 86.7%	NR	*Intervention 1:* 12.6 (3.5) *Intervention 2:* 11.5 (3.8)	*Intervention 1:* 52.6 (9.8) *Intervention 2:* 56.2 (10.8)	*Intervention 1:* 38.5% *Intervention 2:* 46.2%	*NR*
Kostka 2017	6MWT	Multi-modal exercise rehabilitation program (bicycle, treadmill, gait training)	Mixed	AT + RT	3 weeks total, 6 sessions per week, 60 min per session	1080	Moderate	31	31	Unclear	NR	26.7 (38.2)	60.7 (12.7)	54.8%	NR
Lam 2010	6MWT; 10MWT (normal); 10MWT (fast); Peak VO_2	Treadmill exercise	Ambulatory	AT	24 or 12 weeks total, 3 sessions per week, 40 min per session	1440 or 2880	At least vigorous	52	52	Unclear	NR	59.0 (66.9)	66.8 (7.9)	34.6%	26 4.08(.35)
Lau 2011	10MWT (fast); BBS	*Intervention 1:* Speed-dependent treadmill training *Intervention 2:* Steady treadmill training	Ambulatory	AT	2.5 weeks total, 5 sessions per week, 30 min per session	375	At least vigorous	*Intervention 1:* 15 *Intervention 2:* 15	*Intervention 1:* 13 *Intervention 2:* 13	*Intervention 1:* 86.7% *Intervention 2:* 86.7%	NR	*Intervention 1:* 12.9 (5.3) *Intervention 2:* 12.7 (5.7) *in days	*Intervention 1:* 69.5 (11.1) *Intervention 2:* 72.1 (9.2)	*Intervention 1:* 26.7% *Intervention 2:* 33.3%	NR
Lee 2013	6MWT; Peak VO_2	Ergometer	Non-ambulatory	AT	4 weeks total, 5 sessions per week, 30 min per session	600	Moderate	8	8	Unclear	NR	57.4 (34.6) *in days	63.2 (14.1)	50.0%	34 83.38±10.23

Lee 2015	6MWT; 10MWT (fast)	*Intervention 1:* Progressive treadmill training *Intervention 2:* High speed treadmill training	Ambulatory	AT	5 weeks total, 4 sessions per week, 30 min per session	600	Intervention 1: At least vigorous Intervention 2: Moderate	*Intervention 1:* 31 *Intervention 2:* 30	*Intervention 1:* 31 *Intervention 2:* 30	*Intervention 1:* 86.1% *Intervention 2:* 83.3%	NR	*Intervention 1:* 40.9 (8.7) *Intervention 2:* 34.8 (4.5) *in days	*Intervention 1:* 65.5 (4.4) *Intervention 2:* 63.2 (8.2)	*Intervention 1:* 38.7% *Intervention 2:* 56.7%	NR
Lee 2017	10MWT (normal); BBS	Cycling and gait training	Mixed	AT	6 weeks total, 3 sessions per week, 30-mins per session	540	Unclear	8	8	Unclear	NR	227.1 (88.5) *in days	53.9 (12.7)	50.0%	34 62.6±20.4
Lee 2018	Peak VO_2; BBS	*Intervention 1:* Aquatic therapy *Intervention 2:* Land-based aerobic exercise (upper- and lower-body ergometer)	*Intervention 1:* Non-ambulatory *Intervention 2:* Ambulatory	AT	4 weeks total, 5 sessions per week, 30-mins per session	600	Intervention 1: Moderate Intervention 2: At least vigorous	*Intervention 1:* 18 *Intervention 2:* 14	*Intervention 1:* 18 *Intervention 2:* 14	*Intervention 1:* 94.7% *Intervention 2:* 77.8%	*Intervention 1:* 0% *Intervention 2:* 0%	*Intervention 1:* 30.4 (21.9) *Intervention* 2: 29.2 (19.9) *in days	*Intervention 1:* 57.6 (14.0) *Intervention 2:* 63.7 (11.4)	*Intervention 1:* 52.6% *Intervention 2:* 44.4%	*34* *Intervention1: 73.83±20.64* *Intervention2: 69.36±17.5*
Lu 2017	BBS	BWS treadmill training	Ambulatory	AT	8 weeks total, 5 Sessions per week, 20-min sessions	800	Unclear	30	30	Unclear	NR	28.5 (12.0-95.3) *median (IQR) *in days	58.1 (13.9)	23.3%	NR
Macko 1997	Peak VO_2	Low-intensity aerobic exercise using a graded treadmill	Ambulatory	AT	24 weeks total, 3 Sessions per week, 40-min sessions	2880	Moderate	9	8	100%	0%	3.0 (2.4) *in years	67.0 (8.4)	NR	NR
Macko 2001	Peak VO_2	Treadmill exercise	Ambulatory	AT	24 weeks total, 3 Sessions per week, 40-min sessions	2880	Moderate	19	19	82.6%	0%	28.0 (26.0)	67.0 (8.0)	21.1%	NR
Madhavan 2019	6MWT; 10MWT (normal); 10MWT (fast)	High-intensity interval training on treadmill	Ambulatory	AT	4 weeks total, 3 Sessions per week, 40-mins total	480	At least vigorous	16	16	100%	0%	6.4 (4.5)	57.4 (9.8)	37.5%	6 21.19±5.26

Marzolini 2013	6MWT; Peak VO_2	Aerobic (treadmill, walking or cycling) and resistance exercise	Mixed	AT + RT	24 weeks total, 5 sessions per week, 90-mins per session	8640	Moderate	41	41	91.0%	NR	18.5 (33.8)	63.6 (13.5)	26.8%	2 4.9±1.0
Marzolini 2014	Berg 6MWT	Aerobic (treadmill, walking or cycling) and resistance exercise	Mixed	AT + RT	24 weeks total, 5 sessions per week, 90-mins per session	8640	Moderate	77 75	77 75	92%	0%	29.5±30.9 29.3±31.1	64±12.7 63.8±12.6	29.2%	2 5.0±1.2
Marzolini 2018	6MWT; Peak VO_2	*Intervention 1:* Aerobic (walking, cycling) and resistance training *Intervention 2:* Aerobic (walking, cycling) training	Mixed	AT + RT	24 weeks total, 5 sessions per week	Both interventions: 3,600	At least vigorous	*Intervention 1:* 33 *Intervention 2:* 35	*Intervention 1:* 33 *Intervention 2:* 35	*Intervention 1:* 91.7% *Intervention 2:* 94.6%	*Intervention 1:* 0% *Intervention 2:* 0%	*Intervention 1:* 14.6 ± 15.5 *Intervention 2:* 9.3 ± 5.7	*Intervention 1:* 61.7 ± 10.0 *Intervention 2:* 65.6 ± 13.2	*Intervention 1:* 33.3% *Intervention 2:* 37.1%	*1* *Intervention 2.89±2.1* *Intervention 2.18±1.6*
Munari 2018	6MWT; 10MWT (fast); Peak VO_2	*Intervention 1:* High-intensity treadmill training *Intervention 2:* Low-intensity treadmill training	Ambulatory	AT	3 months total, 3 sessions per week, 50-60-mins per session	1800-2160	At least vigorous	*Intervention 1:* 8 *Intervention 2:* 7	*Intervention 1:* 8 *Intervention 2:* 7	*Intervention 1:* 100% *Intervention 2:* 87.5%	*Intervention 1:* 0% *Intervention 2:* 0%	Intervention 1: 5.2 (2.9) Intervention 2: 6.4 (3.8) *in years	*Intervention 1:* 61.0 (5.8) *Intervention 2:* 62.0 (11.3)	*Intervention 1:* 12.5% *Intervention 2:* 0%	*13* *Intervention1: 95±5.98* *Intervention2: 96.43±3.78*
Patterson 2008	6MWT; 10MWT (normal); Peak VO_2	Treadmill aerobic exercise	Ambulatory	AT	24 weeks total, 3 sessions per week, 20-40-mins per session	1440-2880	At least vigorous	39	39	Unclear	NR	20.5 (64.0)	64.0 (8.0)	35.9%	NR
Plummer 2007	6MWT; 10MWT (normal); 10MWT (fast); BBS	BWS treadmill training and overground training	Ambulatory	AT	12 weeks total, 3 sessions per week, 30-mins per session	1080	Moderate	7	6	85.7%	0%	5.1 (1.2)	54.7 (15.4)	57.1%	6 20
Regan 2019	6MWT	Neurological exercise training program (NExT)	Ambulatory	AT + RT	19 weeks total, 2-5 Sessions per week, 20-60 mins per session	760-5700	Moderate	5	5	100%	0%	6.4 (3.5) *in years	66.0 (8.3)	20.0%	NR

Rimmer 2000	Peak VO_2	Cardiovascular (treadmill, cycling, stepper, and/or elliptical), strength and flexibility training	Mixed	AT + RT	12 weeks total, 3 sessions per week, 60-mins per session (AT=30. RT=20, Flex=10 mins) JUST AT = 1,080	2160	At least vigorous	35	35	Unclear	8.6%	> 6.0 months	53.2 (8.3)	74.3%	NR
Robertson 2017	Peak VO_2	Treadmill walking, stationary cycling and overground walking	Mixed	AT + RT	6 months total, 5 sessions per week, 20-60 mins per session	600-1800	At least vigorous	8	4	57.1%	NR	5.0 (3.0)	67.0 (11.0)	25.0%	NR
Ryan 2019	Peak VO_2	Treadmill training	Ambulatory	AT	24 weeks total, 3 Sessions per week, 40-min sessions	2880	At least vigorous	5	5	Unclear	NR	> 6.0 months	NR	NR	NR
Shin 2015	6MWT	*Intervention 1:* Treadmill gait training with arm swing *Intervention 2:* Treadmill gait training without arm swing	Ambulatory	AT	4 weeks total, 3 sessions per week, 30-mins per session	360	Moderate	*Intervention 1:* 10 *Intervention 2:* 10	*Intervention 1:* 10 *Intervention 2:* 10	Unclear	NR	*Intervention 1:* 17.3 (14.5) *Intervention 2:* 18.7 (6.9)	*Intervention 1:* 51.5 (11.9) *Intervention 2:* 55.2 (9.5)	*Intervention 1:* 15.0% *Intervention 2:* 10.0%	*NR*
Strømmen 2016	10MWT (fast); BBS	Intense treadmill training	Ambulatory	AT	30 days total, 5 sessions per week, 60-min total (2, 30-min sessions a day)	9000	Moderate	20	20	80.0%	14.7%	41.0 (27.0-49.0) *mean (IQR) *in hours	66.0 (8.0)	45%	*19 6(3-8)*

Sullivan 2007	6MWT; 10MWT (normal); 10MWT (fast)	*Intervention 1:* BWS treadmill training and upper-extremity ergometry *Intervention 2:* Resistive leg cycling and upper-extremity ergometry *Intervention 3:* BWS treadmill training and resistive leg cycling *Intervention 4:* BWS treadmill training and lower-extremity progressive-resistive exercise	Mixed	AT + RT	6 weeks total, 4 sessions per week, 60-mins per session	1440	Moderate	*Intervention 1:* 20 *Intervention 2:* 20 *Intervention 3:* 20 *Intervention 4:* 20	*Intervention 1:* 19 *Intervention 2:* 18 *Intervention 3:* 18 *Intervention 4:* 16	*Intervention 1:* 95.0% *Intervention 2:* 90.0% *Intervention 3:* 90.0% *Intervention 4:* 80.0%	NR	*Intervention 1:* 60.6 (13.7) *Intervention 2:* 63.4 (8.6) *Intervention 3:* 58.2 (15.2) *Intervention 4:* 61.4 (11.2)	*Intervention 1:* 27.5 (16.1) *Intervention 2:* 28.4 (19.0) *Intervention 3:* 23.1 (15.0) *Intervention 4:* 20.7 (14.4)	*Intervention 1:* 50.0% *Intervention 2:* 55.0% *Intervention 3:* 65.0% *Intervention 4:* 55.0%	*6* *Intervention1: 24.5±5.5* *Intervention2: 24.4±4.5* *Intervention3: 24.2±4* *Intervention4: 22.1±6.3*
Tang 2010	6MWT; Peak VO_2	Cardiac rehabilitation (overground walking, cycle ergometer, or interval training)	Mixed	AT + RT	24 weeks total, 5 sessions per week, 30-60-mins per session	3600-7200	At least vigorous	43	38	92.7%	NR	30 (27.3)	64.5 (12.2)	69.8%	1 2.9±2.7
Visintin 1998	10MWT (normal); BBS	*Intervention 1:* BWS treadmill training *Intervention 2:* Treadmill training	Ambulatory	AT	6 weeks total, 4 sessions per week, 20-mins per session	480	Moderate	*Intervention 1:* 50 *Intervention 2:* 50	*Intervention 1:* 50 *Intervention 2:* 50	*Intervention 1:* 86.0% *Intervention 2:* 72.0%	NR	*Intervention 1:* 68.1 (26.5) *Intervention 2:* 78.4 (30.0) *in days	*Intervention 1:* 66.5 (12.8) *Intervention 2:* 66.7 (10.1)	*Intervention 1:* 38.0% *Intervention 2:* 44.0%	*27* *Intervention1: 24.5±12.1* *Intervention2: 22.4±14.7*
Werner 2002	10MWT (fast)	*Intervention 1:* BWS treadmill training and physiotherapy *Intervention 2:* BWS treadmill training only	Ambulatory	AT	3 weeks total, 5 Sessions per week, 30-min sessions	450	Moderate	*Intervention 1:*14 *Intervention 2:* 14	*Intervention 1:*14 *Intervention 2:* 14	*Intervention 1:* 100% *Intervention 2:* 100%	NR	*Intervention 1:* 55.4 (12.8) *Intervention 2:* 54.0 (8.3)	*Intervention 1:* 4.2 (1.4) *Intervention 2:* 5.1 (1.7)	*Intervention 1:* 50.0% *Intervention 2:* 42.9%	*NR*
Yagura 2006	10MWT (normal)	BWS treadmill training	Ambulatory	AT	6 weeks total, 3 sessions per week, 40-mins per session	720	Moderate	*Group 1:* 22 *Group 2:* 25	*Group 1:* 22 *Group 2:* 25	*Group 1:* 95.7% *Group 2:* 96.2%	*Group 1:* 0% *Group 2:* 0%	*Group 1:* 57.0 (11.0) *Group 2:* 58.4 (24.4) *in days	*Group 1:* 62.9 (7.4) *Group 2:* 59.3 (5.7)	*Group 1:* 27.3% *Group 2:* 24.0%	*6* *Group1: 11.9±5.4* *Group 2: 15±5.4*

Yoon 2016	6MWT; BBS	*Intervention 1:* Inclined treadmill training *Intervention 2:* Treadmill training	Ambulatory	AT + RT	4 weeks total, 5 Sessions per week, 30-mins per session	600	Moderate	*Intervention 1:* 9 *Intervention 2:* 9	*Intervention 1:* 9 *Intervention 2:* 9	Unclear	NR	*Intervention 1:* 13.6 (8.5) *Intervention 2:* 17.1 (8.4)	*Intervention: 1:* 56.3 (7.1) *Intervention 2:* 61.2 (13.0)	*Intervention 1:* 33.3% *Intervention 2:* 44.4%	NR

*MR= motor recovery NR=not reported or not reported in aggregate

†Superscript numbers refer to the instrument used to measure stroke severity or motor recovery and the way in which the data is reported (see below)

Stroke Severity/motor Recovery Scales used in Table S3

1. National Institute of Health Stroke Scale (mean ± SD)
2. Chedoke-McMaster Stroke Assessment Score (leg)
3. Stroke-Adapted Sickness Impact Profile
4. Modified Rankin Scale (grade)
5. American Heart Association Stroke Functional Classification (Class II and III)
6. Fugl-Meyer Motor Assessment of Motor Recovery after Stroke (Lower extremity subscale)
7. Functional Independence Measure: Locomotion sub-score
8. Modified Rankin Scale for Neurologic Disability (Scores of 1-2)
9. Rivermead Motor Assessment Scale (score for gross function)
10. Functional Ambulation Categories
11. Fugl-Meyer Motor Assessment of Motor Recovery after Stroke (score)
12. Functional Independence Measure (motor score)
13. Barthel Index of Activities of Daily Living
14. Functional Ambulation Categories (household ambulation)
15. Functional Ambulation Categories (median score)
16. Brunnstrom Stages of Stroke Recovery (proportion in stage 3)
17. Rivermead Mobility Index
18. Brunnstrom (proportion in stage 5)
19. National Institute of Health Stroke Scale (median score (Q1,Q3))
20. Modified Barthel Index
21. Functional Ambulation Categories (proportion in level 5)
22. Motor Assessment Score (0-48)
23. Functional Independence Measure (proportion scoring 3-5)
24. Functional Ambulation Categories (mean ±SD score)
25. Scandinavian Stroke Scale
26. National Institute of Health Stroke Scale (mean ±SEM)
27. STroke REhabilitation Assessment of Movement (STREAM) (lower extremity)
28. Stroke Impairment Assessment (SIAS) (median range)
29. Brunnstrom stage (lower extremity (mean ± SD))
30. Functional Independence Measure (Locomotor) median (IQR))
31. Rivermead Mobility Index (median IQR)
32. Community Mobility (eight dimensions) (proportion of patients as household ambulators) DOI: https://doi.org/10.1123/japa.7.1.7
33. Barthel Index (proportion of patients with moderate dependency)
34. Korean version of the Modified Barthel Index (mean ± SD)
35. Modified Rankin Scale for Neurologic Disability (scores of 2)

Table S4. Risk of Bias Assessment.

Study	Age and sex reported?	Reported proportion lost to follow-up?	Duration of session appropriate?	Duration of study appropriate?	Frequency of exercise appropriate?	Intensity of exercise appropriate?	For 6MWT, did the participants have at least one trial before formal testing?	Loss to follow-up minimal?	Ascertainment of time since stroke?	TIA subjects included?	Similar ages between groups?	Similar sex proportions between groups?	Groups similar in other characteristics?	Randomized?	Control appropriate?	Assessors of outcomes blinded to treatment allocation?	Similar loss to follow-up in both groups	Groups selected from the same population?	Group similar in stroke subtypes?	Group similar in post-stroke time?
Randomized Control Trial (RCT) Studies																				
Ada 2003	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Unclear	Low
Ada 2013	Low	Low	High	Low	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Unclear	Low
Aidar 2018	Low	Low	Low	Low	High	Unclear	NA	Low	Unclear	Low	Low	Low	Unclear	Low	Low	Unclear	Low	Low	Low	Unclear
Askim 2018	Low	Low	Low	High	High	Unclear	Unclear	Low	Unclear	High	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Awad 2016	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Unclear	High	Low	Low	Low	High	Low	Low	Low	Low	Low
Bang 2016	Low	Low	High	High	Low	Low	Unclear	Low	Unclear	Unclear	High	Low	Low	Low	High	Unclear	Low	Low	Unclear	Low
Chu 2004	Low	Low	High	High	Low	Low	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	High
Combs-Miller 2014	Low	Low	High	High	Low	Low	Unclear	Low	Unclear	Unclear	High	High	Low	Low	High	Low	Low	Low	Low	Low
da Cunha Filho 2001	Low	Low	High	Low	Low	Low	NA	High	Low	Low	Low	Low	Low	Low	Low	Unclear	Low	Low	Unclear	Low
DePaul 2014	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low	Low	Low	Low	Low	High	Low	Low	Low	Low	Low

Duncan 2011	Low	Low	Low	Low	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Eich 2004	Low	Low	High	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	High	Low	Low	Low	Low	Low
Frimpong 2014	Low	High	High	High	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Unclear	Low	Low	Unclear	Unclear	Low	Low	Low
Gama 2017	Low	Low	High	Low	Unclear	Unclear	Low	Unclear	Low	Low	Low	Low	Low	Low	High	Low	Low	Low	Low	High
Gezer 2019	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Unclear	Low	Unclear	Low	Low	Low	Low
Gjellesvik 2020	Low	Low	High	Low	Low	Unclear	NA	Low	Low	Low	Low	Low	Low	Low	Unclear	Low	Low	Low	Low	Low
Globas 2012	Low	Low	Low	Low	Low	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	High	Low	Low	Low	High
Gordon 2013	High	Low	Low	Low	Unclear	Unclear	Low	Unclear	Low	Low	Low	Low	Low	Low	Low	High	Low	Low	Low	Low
Grau-Pellicer 2020	Low	Low	Low	High	High	Unclear	Unclear	Low	Unclear	Low	High	Low	Low	Low	Low	High	Low	Low	Low	Low
Hornby 2016	Low	Low	Low	High	Low	Low	Unclear	Low	Unclear	Low	Low	Low	Low	Low	High	Low	Low	Low	Low	Low
Hoyer 2012	Low	Low	High	Unclear	Unclear	Unclear	Low	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Hsu 2019	Low	Low	High	High	Low	Low	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Ivey 2010	Low	Low	High	Low	Low	Low	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Unclear	Low	Low	Low	Unclear
Ivey 2011	High	Low	High	Low	Low	Low	Unclear	Low	Unclear	Unclear	Low	Unclear	Low	Low	Low	Unclear	Low	Low	Unclear	Unclear
Ivey 2015	Low	Low	Low	Unclear	Low	Unclear	High	Unclear	Unclear	Low	Low	High	Low	Low	High	High	Low	Low	Low	Low

Jin 2012	Low	Low	High	Low	Low	Unclear	Low	Unclear	Low	Low	Low	Low	Low	Low	High	Low	Low	Low	Low	Low
Kang 2012	Low	Low	High	High	Low	High	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	High	High	Low	Low	Low	Low
Kim 2015	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Unclear
Koch 2020	Low	Low	High	Low	Low	Unclear	Unclear	High	Unclear	Low	Low	High	High	Low	Low	High	Low	Low	Low	Low
Kuys 2011	Low	Low	High	High	Low	Low	Unclear	Low	Unclear	Unclear	High	Low	Low	Low	Low	Low	Low	Low	Unclear	Low
Kwon 2015	Low	Low	High	High	Low	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	High	High	Low	Low	Low	Low
Lamberti 2017	Low	Low	Low	High	Low	High	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	High	High	Low	Low	Low	High
Langhammer 2010	Low	Low	High	Unclear	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	High	Low	Low	Low	Low	Low
Lee 2008	Low	Low	Low	High	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	High	Low	Low	Low	High
Lee 2015	Low	Low	High	Low	Low	Low	Low	Low	Low	Low	Low	Unclear	Low	Low	Low	Low	Low	Low	Low	Low
Lee 2019	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Unclear	Low	Low	High	High
Lennon 2008	Low	Low	High	High	High	Low	NA	Low	Unclear	Low	Low	Low	Low	Low	Low	Unclear	Low	Low	Low	Low
Letombe 2010	Low	High	Low	High	Low	Low	NA	Unclear	Unclear	Unclear	Low	Low	Unclear	Low	Low	Unclear	Low	Low	Low	Low
Linder 2017	Low	Low	Low	High	Low	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	High	Low
Liu-Ambrose 2015	Low	Low	Unclear	Low	High	Low	Low	Low	Unclear	Low	Low	High	Low	Low	Unclear	Low	Low	Low	Low	High

Luft 2008	Low	Low	High	Low	Low	Low	Unclear	High	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	High
Mackay-Lyons 2013	Low	Low	Low	Low	Low	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	High	Low	Low	Low	Low	Low
Macko 2005	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Low	Low	Low	Low	Low	High	Unclear	Low	Low	Low	Low
Mainka 2018	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	High	Low	Low	Low	Low	High
Mao 2015	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low	Low	Low	Low	Low	High	Low	Low	Low	Low	Low
Middleton 2014	Low	Low	Low	High	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	High	Low	Low	Low	Low	High
Moore 2015	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	High
Munari 2018	Low	Low	Low	Low	Low	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	High	Low	Low	Low	Unclear	High
Mustafaoglu 2018	Low	Low	Low	High	High	Unclear	NA	Low	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Nave 2019	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Nilsson 2001	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	High	Low	Low	Low	Low	High
Ofori 2019	Low	Low	Low	High	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Unclear	Low	Low	Low	Unclear	Low	Low	Low	Low
Olawale 2011	Low	Low	Low	Low	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Unclear	Low	Low	Low	Low
Outermans 2010	Low	Low	Low	High	Low	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	High	Low	Low	Low	Low
Pang 2005	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low

Peurala 2005	Low	Low	Low	High	Low	Unclear	Unclear	Low	Unclear	Low	Low	Low	Low	Low	High	Unclear	Low	Low	Low	High
Ploughman 2019	Low	Low	Low	Low	Low	Low	Unclear	Low	Unclear	Unclear	High	Low	Low	Low	Low	Low	Low	Low	Low	High
Pohl 2002	Low	Low	High	High	Unclear	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Unclear
Potempa 1995	Low	Low	High	High	Low	Low	NA	Low	Unclear	Unclear	Unclear	Low	Low	Low	Low	Unclear	Low	Low	Low	Unclear
Quaney 2009	Low	Low	Low	High	Low	Low	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	High
Rimmer 2009	Low	Low	Low	Low	Low	Low	NA	Low	Unclear	Unclear	High	Low	Low	Unclear	Low	Low	Low	Low	Unclear	Unclear
Sandberg 2016	Low	Low	High	Low	High	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Serra 2019	Low	Low	Low	Low	Low	Low	NA	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Unclear	Unclear	Low	Unclear	Unclear
Severinsen 2014	Low	Low	Low	Low	Low	Low	Low	Low	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Srivastava 2016	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	High	Low	Low	Low	Low	High
Takatori 2012	Low	Low	Low	Low	High	Unclear	NA	Low	Unclear	Low	High	Unclear	Low	High	Low	Unclear	Low	Low	Low	Unclear
Tang 2009	Low	Low	High	Unclear	Low	Low	Low	Low	Unclear	Unclear	Low	Low	Low	High	Low	High	Low	Low	Unclear	Low
Tanne 2008	Low	Low	Low	Low	High	Low	Unclear	Low	Unclear	Low	Low	Low	Low	High	Low	Unclear	High	Low	Low	High
Toledano-Zarhi 2011	Low	Low	Low	High	High	Low	Unclear	Low	Unclear	Low	Low	Low	Low	Low	Low	Unclear	Low	Low	Unclear	Low
Vanroy 2017	Low	Low	High	Low	Low	Unclear	NA	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low

Yang 2014	Low	Low	High	High	Low	Unclear	Low	Low	Unclear	Low	Low	High	Low	Low	Low	Low	Low	Low	Low	Low
Yeh 2019	Low	Low	Low	Low	Low	Low	Unclear	Low	Unclear	Unclear	High	High	Low	Low	Low	Low	Low	Low	Unclear	High
Zedlitz 2012	Low	Low	Low	Low	Low	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Low	Low	Low	Low	Low	Low	Low	High
Intervention-Only Studies																				
Alabdulwahab 2015	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear										
Andersen 2011	Low	Low	High	Low	High	Unclear	Unclear	Low	Low	Unclear										
Askim 2014	Low	Low	Low	High	High	Low	Unclear	Low	Unclear	Low										
Awad 2015	Low	Low	High	Low	Low	Unclear	Unclear	Low	Unclear	Low										
Barbeau 2003	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low										
Batcho 2013	Low	Low	Unclear	Low	Low	Unclear	Unclear	Low	Unclear	Low										
Betschart 2018	Low	Low	High	High	Unclear	Unclear	Low	Low	Unclear	Low										
Billinger 2012	Low	Low	High	High	Low	Low	Unclear	Low	Unclear	Low										
Blanchet 2016	Low	Low	High	High	High	Low	NA	Low	Unclear	Low										
Boyne 2016	Low	Low	High	High	Low	Low	Low	Low	Unclear	Low										
Broderick 2019	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low										

Carda 2013	High	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low
Chen 2014	Low	Low	High	High	Low	Unclear	NA	Low	Low	Low
Cheng 2019	Low	Low	High	High	Low	Low	Unclear	Low	Unclear	Low
Cho 2014	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Choi 2015	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Choi 2017	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low
Chua 2015	Low	Low	Low	High	Low	Unclear	Low	Low	Unclear	Low
Combs 2012	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Daly 2011	Low	Low	Low	Low	Low	Unclear	Unclear	Low	Unclear	Low
Danks 2016	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Low
Dawes 2008	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Dite 2015	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Druzbicki 2018	Low	Low	High	High	Low	Low	NA	Low	Unclear	Low
Dunn 2017	Low	Low	Unclear	Low	Unclear	Unclear	Unclear	High	Unclear	Low
Enzinger 2009	Low	High	High	High	Low	Unclear	NA	Unclear	Unclear	Low

Fishbein 2019	Low	Low	High	High	High	Unclear	NA	Low	Unclear	Low	
Franciulli 2019	Low	Unclear	High	High	Low	Low	NA	Unclear	Unclear	Low	
Gama 2015	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear	
Gjellesvik 2012	Low	Low	High	Low	Low	Low	Unclear	Low	Low	Low	
Graham 2018	Low	Low	High	High	Low	Low	Unclear	Unclear	Unclear	Low	
Grau-Pellicer 2019	Low	Low	High	Low	High	Unclear	NA	Low	Unclear	Low	
Han 2018	Low	Low	High	High	Low	Low	Unclear	Low	Low	Low	
Hesse 1994	Low	Low	High	High	Low	Unclear	Low	Low	Unclear	Low	
Hesse 1995	Low	High	High	High	Low	Unclear	NA	Low	Unclear	Low	
Holleran 2014	Low	Low	Low	High	Low	Unclear	Unclear	Low	Unclear	Low	
Hornby 2008	Low	Low	High	Unclear	Unclear	Unclear	Unclear	Low	Unclear	Low	
Hsu 2020	Low	Low	High	Low	Unclear	Low	NA	Low	Unclear	Low	
In 2017	Low	Low	High	High	Low	Unclear	NA	Low	Low	Low	
Janssen 2008	Low	Low	High	High	High	Low	Unclear	Low	Unclear	Low	
Jeong 2016	Low	Low	Low	High	Low	Unclear	Low	Low	Low	Low	

Jorgensen 2010	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Kang 2016	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low
Kim 2017	Low	Low	High	High	Low	Unclear	Unclear	Low	Low	Low
Kim 2018	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low
Kim 2018	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Kostka 2017	Low	Low	Unclear	High	Low	Unclear	Unclear	Low	Unclear	Low
Lam 2010	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Low
Lau 2011	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Lee 2013	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low
Lee 2015	Low	Low	High	High	Low	Unclear	Low	Low	Unclear	Unclear
Lee 2017	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Lee 2018	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Unclear
Lu 2017	Low	High	High	High	Low	Unclear	NA	Unclear	Unclear	Low
Macko 1997	Low	Low	High	Low	Low	Low	NA	Low	Low	Low
Macko 2001	Low	Low	High	Low	Low	Low	NA	Low	Unclear	Unclear

Madhavan 2019	Low	Low	High	High	Low	Low	Unclear	Low	Unclear	Low	
Marzolini 2013	Low	Low	Low	Low	Low	Low	Unclear	Low	Unclear	Low	
Marzolini 2018	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	
Patterson 2008	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Low	
Plummer 2007	Low	Low	High	Low	Low	Unclear	Unclear	Low	Unclear	Low	
Regan 2019	Low	Low	Unclear	Low	Low	Low	Unclear	Low	Unclear	Low	
Rimmer 2000	Low	Low	High	Low	Low	Unclear	NA	Low	Unclear	Low	
Robertson 2017	Low	Low	Unclear	Low	Low	Low	NA	Low	Unclear	Low	
Ryan 2019	High	High	High	Low	Low	Low	NA	Unclear	Unclear	Low	
Shin 2015	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Unclear	
Strømmen 2016	Low	Low	High	High	Low	Low	NA	Low	Unclear	Low	
Sullivan 2007	Low	Low	Low	High	Low	Unclear	Unclear	Low	Unclear	Low	
Tang 2010	Low	Low	Low	Low	Low	Low	Low	Low	Unclear	Low	
Tang 2013	Low	Low	High	Low	Low	Low	Unclear	Low	Unclear	Low	
Visintin 1998	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low	

Werner 2002	Low	Low	High	High	Low	Unclear	NA	Low	Unclear	Low
Yagura 2006	Low	Low	High	High	High	Unclear	NA	Low	Unclear	Low
Yoon 2016	Low	Low	High	High	Low	Unclear	Unclear	Low	Unclear	Low

Table S5. Summary of Meta-Regressions between Time Post-stroke as a Continuous Variable and Change in Outcome Measures (Pre-post and Intervention vs Control).

Outcome		Slope of ln(Post-Stroke Time)				Begg's rank test ‡	
Weighted mean difference	Number of studies	Estimate [95% CI]	t-value	DF	p-value	tau	p-value
Post vs Pre Intervention *							
6-minute walk distance (m)	110	-10.545 [-15.441, -5.722]	-4.32	107	< 0.001	0.15	0.021
10-meter walk test, comfortable speed (m/s)	73	-0.04 [-0.06, -0.02]	-4.02	70	< 0.001	0.16	0.048
10-meter walk test, fast speed (m/s)	60	-0.036 [-0.065, -0.007]	-2.47	57	0.016	-0.01	0.934
$\dot{V}O_{2peak}$, $mL \cdot kg^{-1} \cdot min^{-1}$	48	-0.284 [-0.664, 0.095]	-1.51	45	0.148	0.11	0.268
Berg Balance Scale	43	-0.896 [-1.769, -0.023]	-2.07	40	0.045	0.18	0.090
Intervention vs Control †							
6-minute walk distance (m)	48	-5.286 [-12.044, 1.472]	-1.58	44	0.122	0.20	0.043
10-meter walk test, comfortable speed (m/s)	27	-0.007 [-0.047, 0.034]	-1.80	23	0.09	0.09	0.532
10-meter walk test, fast speed (m/s)	21	-0.030 [-0.065, 0.005]	-0.35	17	0.733	0.10	0.531
$\dot{V}O_{2peak}$, $mL \cdot kg^{-1} \cdot min^{-1}$	22	-0.156 [-0.624, 0.311]	-0.70	18	0.491	0.04	0.824
Berg Balance Scale Score	11	0.187 [-0.672, 1.045]	0.51	7	0.623	0.35	0.165

* Estimate was controlled for baseline value

† Estimate was controlled for baseline between-group difference and baseline value in the intervention group

‡ Significance in Begg's rank test indicates significant risk of publication bias

$\dot{V}O_{2peak}$ = Peak oxygen uptake

Table S6. Summary of Meta-Regressions between Time-post-stroke as a Continuous Variable and Change in Outcome Measures (Pre-post and Intervention vs Control); with Additional Covariates.

Outcome		Slope of ln(Post-Stroke Time)				Begg's rank test ‡	
Weighted mean difference	Number of studies	Estimate [95% CI]	t-value	DF	p-value	tau	p-value
Post vs Pre Intervention*							
6-minute walk distance (m)	102	-11.732 [-18.449, -5.015]	-3.47	94	< 0.001	0.14	0.038
10-meter walk test, comfortable speed (m/s)	67	-0.038 [-0.059, -0.016]	-3.55	59	< 0.001	0.15	0.067
10-meter walk test, fast speed (m/s)	58	-0.037 [-0.079, 0.006]	-1.73	50	0.09	-0.01	0.947
$\dot{V}O_{2peak}$, $mL \cdot kg^{-1} \cdot min^{-1}$	45	-0.206 [-0.502, 0.091]	-1.40	37	0.168	0.12	0.262
Berg Balance Scale	38	-0.788 [-1.519, -0.056]	-2.20	30	0.036	0.20	0.083
Intervention vs Control †							
6-minute walk distance (m)	44	-6.725 [-14.382, 0.932]	-1.78	35	0.083	0.15	0.155

*Estimate was controlled for baseline value, age, female proportion, exercise intensity (binary), exercise dose (binary), and ambulatory exercise (binary).

† Estimate was controlled for baseline between-group difference, baseline value, age, female proportion, exercise intensity (binary), exercise dose (binary), and ambulatory exercise (binary).

‡ Significance in Begg's rank test indicates significant risk of publication bias

$\dot{V}O_{2peak}$ = Peak oxygen uptake

Table S7. Summary of Meta-Regressions between time post-stroke ≤6 vs. >6 Months and Change in Outcome Measures (Pre-post and Intervention vs Control).

Outcome						Begg's rank test [#]	
Weighted mean difference	Number of studies	Estimate [95% CI]	t-value	DF	p-value	tau	p-value
Post vs Pre Intervention [*]							
6-minute walk distance (m)	111	22.591 [8.184, 36.998]	3.11	108	0.002	0.15	0.017
10-meter walk test, comfortable speed (m/s)	75	0.090 [0.040, 0.139]	3.62	72	< 0.001	0.15	0.057
10-meter walk test, fast speed (m/s)	63	0.044 [-0.048, 0.136]	0.95	60	0.344	-0.01	0.953
$\dot{V}O_{2peak}$, $mL \cdot kg^{-1} \cdot min^{-1}$	57	0.611 [-0.457, 1.679]	1.15	54	0.256	0.14	0.132
Berg Balance Scale	47	2.934 [0.007, 5.861]	2.02	44	0.049	0.20	0.052
Intervention vs Control †							
6-minute walk distance (m)	48	21.890 [1.660, 42.119]	2.18	44	0.035	0.20	0.043
10-meter walk test, comfortable speed (m/s)	28	0.033 [-0.073, 0.139]	0.64	24	0.528	0.10	0.465
10-meter walk test, fast speed (m/s)	23	0.079 [-0.024, 0.182]	1.60	19	0.126	0.15	0.346
$\dot{V}O_{2peak}$, $mL \cdot kg^{-1} \cdot min^{-1}$ [‡]	27	-0.052 [-1.732, 1.629]	-0.16	23	0.950	0.07	0.620
Berg Balance Scale Score [§]	13	-0.761 [-3.738, 2.216]	-0.58	9	0.577	0.33	0.129

[*] Estimate was controlled for baseline value

[†] Estimate was controlled for baseline between-group difference and baseline value in the intervention group

[‡] There were only 6 studies in the group of ≤6 months

[§] There were only 4 studies in the group of ≤6 months

[||] The reference group is >6 months

[#] Significance in Begg's rank test indicates significant risk of publication bias

$\dot{V}O_{2peak}$ = Peak oxygen uptake

Table S8. Summary of Meta-Regressions Between Time Post-stroke ≤6 vs. >6 Months and Change in Outcome Measures (Pre-post and Intervention vs Control) with Additional Covariates.

Outcome						Begg's rank test §	
Weighted mean difference	Number of studies	Estimate [95% CI]	t-value	DF	p-value	tau	p-value
Post vs Pre Intervention *****							
6-minute walk distance (m)	103	23.638 [3.099, 44.177]	2.28	95	0.025	0.14	0.042
10-meter walk test, comfortable speed (m/s)	67	0.146 [0.070, 0.222]	3.83	59	< 0.001	0.15	0.067
10-meter walk test, fast speed (m/s)	59	0.043 [-0.090, 0.176]	0.65	51	0.52	0.00	0.958
$\dot{V}O_{2peak}$, $mL \cdot kg^{-1} \cdot min^{-1}$	51	0.645 [-0.410, 1.700]	1.23	43	0.223	0.14	0.149
Berg Balance Scale ‡	40	2.059 [-0.509, 4.626]	1.63	32	0.112	0.20	0.074
Intervention vs Control †							
6-minute walk distance (m)	44	26.608 [2.644, 50.572]	2.25	35	0.031	0.15	0.155

* Estimate was controlled for baseline value, age, female proportion, exercise intensity (binary), exercise dose (binary), and ambulatory exercise (binary).

† Estimate was controlled for baseline between-group difference, baseline value, age, female proportion, exercise intensity (binary), exercise dose (binary), and ambulatory exercise (binary).

‡ The reference group is >6 months

§ Significance in Begg's rank test indicates significant risk of publication bias

$\dot{V}O_{2peak}$ = Peak oxygen uptake

Figure S1. Flow Diagram.

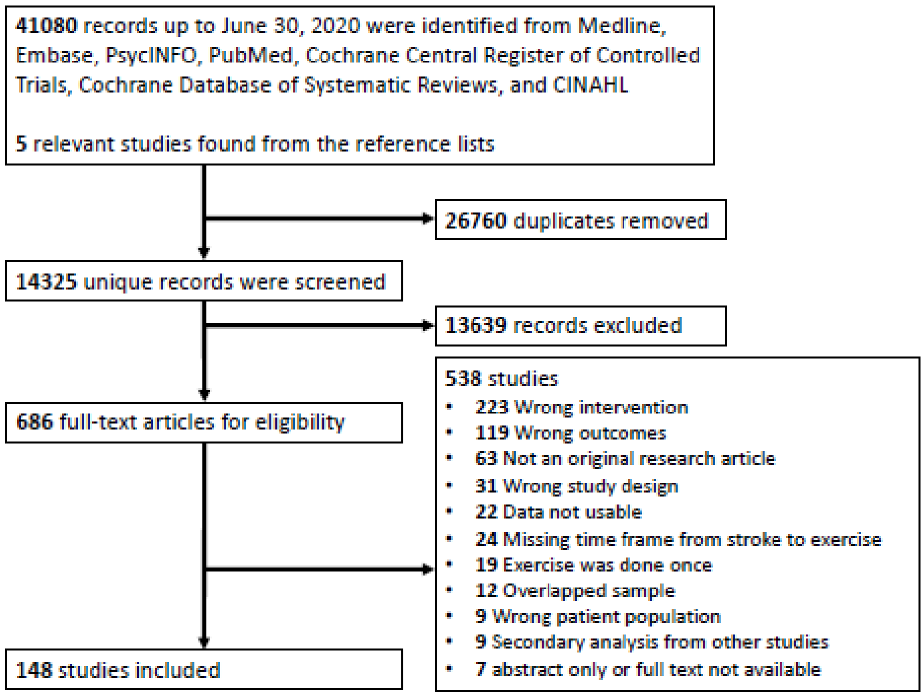
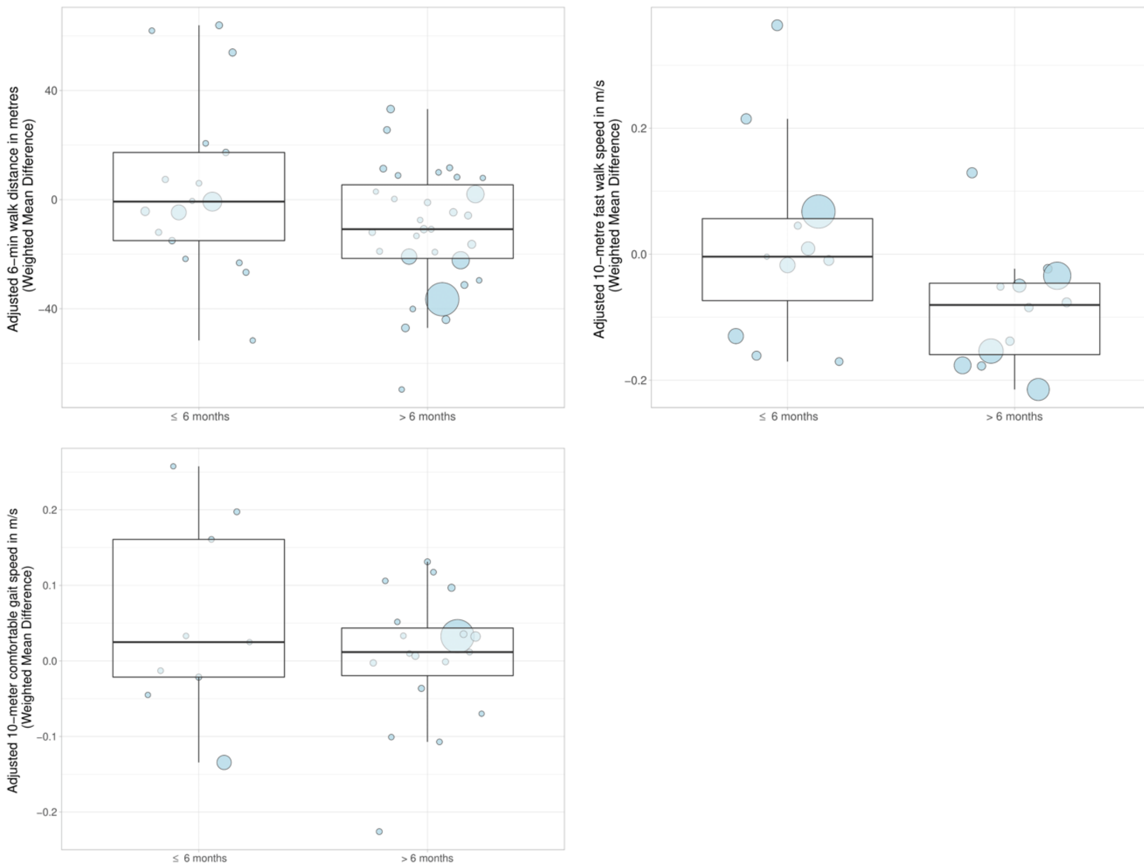


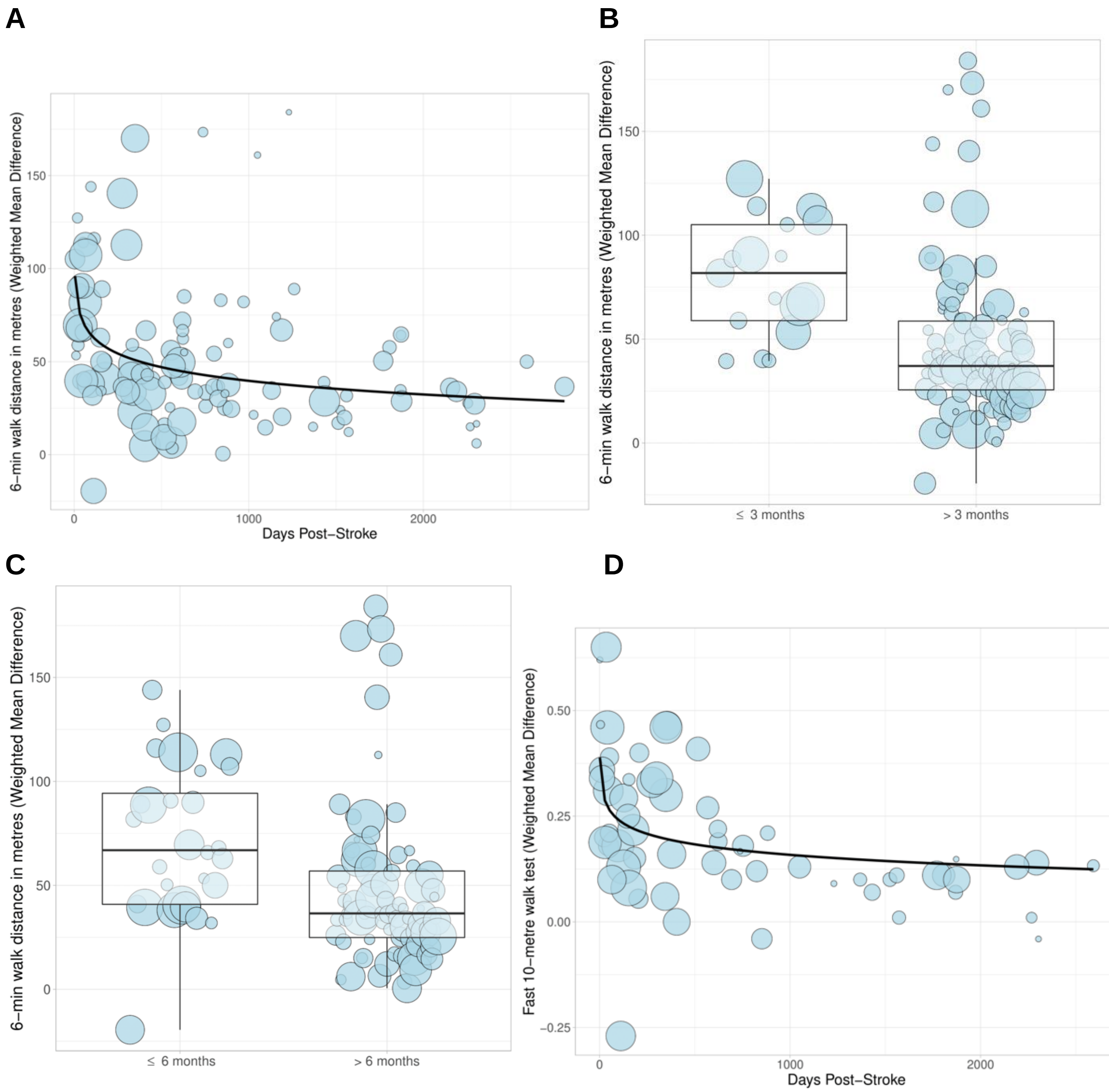
Figure S2. Meta-Regression of Mobility Outcomes by Time Post-stroke of Controlled Comparisons (≤6 Months vs > 6 months Post-stroke).

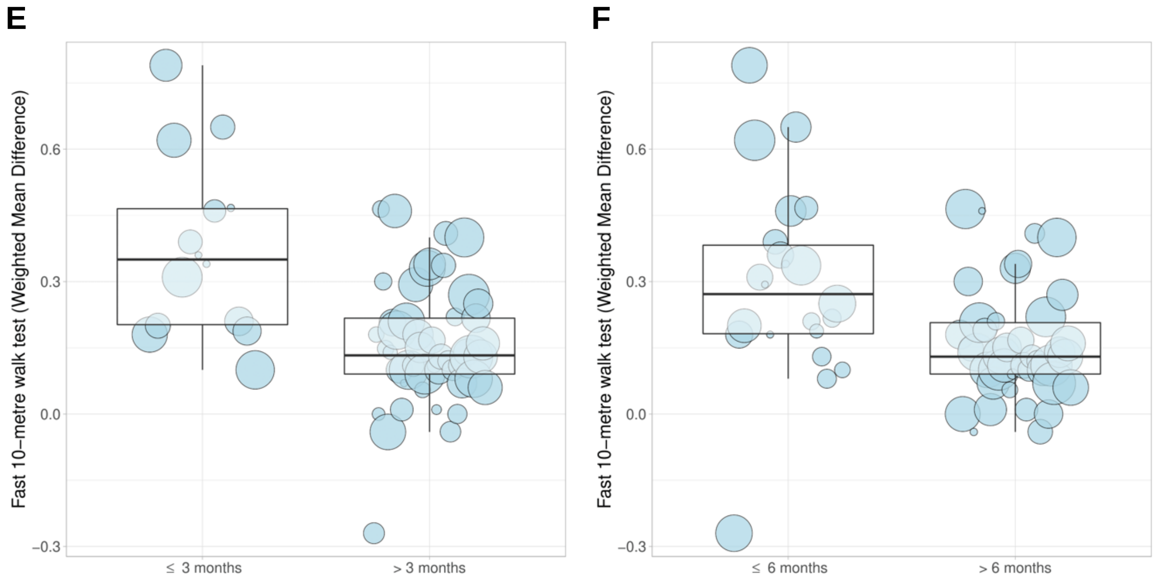


6 Minute Walk Distance, m **10 Meter Walk Time, fast (m/s)**

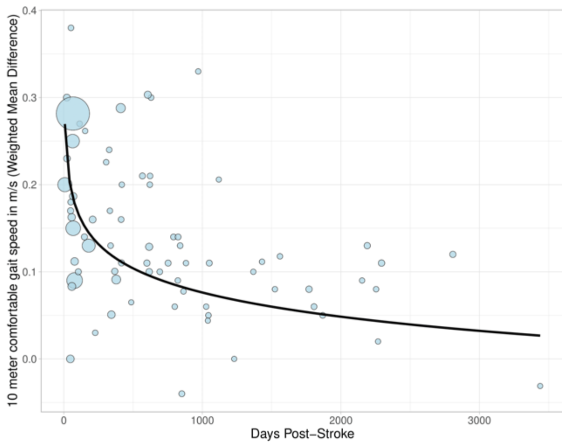
10 Meter Walk Time, comfortable (m/s)

Figure S3. Meta-Regression of Mobility Outcomes by Time Post-stroke of Pre- and Post Studies.

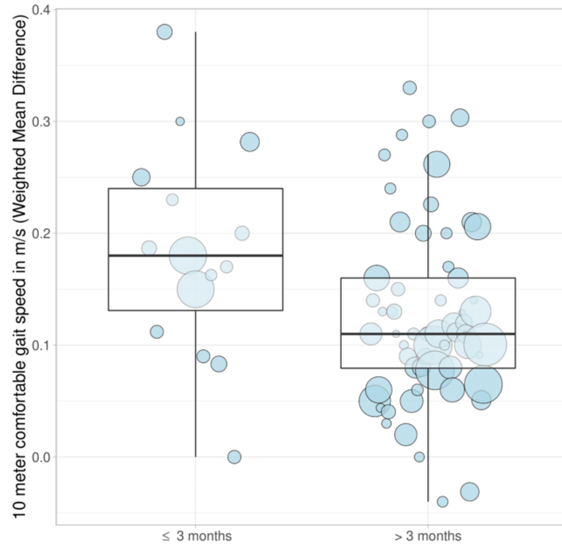



E
F
Fast 10−metre walk test (Weighted Mean Difference)
0.6
0.3
0.0
−0.3
≤ 3 months
> 3 months
≤ 6 months
> 6 months

G



H



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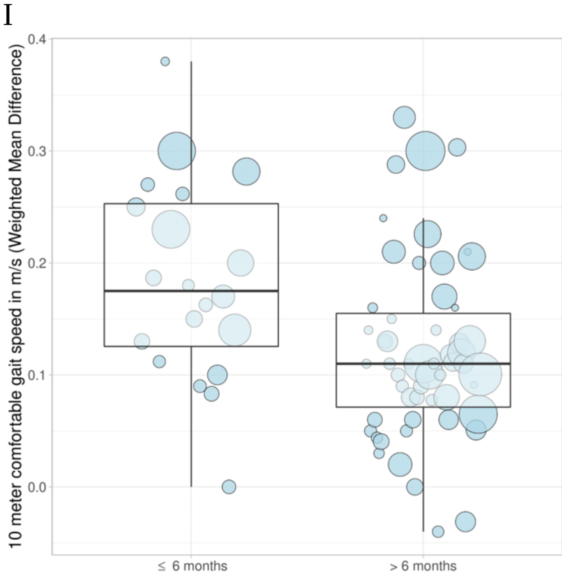


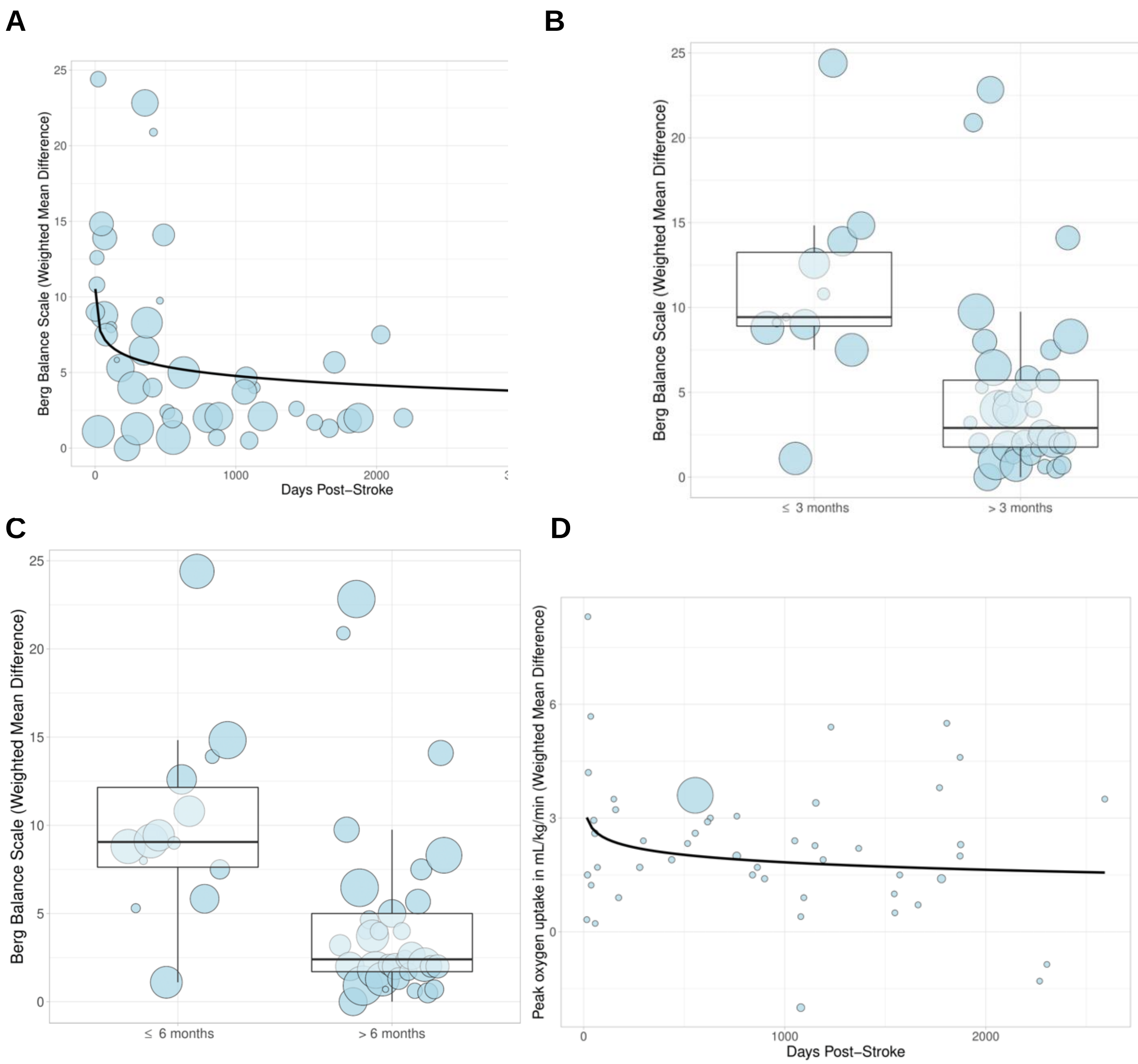
6 Minute Walk Distance, m

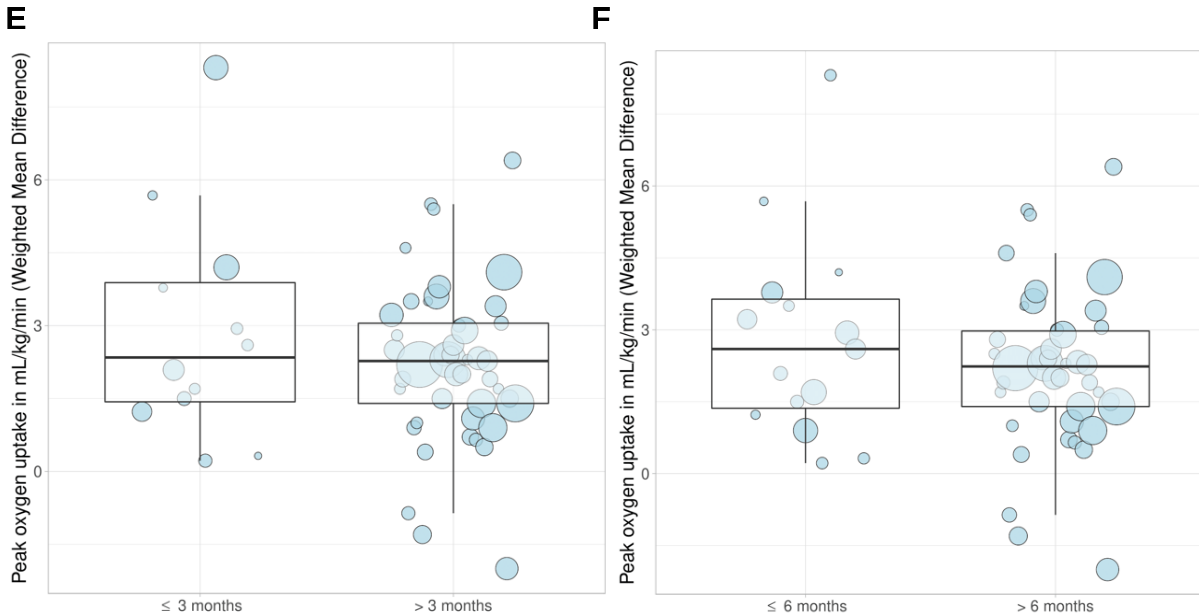
10 Meter Walk Time, fast (m/s)

10 Meter Walk Time, comfortable (m/s)

Panels A, D, G: Time as a Continuous Variable. Panels B, E, H: ≤3 months vs > 3 months Post-stroke. Panels C, F, I: ≤6 Months vs > 6 months Post-stroke

Figure S4. Meta-Regression of Balance and Cardiorespiratory Outcomes by Time Post-stroke of Pre- and Post-Studies.





Berg Balance Score

Cardiorespiratory Fitness, mL/kg/min

Panels A, D: Time as a Continuous Variable Panels B, E: ≤3 months vs > 3 months Post-stroke
Panels C, F: ≤6 Months vs > 6 months Post-stroke