# Exercise physiology and stroke

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The Research Team are unable to ensure that the information listed below provides an accurate & up-to-date snapshot of these matters

**Research question:** What is the evidence for the use of Exercise Physiology in addition to Neurological Physiotherapy for adults with Stroke?

What frequency of Exercise Physiology direct intervention has evidence (when provided in addition to Neurological Physiotherapy)?

Can Exercise Physiology programs for adults with Stroke be effectively delegated for implementation by others, implemented through a home program, and/or implemented through group programs?

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# 1. Contents



# 2. Summary

Exercise is likely effective to improve outcomes for people after stroke. There is evidence for the effectiveness of different forms of exercise including unassisted walking, treadmill training, cardiorespiratory exercise, resistance training, pilates, seated exercise and others.

There is less clear evidence regarding dosage and delivery of exercise programs. There is some evidence that exercise programs of at least 12 weeks, delivered for between 120 and 150 minutes per week, are more effective than shorter programs. However, the evidence is of low certainty and most studies reviewed were unable to draw conclusions around dosage.

Home-based programs may achieve similar outcomes to centre- or hospital-based programs for people with stroke, though studies show inconsistent results. Home-based programs may also be supervised by an allied health professional via telehealth. Therefore, evidence for home-based programs may not equate to evidence for unsupervised exercise activity.

Both exercise physiologists and neurophysiotherapists can develop and prescribe exercise programs. Most interventions reviewed were delivered by a physiotherapist. Few studies specified whether the intervention was developed or supervised by either a specialist neurophysiotherapist or by an exercise physiologist. No evidence was found regarding the comparative efficacy of interventions provided by an exercise physiologist or neurophysiotherapist.

## 3. Scope of practice

Neurological physiotherapy or neurophysiotherapy is a specialty within physiotherapy focussing on management of neurological conditions. As physiotherapists, they can diagnose and assess conditions, offer hands on treatment, prescribe tailored exercise programs, develop treatment plans and offer education about symptoms (Allied Health Professionals Australia (AHPA), n.d a; Health Direct, 2021; Very Well Health, 2021).

In the context of neurological conditions, exercise physiologists can develop specialised exercise programs to address fitness, strength and mobility within the capacity of the client (AHPA, n.d b).

There is overlap between the role of the physiotherapist and exercise physiologist. They can both prescribe exercise programs, though a physiotherapist is also trained in manual techniques. A physiotherapist can diagnose conditions whereas an exercise physiologist will usually be referred to after diagnosis (AHPA, n.d a-b; Health Direct, 2021; Very Well Health, 2021).

## 4. Efficacy

The type of exercise as well as the environment, supervision, use of mechanical devices or assistive technology, frequency and duration of exercise can influence its efficacy for people with stroke.

A 2020 Cochrane review of physical fitness interventions found:

> cardiorespiratory fitness training, particularly involving walking, can improve fitness, balance and walking after stroke. The improvements in cardiorespiratory fitness may reduce the chance of stroke hospitalisation by 7%. Mixed training improves walking ability and improves balance. Strength training may have a role in improving balance. So, overall it seems likely that people with stroke are likely to benefit the most from training that involves cardiorespiratory training and that involves some walking. However, there was not enough information to draw reliable conclusions about the impact of fitness training on other areas such as quality of life, mood, or cognitive function. Cognitive function is under-investigated despite being a key outcome of interest for stroke survivors (Saunders et al, 2020, p.2).

More recently, systematic reviews have shown possible effects of exercise programs on cognitive and motor skills, mobility, upper and lower limb function, performance in daily activities, bone health and quality of life (Amanzonwe et al, 2023; Cronin et al, 2023; Mackie & Eng, 2023; Zhang et al 2023; Mah et al, 2023; Westlake et al, 2023; Wen & Wang, 2022; Sallehudin et al, 2022; Ali et al, 2021). There is less clear evidence for the comparative efficacy of different types of exercise or exercise program.

## 4.1 Delivery

Much of the efficacy data is based on controlled trials which compare specific types of exercise with standard rehabilitation treatment after stroke. This standard treatment often also includes an exercise component delivered or monitored by a physiotherapist. A handful of studies explicitly note neurophysiotherapy used as an active control (Mackie & Eng, 2023; Zhang et al, 2023) though no studies were found that compared the delivery of the same exercise therapy by different professions (e.g. physiotherapy compared to exercise physiology or physiotherapy plus exercise physiology compared to physiotherapy alone).

Different formal or informal supports can provide varying degrees of supervision for exercise programs. The level and type of supervision as well as the environment in which the program is completed, may influence how effective the intervention is.

Home based exercise programs have been shown to improve outcomes for people with stroke. Evidence varies when comparing efficacy with hospital or clinic-based exercise programs. Ali et al (2021) find more consistent benefits to health-related quality of life for home-based exercise programs. There is evidence that home-based exercise programs have similar efficacy compared with centre-based programs in improving cognition, mood, arm activity, balance, walking speed, mobility and participation (Nascimento et al, 2022; Westlake et al, 2023; also refer to RES 233 Virtual reality as a support tool for further information on virtual reality exercise programs for people with stroke). Efficacy of home-based programs may not indicate the value of unsupervised exercise as many such programs still involve supervision via virtual reality or telehealth (Ali et al, 2021).

A 2016 Cochrane review found very low to moderate quality evidence that exercise programs delivered with the assistance of a carer or family member could improve outcomes for people with stroke.

## 4.2 Dosage

Most systematic reviews considered here found insufficient evidence to recommend an optimal dose of exercise therapy (Zhang et al, 2023; Mah et al, 2023; Wen & Wang et al, 2022; Saunders et al, 2020). However, there is some evidence that programs longer than 12 weeks that include 120-150 minutes of training per week are more effective than shorter programs (Amanzonwe et al, 2023; Ali et al, 2021; Saunders et al, 2020). Due to the progressive nature of many exercise programs, dosage is highly variable by design. Saunders et al offer this assessment:

> With regard to dose, the reality of progression is that dose is not fixed and should constantly change to drive adaptations. In those who respond more, progression may occur faster whilst being more conservative in those who adapt slower. A 'one-size-fits-all' dose, particularly in terms of intensity and progression, does not seem realistic and should instead be personalised. With regard to a starting dose, perhaps this is less

important because progression will move things on quickly; just doing something will be a good start and help familiarise patients with what is involved (2020, pp.43-44).

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