

## **Uncertainties: Does yoga reduce the risk of falls in older people?**

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### **What you need to know**

- Exercise programmes that involve balance and functional exercises are effective at preventing falls in older people living in the community.
- The effect of yoga on falls in this population is currently uncertain, however randomised controlled trials (RCTs) are under way to investigate the effect.
- Health professionals can confidently recommend yoga to older people to improve physical function and mental well-being, as long as there are no clinical contraindications, but there is currently insufficient evidence to recommend yoga for preventing falls.

### **Introduction**

Falls and fall-related injuries are a common and serious problem for older people. People aged 65 and older have the highest risk of falling, with 30% of people older than 65 and 50% of people older than 80 falling at least once a year.<sup>1-3</sup> A fall is defined as “an unexpected event in which the participant comes to rest on the ground, floor, or lower level”.<sup>4</sup> Falls result from a mismatch between the physical ability of an individual and the immediate demands of the environment or of the activity being undertaken. Every fall has the potential to be a life-changing event, and may result in chronic disability, admission to assisted living, or death. Even when a fall does not result in serious injury, it can precipitate a fear of falling, which may lead to restriction of activity and hence physical deconditioning, which in turn increases the risk of future falls.<sup>5,6</sup>

Most falls are preventable. Clinical guidelines from several countries recommend multifactorial interventions for preventing falls in older people, with exercise as a key component.<sup>3,7,8</sup> A recent Cochrane review including 108 RCTs and 23,407 participants concluded there is strong evidence that “well-designed exercise programmes” reduce the rate of falls and the number of people experiencing falls among community-dwelling older people.<sup>9</sup> Programmes that focussed on balance, gait, coordination and functional task training appeared the most effective, reducing the falls rate by 24%.

Yoga is a mind-body practice that originated in India and typically involves a combination of physical postures, breathing exercises and concentration/meditation. Although it originally evolved as a spiritual practice, yoga has become a popular means of promoting physical and mental well-being.<sup>10</sup> There are many different types of yoga, each of which place varying emphasis on physical, mental and spiritual practices. However, in the West, the term ‘yoga’ often denotes a modern form of Hatha Yoga, consisting largely of postural exercises that are performed with the goal of developing strength, balance and flexibility.

There is evidence from observational studies that yoga is an acceptable and attractive form of exercise to older people,<sup>11</sup> and mostly small RCTs demonstrate evidence of benefit for several aspects of health, including balance, strength, mobility, sleep quality, and mental well-being.<sup>12,13</sup> However, the lack of adequately powered RCTs to determine the effect of yoga on falls provides uncertainty and yoga is not recommended specifically in fall prevention guidelines.<sup>3,7,8</sup>

### **What is the evidence of uncertainty?**

#### **Search strategy**

Identifying evidence on falls:

We searched Medline and the Cochrane Library using terms related to yoga and falls. We included systematic reviews and RCTs that investigated the effect of yoga (any type) on the incidence of falls or fall-related injuries in community-dwelling people aged  $\geq 60$  years.

Identifying evidence on key fall risk factors:

We searched our personal archive of references for systematic reviews of RCTs that investigated the effect of yoga on balance, mobility or lower-limb strength in community-dwelling people aged  $\geq 60$  years.

Identifying ongoing trials:

We searched four registries for ongoing RCTs that are investigating the effect of yoga on fall outcomes in community-dwelling people aged  $\geq 60$  years: Clinicaltrials.gov

(<https://clinicaltrials.gov/>); WHO International Clinical Trials Registry Platform

(<http://apps.who.int/trialsearch/>); ISRCTN (<https://www.isrctn.com/>); and Australian New

Zealand Clinical Trials Registry (<https://www.anzctr.org.au/>).

We did not identify any systematic reviews or RCTs that evaluated the effect of yoga on falls or fall-related injuries in community-dwelling older people. The latest Cochrane reviews of interventions for fall prevention in community settings confirmed that no such trials have been published.<sup>9,14,15</sup> The absence of relevant RCTs highlights that the effect of yoga on falls in older people remains uncertain.

We identified two systematic reviews of RCTs involving yoga that provided outcome data for fall risk factors (table 1). A 2016 systematic review assessed the effect of yoga against inactive controls (e.g. usual care) on balance and mobility in people aged  $\geq 60$  years.<sup>12</sup> Meta-analyses demonstrated small improvements in balance (Hedges'  $g = 0.40$ , 95% CI 0.15 to 0.65) and medium improvements in mobility ( $g = 0.50$ , 95% CI 0.06 to 0.95) and the methodological quality of included studies was moderate to high (score of 6 or higher on the 11-point PEDro scale). A 2019 systematic review assessed the effect of yoga versus active (e.g. walking) and inactive controls on physical function and health-related quality of life (HRQoL) in people aged  $\geq 60$  years.<sup>13</sup> For fall risk factors, meta-analyses revealed statistically significant effects favouring the yoga group for balance ( $g = 0.70$ , 95% CI 0.19 to 1.22) and lower-limb strength ( $g = 0.45$ , 95% CI 0.22 to 0.68) compared to inactive controls, and lower-limb strength ( $g = 0.49$ , 95% CI 0.10 to 0.88) compared to active controls. However, a wide 95% confidence interval in most of the comparisons limits the robustness of these results. Uncertainty remains regarding the optimal components and dose of yoga, the influence of participant characteristics on effect estimates, and the extent to which such improvements translate to a reduction in falls.

Few yoga-related adverse events were noted in the two systematic reviews. In the 2016 review, all six trials monitored adverse events. One trial reported a fall during a yoga session, three trials reported minor events, including knee pain, low back pain and muscle strain, and the other two trials reported no adverse events.<sup>12</sup> In the 2019 review, four trials reported yoga-related adverse events, including groin muscle strain, fall during class, and musculoskeletal pain. Four trials reported no adverse events, and the remaining 14 trials did not report safety data.<sup>13</sup>

### **Is ongoing research likely to provide relevant evidence?**

We identified two relevant ongoing RCTs of yoga in older people (table 2). In the Successful AGEing (SAGE) yoga trial, 560 community-dwelling people aged  $\geq 60$  years will be randomised to 80 sessions of a group-based Iyengar yoga programme plus home practice or to an active control of a self-managed yoga relaxation programme.<sup>16</sup> Both will last 12 months. Due to the COVID-19 pandemic, yoga classes are currently being delivered successfully online via a web-based video-conferencing tool. The primary outcome is falls incidence over 12 months. Secondary outcomes include mental well-being, HRQoL, physical function, physical activity, pain, balance self-confidence, sleep, goal attainment and healthcare resource use. In the Gentle Years Yoga Trial, 586 community-dwelling people aged  $\geq 65$  years with multimorbidity will be randomised to a group-based yoga programme (British Wheel of Yoga Gentle Years Yoga<sup>®</sup>; 12 sessions over 12 to 14 weeks) plus home practice or to an inactive control of usual care.<sup>17</sup> The primary outcome is HRQoL (EQ-5D utility) over 12 months. Falls incidence (self-reported at 3, 6 and 12 months) is a secondary outcome, along with depression, anxiety, loneliness, HRQoL (PROMIS-29), adverse events, and healthcare resource use. Both trials include yoga practices targeting balance, posture, and relaxation, tailored to an older adult population.<sup>18,19</sup> They are due to complete in 2022, and together will supplement the current evidence base regarding the effect of yoga on falls in older people.

The lack of evidence regarding the impact of yoga on falls possibly reflects the difficulty of conducting research in this area. Fall prevention research is resource intensive, due to the required large sample sizes (generally at least 500 people are required for sufficient statistical power), monthly, prospective reporting of falls over long periods (usually 12 months), and the nature of the population, where drop out or low intervention adherence due to ill health or other competing demands is not uncommon.

### **What should we do in the light of the uncertainty?**

The United Kingdom's National Institute for Health and Care Excellence provides guidance on the assessment and prevention of falls in older people.<sup>3</sup> The guidance recommends that healthcare professionals should routinely ask older people whether they have fallen in the past year and about the frequency, context and characteristics of any falls. Older people reporting a fall or at risk of falling should be observed for balance and gait deficits and considered for risk assessment and risk reduction interventions. Given the multiple risk factors for falls, if a clinician judges a person to be at high risk of falling, then a multifactorial falls assessment should be carried out which aims to identify specific risk factors resulting in appropriate tailored interventions. These interventions may include balance and strength exercise programmes, home hazard assessment and intervention, vision assessment and referral and medication review with modification/withdrawal of medicines. Primary care practitioners might wish to initiate elements of this process with support from allied health professionals.

The optimum approach for the majority of older people living in the community should include regular participation in exercise programmes that focus on balance and functional training.<sup>20</sup> These programmes have been shown to be effective for both primary and secondary prevention of falls and non-vertebral fractures in older people.<sup>3,20</sup> A 2017 systematic review and meta-analysis found that exercise programmes that involve a high challenge to balance and include more than 3 hours/week of exercise have greater fall prevention effects than programmes without these attributes.<sup>21</sup> A high challenge to balance is achieved with exercises performed in standing that

involve safely: a) reducing the base of support (e.g., standing with one foot in front of the other, or on one leg); b) moving the centre of gravity and controlling body position while standing (e.g., reaching, stepping up onto a higher surface); and c) standing without using the arms for support, or reducing reliance on upper limb support (e.g., hold onto a surface with one hand rather than two). Figure 1 includes examples of yoga poses that are likely to improve balance.

Health professionals can also confidently recommend yoga to older people as an intervention for improving physical function and mental well-being, as long as there are no clinical contraindications. It is important to note that not all styles of yoga will be suitable, and older people should find an experienced instructor who can modify the yoga to suit their abilities and needs, which will in turn maximise benefits and safety. Links to a directory of yoga classes and useful falls prevention resources are presented in the 'Additional resources' box below.

#### **Recommendations for further research**

Ongoing RCTs are evaluating the effectiveness, cost-effectiveness and safety of yoga on falls in community-dwelling older people. Other studies are needed to further explore the optimal type and dose of yoga in terms of fall prevention effectiveness and cost-effectiveness. Further research should also investigate the effects of yoga on falls compared with other fall prevention interventions in community-dwelling people aged 60 years and older.

#### **Education into practice**

Do you routinely ask older patients about falls and observe for deficits in gait and balance?

Do you understand the referral pathway to local services that reduce fall risks?

At your practice, are all older patients offered information orally and in writing about what measures they can take to prevent falls and how to cope if they have a fall?

#### **What patients need to know**

- Falls are a common cause of injury in older age. Around 1 in 3 people over 65 who live at home will have at least one fall a year, and about half of these will have more frequent falls.
- Some falls can have serious, ongoing consequences. Although most falls do not result in serious injury, some can result in a fracture, hospitalisation, or complications such as pain, reduced quality of life, and a loss of self-confidence and independence.
- Healthcare professionals can help older people to understand their risk of falling and what they should do if they experience a fall. They can also help to implement interventions to reduce falls risk. Relevant resources are shown in the next box.
- Many falls are preventable. The most effective action older people can take to reduce their risk of falling is to regularly undertake exercise that primarily targets improvement in balance, strength and physical function. Other actions include reducing hazards and maximising safety in the home environment and making healthcare appointments to review medications and address vision problems.
- We do not know if yoga can prevent falls. Studies involving older people have shown that yoga can improve balance and strength (fall risk factors), but there is currently insufficient evidence to show that it prevents falls.

- There are many styles of yoga, some of which will be generally more suitable for older people than others. Online class directories can be used to search for local classes and it's worth speaking to a yoga teacher about their approach before you sign up for their class.

### Additional resources

For the public:

- NHS Choices – Falls and falls prevention: [www.nhs.uk/conditions/falls/](http://www.nhs.uk/conditions/falls/)
- NHS Choices – Are you at risk of falling? A simple online test: [www.nhs.uk/live-well/healthy-body/are-you-at-risk-of-falling/](http://www.nhs.uk/live-well/healthy-body/are-you-at-risk-of-falling/)
- Age UK – The 'Staying steady' falls prevention guide: [https://www.ageuk.org.uk/globalassets/age-uk/documents/information-guides/ageukig14\\_staying\\_steady\\_inf.pdf](https://www.ageuk.org.uk/globalassets/age-uk/documents/information-guides/ageukig14_staying_steady_inf.pdf)
- Sage, Public Health England, Chartered Society of Physiotherapy – The 'Get up and go' falls prevention guide: [www.csp.org.uk/system/files/get\\_up\\_and\\_go\\_0.pdf](http://www.csp.org.uk/system/files/get_up_and_go_0.pdf)
- NHS Inform – What to do if you fall: [www.nhsinform.scot/healthy-living/preventing-falls/dealing-with-a-fall/what-to-do-if-you-fall](http://www.nhsinform.scot/healthy-living/preventing-falls/dealing-with-a-fall/what-to-do-if-you-fall)
- Yoga class finder: <https://www.bwy.org.uk/find-a-yoga-class/>

For healthcare professionals:

- NICE Clinical Knowledge Summary – Falls risk assessment for older people in the community: [cks.nice.org.uk/falls-risk-assessment](http://cks.nice.org.uk/falls-risk-assessment)
- NICE Quality Statement 86 – Falls in older people: [www.nice.org.uk/guidance/qs86](http://www.nice.org.uk/guidance/qs86)
- CDC STEADI initiative – Co-ordinated guidance on implementing fall prevention strategies in clinical practice: [www.cdc.gov/steady/index.html](http://www.cdc.gov/steady/index.html)
- Public Health England – Falls: applying All Our Health: [www.gov.uk/government/publications/falls-applying-all-our-health/falls-applying-all-our-health](http://www.gov.uk/government/publications/falls-applying-all-our-health/falls-applying-all-our-health)
- Public Health England, National Falls Prevention Coordination Group – Falls and fractures: consensus statement and resources pack: [www.gov.uk/government/publications/falls-and-fractures-consensus-statement](http://www.gov.uk/government/publications/falls-and-fractures-consensus-statement)
- Later Life Training – UK-based provider of falls prevention exercise qualifications: [www.laterlifetraining.co.uk/](http://www.laterlifetraining.co.uk/)
- National Council on Aging – US directory of evidence-based fall prevention exercise programmes: [www.ncoa.org/healthy-aging/falls-prevention/falls-prevention-programs-for-older-adults-2/](http://www.ncoa.org/healthy-aging/falls-prevention/falls-prevention-programs-for-older-adults-2/)
- Centre for Ageing Better – Raising the bar on strength and balance: The importance of community-based provision: [www.ageing-better.org.uk/publications/raising-bar-strength-balance](http://www.ageing-better.org.uk/publications/raising-bar-strength-balance).

### How patients were involved in the creation of this article

A draft of the manuscript was reviewed by a patient and public engagement reviewer. The reviewer commented on the selected age range and outcome measures. They also asked about the role of doctors in promoting yoga, which was subsequently addressed in the 'What should we do' section. We are grateful for their input.

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The Gentle Years Yoga Trial and AT is the chief investigator of the Successful AGEing (SAGE) yoga trial.

**Contributorship statement:** GAT and LW conducted the searches. GAT lead the writing of the first draft of the manuscript with support from the other authors. All authors were responsible for critical review of the manuscript and approved the final version for submission. GAT is the guarantor.

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Table 1 | Summary of literature findings

Study	Size	Intervention/comparison	Key results	Uncertainty
<p>Youkhana et al<sup>6</sup></p> <p>Systematic review of yoga on balance and mobility in people aged ≥60 years</p> <p>January 2016</p>	6 RCTs (n=307)	The intervention included physical yoga, excluding yoga involving meditation and breathing exercises alone. No limitation was placed on the type, duration and frequency of yoga intervention. The control intervention was defined as no intervention, wait list control or usual care	<p><u>Balance:</u> Hedges' g = 0.40 (i.e. small-to-moderate effect), 95% CI 0.15 to 0.65 (6 RCTs, n=307)</p> <p><u>Mobility:</u> Hedges' g = 0.50 (i.e. moderate effect), 95% CI 0.06 to 0.95 (3 RCTs, n=225)</p> <p>The methodological quality of included studies was moderate to high (≥6 on the 11-point PEDro scale)</p>	<p>There was insufficient data to assess the impact of programme and participant characteristics on effect estimates.</p> <p>Further research is required to determine whether yoga-related improvements in balance and mobility translates to fewer falls in older people.</p>
<p>Sivaramakrishnan et al<sup>7</sup></p> <p>Systematic review of yoga on physical function and HRQoL in people aged ≥60 years</p> <p>April 2019</p>	<p><u>Physical function:</u> 17 RCTs (n=967)</p> <p><u>HRQoL:</u> 20 RCTs (n=1,567)</p>	Studies comparing yoga interventions with active and inactive controls were included. Studies in which yoga was specified as a control condition or where yoga was combined with other practices or exercise forms were excluded.	<p><u>Balance – yoga vs. inactive control:</u> Hedges' g = 0.70 (i.e. moderate-to-large effect), 95% CI 0.19 to 1.22 (7 RCTs, n=265), p=0.01</p> <p><u>Balance – yoga vs. active control:</u> Hedges' g = 0.32 (i.e. small-to-moderate effect), 95% CI -0.02 to 0.66 (5 RCTs, n=264), p=0.01</p> <p><u>Mobility – yoga vs. active control:</u> Hedges' g = 0.31 (i.e. small-to-moderate effect), 95% CI -0.25 to 0.87 (3 RCTs, n=173), p=0.28</p> <p><u>Lower-limb strength – yoga vs. inactive control:</u> Hedges' g = 0.45 (i.e. small-to-moderate effect), 95% CI 0.22 to 0.68 (7 RCTs, n=485), p&lt;0.001</p> <p><u>Lower-limb strength – yoga vs. active control:</u> Hedges' g = 0.49 (i.e. small-to-moderate effect), 95% CI 0.10 to 0.88 (3 RCTs, n=225), p&lt;0.001</p> <p>Relatively few studies were rated as high risk of bias (using the Cochrane Risk of Bias tool), however several studies had unclear risk of bias in the selection and detection bias domains.</p>	<p>Wide 95% confidence interval for most of the comparisons make conclusions less compelling.</p> <p>Further research is required to determine whether yoga-related improvements in balance, mobility and lower-limb strength translates to fewer falls in older people.</p>

CI, confidence interval; HRQoL, health-related quality of life; RCT, randomised controlled trial

Table 2 | Relevant ongoing randomised trials of yoga for people aged 60 years and over

Trial name	Location	Participants	Intervention/comparison	Primary outcome	Secondary outcomes
SAGE – Successful AGEing yoga trial <sup>10</sup> (ACTRN12619001183178)	Australia	560 community-dwelling people aged ≥60 years	<p><u>Intervention:</u> Group-based yoga programme including postures to challenge balance and build leg strength (80 sessions [two per week over 12 months] + home practice)</p> <p><u>Comparison:</u> Self-managed yoga relaxation programme with content that emphasises breathing and relaxation</p>	Falls over 12 months (falls will be self-reported using monthly falls calendars)	Mental well-being, physical activity, HRQoL, self-efficacy for activity-specific balance, physical function, pain, sleep quality, healthcare resource use
The Gentle Years Yoga Trial <sup>11</sup> (ISRCTN13567538)	United Kingdom	586 community-dwelling people aged ≥65 years with ≥2 chronic conditions	<p><u>Intervention:</u> Usual care + group-based yoga programme (British Wheel of Yoga Gentle Years Yoga®; 12 sessions [one per week over 12-14 weeks] + home practice)</p> <p><u>Comparison:</u> Usual care alone</p>	HRQoL over 12 months (HRQoL will be measured using the EuroQol 5-Dimension 5-level utility score)	Falls (self-reported in 3-, 6- and 12-month case report forms), depression, anxiety, HRQoL, loneliness, adverse events, healthcare resource use

HRQoL, health-related quality of life

## Figures

Suggestions from iStock:

- (1) <https://www.istockphoto.com/au/photo/senior-people-and-coach-doing-yoga-in-gym-gm860152660-142177959>
- (2) <https://www.istockphoto.com/au/photo/senior-woman-practicing-tree-pose-with-friends-gm928804460-254731231>
- (3) <https://www.istockphoto.com/au/photo/senior-people-standing-in-warrior-pose-at-gym-gm818938040-132503049>

**Fig 1** Example yoga postures that may improve balance and strength