

Stepping On scale up in NSW: evaluation studies and related publications



Executive Summary

Introduction: *Stepping On* is a fall prevention program underpinned by behaviour change and exercise, involving seven weekly group sessions on a variety of fall prevention topics and home exercise. It is targeted at community-dwelling people aged ≥ 65 years with intact cognition and who walk unaided but who are at risk of falls. *Stepping On* was found to reduce the rate of falls by 31% in a randomised trial in Australia [1] and has been implemented and tested in the USA [2, 3]. The New South Wales Health Department has been delivering *Stepping On* since 2008.

Methods: Four projects evaluating the delivery of *Stepping On* across NSW were supported by an NHMRC Partnership Grant with NSW Health as the partner. This report summarises 4 peer-reviewed publications from these projects and 7 related peer-reviewed publications also supported by this NHMRC Partnership Grant.

Results:

- Paper 1. Lasting impacts of *Stepping On* participation were reported for exercise and walking behaviour in a survey of 291 participants 6 months after program completion.
- Paper 2. At a state-wide population level there was no indication of reduced fall-related ambulance use or hospital admissions as seen from the delivery of the program to 10,000 eligible people. Ambulance callouts for falls in people aged 75-84 years may have reduced following program participation.
- Paper 3. Initial program benefits for health service usage were observed in the 12 months following program participation but tapered off over time in an analysis of 3 years of service use before and after program participation in 9163 *Stepping On* participants.
- Paper 4. Overall fall-related health service use among the target population of older adults increased over time. *Stepping On* appeared to mitigate participants' rising fall-related health service use in a comparison between 1452 *Stepping On* participants and 5799 matched controls from the 45 and Up study.
- The other 7 papers supported by the grant presented the demographics of falls in NSW highlighting the rising rate of falls in NSW which are especially common in residential aged care and among people with neurological conditions, provide guidance on delivery of *Stepping On* and other programs to culturally and linguistically diverse populations and to men, and show the effectiveness of training health professionals to prescribe exercise for fall prevention.

Conclusions: Taken together these analyses suggest that *Stepping On* mitigates fall-related healthcare costs, particularly in the short term. Further strategies are required to maintain longer term exercise and fall prevention participation. Different strategies may need in those at lower and higher risk of falls who are not eligible for *Stepping On*. This evidence supports continued investment in *Stepping On* by NSW Health and guides delivery of *Stepping On* and other fall prevention initiatives.

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Grant details: Sherrington C, Clemson L, Lord SR. NHMRC Partnership Project Grant. Widespread implementation of interventions to prevent falls in older people. Commenced 2011. \$1,490,038. APP1016876.

Paper 1. *Stepping On* participant follow up survey.

Design: Survey of *Stepping On* participants prior to and 6 months after program completion.

Results: Baseline questionnaires were completed by 458 participants (mean age 77; standard deviation [SD] 6.7; 76% female). Both baseline and follow-up surveys were completed by 291 participants (64%; mean age 78; SD 6.9; 76% female). Program satisfaction was high: 251 participants (86%) completed the whole program, 284 (98%) said it increased their awareness of falls, and 284 (98%) would recommend *Stepping On* to others. There were statistically significant increases in the proportion of participants who reported doing regular balance and strength exercise (74% vs 24%; $p < 0.0001$) and using safe walking strategies (78% vs 51%; $p < 0.0001$), at follow-up compared with baseline. There was also a significant improvement in the Falls Behavioural Scale, indicating less risk-taking behaviour (mean increase 0.15 out of 4; 95% confidence interval [CI] 0.12, 0.19; $p < 0.0001$), and an increase in self-reported structured exercise (mean increase 2.0 hours per week; 95% CI 1.6, 2.5; $p < 0.0001$). The main motivators for, and barriers to, uptake of structured exercise included participants' health, availability and access to local programs, and the amount of time available to take part. Study limitations included the self-reported nature of the measures used and the large amount of missing data.



Conclusions: This study demonstrates the appeal of the *Stepping On* program, and its positive impact on fall prevention behaviours among adults in the community aged 65 years and older

Publication: Tiedemann A, Purcell K, Clemson L, Lord SR, Sherrington C. Fall prevention behaviour after participation in the Stepping On program: a pre-post study. *Public Health Research and Practice*. 2021Mar 10;31(1):30122004.

Full text:

<https://www.phrp.com.au/issues/march-2021-volume-31-issue-1/fall-prevention-behaviour-after-participation-in-the-stepping-on-program-a-pre-post-study/>

Paper 2. Statewide hospital and ambulance use prior to and after *Stepping On*.

Design: Routinely collected fall-related ambulance usage and hospital admissions in NSW residents aged ≥ 65 years between 2009 and 2015 were compared prior to and following the implementation of *Stepping On* using multilevel models.

Results: Between 2009 and 2014 the program was delivered in 1077 sites to 10 096 older adults. Rates of fall-related ambulance use and hospital admissions per 100-person-years were 1-2 in people aged 66-74, 4-5 in people aged 75-84 and 12-13 in people aged ≥ 85 . These rates increased over time ($p < .001$). The interaction between time and program delivery was not significant for fall-related ambulance use or hospital admissions. The time-related increase in fall-related ambulance usage in people aged 75-84 years may have been moderated by the *Stepping On* program (rate ratio 0.97, 95% CI 0.93-1.00, $p = .045$)

Conclusion: There was no indication of a reduced rate of fall-related ambulance use or hospital admissions across the entire sample. Ambulance call-outs for falls in people aged 75-84 years may have reduced following program participation.

Publication: Paul S, Li Q, Harvey L, Carroll T, Priddis A, Tiedemann A, Clemson L, Lord SR, Close JCT, Sherrington C. Scale-up of the *Stepping On* fall prevention program among older adults in NSW: program reach and fall-related health service use. *Health Promotion Journal of Australia*. 2021 Oct;32 Suppl 2:391-398.

Abstract:

<https://onlinelibrary.wiley.com/doi/10.1002/hpja.413>

Paper 3. Fall-related health service use by individuals before and after *Stepping On* participation.

Design: Routinely collected ambulance, emergency, hospital and mortality data for 9163 participants across NSW Local Health Districts between 2009 and 2015 were analysed for patterns in fall-related health service use three years before and after the *Stepping On* program.

Results: Overall fall-related health service use increased over the 6-year study period. There was a high period of usage prior to program participation, which decreased post-program, then appeared to increase again after 12–15 months. Subgroup analysis showed strongest post-program reductions for women. The results of this observational study need to be interpreted with caution.

Conclusion: Patterns of service usage suggest initial program benefits that taper off over time. Investment in ongoing fall prevention programs may be needed for lasting impacts.

Publication: Paul S, Taylor J, Tiedemann A, Harvey L, Close JCT, Lord SR, Dolja-Gore X, Carney R, Clemson L, Sherrington C. Patterns of health service use before & after a statewide falls prevention initiative for older adults at risk of falls. *Australasian Journal on Ageing*. 2022 Dec;41(4):542-553.



Full text:

<https://onlinelibrary.wiley.com/doi/full/10.1111/ajag.13053>

Paper 4. Fall-related health service in *Stepping On* participants and matched controls from the 45 and Up study.

Design. *45 and Up Study* participants who did and did not participate in *Stepping On* were identified in a 1:4 ratio. Rates of fall-related health service use from routinely collected linked data were compared between participants and controls over time with adjustment for confounders identified from a directed acyclic graph.

Results. Data from 1452 *Stepping On* participants and 5799 controls were analysed. Health service use increased over time and was greater in *Stepping On* participants (rate ratios (RRs) 1.47-1.82) with a spike in use in the 6-months prior to program participation. Significant interactions indicated differential patterns of health service use in participants and controls: stratified analyses revealed less fall-related health service use in participants post-program compared to pre-program (RRs 0.32-0.48), but no change in controls' health service use (RRs 1.00-1.25). Gender was identified to be a significant effect modifier for health service use. Best practice methods were used to maximise this study's validity, but cautious interpretation of results is required given its non-randomised nature.

Conclusions. *Stepping On* appeared to mitigate participants' rising fall-related health service use.

Publication: Paul S, Khalatbari-Soltani S, Dolja-Gore X, Clemson L, Lord SR, Harvey L, Tiedemann A, Close JCT, Sherrington C. Fall-related health service use in *Stepping On* program participants and matched controls: A non-randomised observational trial within the 45 and Up Study. *Age & Ageing*. 2022 Dec 5;51(12).

Full text:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9799214/>

Other publications enabled by this grant.

Paper 5. Trends in fall-related service use in NSW.

Design: Fall-related ambulance use and hospital admissions in NSW residents aged ≥ 65 years between 2006 and 2013 were obtained from routinely collected data.

Results: There were 314 041 occasions of fall-related ambulance use by older adults and 331 311 fall-related hospitalisations, of which 69% ($n = 227\ 753$) were for injurious falls. Fractures accounted for 57% of injurious hospitalisations. Slips and trips were the most common mechanism of falls requiring hospitalisation (52%). Residents of aged care facilities had a greater proportion of fall injury hospitalisations compared with people living in the community (85% and 65%, respectively).



Conclusions: Rates of fall-related ambulance use and hospitalisation were similar and continued to increase over time. Increased effort is needed to prevent falls and associated injury among older people in NSW, particularly among people living in aged care facilities. Ongoing monitoring of rates and the characteristics of people who fall are needed to determine the long-term impact of fall prevention interventions.

Publication: Paul S, Harvey L, Ryan T, Li Q, Boufous S, Priddis A, Tiedemann A, Clemson L, Lord SR, Mueke S, Close JCT, Lo S, Sherrington C. Trends in fall-related ambulance use and hospitalization among older adults in NSW from 2006 to 2013: a retrospective, population-based study. *Public Health Research & Practice*. 2017 Oct: 27(4).

Full text:

<https://www.phrp.com.au/issues/october-2017-volume-27-issue-4/trends-in-fall-related-ambulance-use-and-hospitalisation-among-older-adults-in-nsw-from-2006-to-2013-a-retrospective-population-based-study/>

Paper 6. Hospital admissions for falls among people with Parkinson's Disease in NSW.

Design: Retrospective study using hospital data in people aged ≥ 65 years hospitalized for a fall between 1 July 2005 and 31 December 2013 in NSW. Rates compared between people with and without Parkinson's Disease (PD).

Results: There were 342 265 fall-related hospital admissions in people aged ≥ 65 years during the study period, of which 8487 (2.5%) were for people with PD. Sixty-seven per cent of fall-related PD admissions were associated with injury and 35% were associated with fracture. People with PD had higher rate ratios for fall admissions (1.63, 95% CI 1.59-1.67) and injury (1.47, 95% CI 1.43-1.51) and longer median length of stay [9 (interquartile range 1-27) vs. 6 (interquartile range 1-20) days in people without PD; $p < 0.001$]. PD remained associated with increased length of stay after controlling for comorbidity, age, sex and injury ($p < 0.001$).

Conclusions: This study provides important benchmark data for hospitalizations for falls and fall injuries for older people with PD

Publication: Paul SS, Harvey L, Canning C, Boufous S, Lord SR, Close JCT, Sherrington C. Fall-related hospitalisation in people with Parkinson's disease. *European Journal of Neurology*. 2017 Mar; 24(3): 523-529.



Abstract:

<https://onlinelibrary.wiley.com/doi/10.1111/ene.13238>

Paper 7. Systematic review of cultural influences on exercise and falls prevention.

Design: Narrative synthesis of 19 published journal articles reporting qualitative data, 16 on exercise and 3 on broader fall prevention.

Results: An overarching theme emerged identifying the influence of cultural values and perceptions on program participation. Also, identified were motivational, social and environmental influences.

Conclusion: Exercise and fall prevention interventions need to be culturally appropriate and utilise the positive influences of social support, especially from physicians and family. Participation is influenced by cultural values and motivational, social and environmental factors. The meaning and importance of exercise can vary between and within cultures. Exercise and fall prevention interventions need to be culturally appropriate and utilise the positive influences of social support, especially from physicians and family. Providing information that falls can be prevented and the reasons why behaviours need to change will be more likely to encourage older people from CALD backgrounds to contemplate participation.

Publication: Jang H, Clemson L, Lovarini M, Willis K, Lord SR, Sherrington C. Cultural influences on exercise participation and fall prevention: a systematic review and narrative synthesis. *Disability and Rehabilitation*. 2016; 38(8): 724-732.

Abstract:

<https://www.tandfonline.com/doi/abs/10.3109/09638288.2015.1061606>

Paper 8. Provider perspectives on programs for culturally and linguistically diverse groups.

Design: Semi-structured in-depth interviews conducted with a convenience sample of 24 program providers implementing, delivering or supporting fall prevention programs including *Stepping On* for CALD groups.

Results: Two major themes emerged: (1) *extra layers of complexity* are needed in program planning, delivery, recruitment and enabling participation of older people from CALD background and (2) program leaders 'going the extra mile' influences success of the program. Complexity included accommodating the linguistic and sociocultural needs in planning the programs, knowing and using the 'right way' to reach and deliver the program to CALD groups and understanding the nuances of facilitating program participation. While it was important to ensure the acceptability and accessibility of the program for the older people from diverse CALD communities, it was the drive and determination of the program leader and their striving for cultural relevance that made the program possible. Sustainability and wider implementation require unique support and additional resources.

Conclusions: These findings can be used to improve the capacity of fall prevention programs to better respond to the growing diversity in needs and preferences among older populations in Australia and internationally.

Publication: Jang H, Lovarini M, Clemson L, Willis K, Lord S, **Sherrington C.** Fall prevention programs for culturally and linguistically diverse groups: program provider perspectives. *Ethnicity and Health.* 2021 Feb;26(2):299-317.

Abstract:

<https://www.tandfonline.com/doi/abs/10.1080/13557858.2018.1493436?journalCode=cet h20>

Paper 9. Men's perspectives following participation in *Stepping On* at Men's Sheds.

Design: Interviews of 11 men who had taken part in *Stepping On* at Men's Sheds

Results: Men's Sheds facilitated participation by being inclusive, male-friendly places, where *Stepping On* was programmed into regular activities and was conducted in an enjoyable, supportive atmosphere. Content challenged participants to think differently about themselves and their personal fall risk and provided practical options to address fall risk. Two major themes were identified: adjusting the mindset where men adopted a more cautious mindset paying greater attention to potential fall risks, being careful, concentrating and slowing down; and changing the ways where men acted purposefully on environmental hazards at home and incorporated fall prevention exercises into their routine schedules.



Conclusions: Practitioners can engage and support older men to address falls by better understanding men's perspectives on personal fall risk and motivations for action.

Publication: Liddle JLM, Jang H, Clemson LM, Lovarini M, Willis K, Lord SR, Sherrington C. Men's perspectives on fall risk and fall prevention following participation in a group-based program

conducted at Men's Sheds, Australia. *Health & Social Care in the Community*. 2017; 25(3): 1118-1126.

Abstract:

<https://onlinelibrary.wiley.com/doi/10.1111/hsc.12412>

Paper 10. Masculinity and falls: insights from the experiences of men aged 70+ years.

Design: Interviews of 25 men, aged 70-93 years who had experienced a recent fall, participated in a qualitative semi-structured interview.

Results: Men's willingness to engage in fall prevention programs was related to their perceptions of the preventability of falls; personal relevance of falls; and age, health, and capability as well as problem-solving styles to prevent falls. Fall prevention advice was rarely given when men accessed the health system at the time of a fall.

Conclusions: Contrary to dominant expectations about masculine identity, many men acknowledged fall vulnerability indicating they would attend or consider attending, a fall prevention program. Health professionals can better engage men by providing consistent messages that falls can be prevented; tailoring advice, understanding men are at different stages in their awareness of fall risk and preferences for action; and by being aware of their own assumptions that can act as barriers to speaking with men about fall prevention.



Men accessing the health system at the time of the fall, and during rehabilitation following a fall represent prime opportunities for health professionals to speak with men about preventing falls and make appropriate referrals to community programs. Tailored advice will take account of individual men's perceptions of preventability; personal relevance; perceptions of age, health and capability; and problem-solving styles.

Publication: Liddle JLM, Lovarini M, Clemson LM, Jang H, Lord SR, Sherrington C, Willis K. Masculinity and preventing falls: insights from the fall prevention experiences of men aged 70 years and over. *Disability and Rehabilitation*. 2018 Jan: 1-8.

Abstract:

<https://www.tandfonline.com/doi/abs/10.1080/09638288.2017.1419381>

Paper 11. Fall prevention education for health and exercise professionals.

Design: Randomised trial among 200 health and exercise professionals from NSW. The intervention group participated in a 1-day face-to-face education workshop on exercise to prevent falls in older age. The waitlist control group received the education intervention after completion of the 3-month follow-up.

Results: The intervention significantly improved knowledge (between-group difference [BGD] 0.27 points out of a possible 6; 95% confidence interval [CI] 0.03, 0.51; $p = 0.03$), perceived clinical behaviour (RR 5.58; 95% CI 3.25, 9.59; $p < 0.001$), confidence (BGD 1.02/10 points; 95% CI 0.65, 1.39; $p < 0.001$) and the proportion of evidence-based exercise prescribed, in both the number of exercises (BGD 0.36; 95% CI 0.03, 0.68; $p = 0.03$) and percentage of participants who prescribed at least 2 hours/week of fall prevention exercise (RR 1.53; 95% CI 1.08, 2.15; $p = 0.015$).

Conclusions: The education workshop significantly improved participants' knowledge, confidence and behaviour regarding fall prevention exercise prescription.

Publication: Tiedemann A, Sturnieks DL, Hill A-M, Lovitt L, Clemson L, Lord SR, Sherrington C. Impact of a fall prevention education program for health and exercise professionals: a randomised controlled trial. *Public Health Research and Practice*. 2021 Sep 8;31(3):30342013.



Full text:

<https://www.phrp.com.au/issues/september-2021-volume-31-issue-3/impact-of-a-fall-prevention-education-program/>

Impact of *Stepping On* from the perspective of participants, family members and medical professionals.

"I found Stepping On extremely helpful and useful. It made me realise that there is more to life than just 'getting old.' Once I understood the reasons behind the exercise, I appreciated (why) they actually do work. I latched onto the (expert presentations) applicable to my situation. I can raise myself from chairs, the bed and with much greater ease; I have confidence when out walking, and apart from remembering 'heel-toe' when walking, looking straight ahead, I have no trouble getting around. In fact, I feel a 'new woman'." Fran



"We all have our abilities and disabilities. As we get older the disabilities become more obvious. You lose some sight, some hearing and maybe your balance is worse. But what you have done is focus on our abilities. No one else has done that." Nancy

I've had some near falls, but you have a quicker recovery and your muscles don't collapse.
Herbert

"My mum is now 91 but participated in a Stepping on program several years ago with my late stepfather. They called it doing her exercises. I recall her proudly telling me how she was able use the techniques from the Stepping on program to fall 'correctly' and get up, I truly believe this has given her a safer outcome from various falls at home where she was able to reduce the impact and get up carefully. Stepping on is a brilliant program and I speak highly of it to any older persons I meet that may benefit."

"I have been referring older people at risk of falls to this program for years now. My patients love the common-sense practical approach and many of them continue to do the exercises for years after. I see the benefit in more confident older people who understand about falls. It is very empowering for them. The biggest problem is that many want to do to again!"

Professor Susan Kurrle, Hornsby District Health Service



"I regularly refer to Stepping On from our Osteoporotic Refracture Prevention Service. My patients not only benefit from the program, they enjoy it! At a recent 12 month follow up a patient who had been a frequent faller proudly declared she had don the program and hadn't had a single fall in over 12 months."

Dr Lillias Nairn, North Shore Ryde Health Service

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1. Clemson, L., et al., *The effectiveness of a community-based program for reducing the incidence of falls in the elderly: a randomized trial*. Journal of the American Geriatrics Society, 2004. 52(9): p. 1487-94.
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3. Guse, C.E., et al., *Translating a Fall Prevention Intervention Into Practice: A Randomized Community Trial*. Am J Public Health, 2015. 105(7): p. 1475-81.

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2. Paul S, Li Q, Harvey L, Carroll T, Priddis A, Tiedemann A, Clemson L, Lord SR, Close JCT, Sherrington C. Scale-up of the Stepping On fall prevention program among older adults in NSW: program reach and fall-related health service use. *Health Promotion J Aust*. 2021 Oct;32 Suppl 2:391-398.
3. Paul S, Taylor J, Tiedemann A, Harvey L, Close JCT, Lord SR, Dolja-Gore X, Carney R, Clemson L, Sherrington C. Patterns of health service use before & after a statewide falls prevention initiative for older adults at risk of falls. *Australasian Journal on Ageing*. 2022 Dec;41(4):542-553.
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5. Paul S, Harvey L, Ryan T, Li Q, Boufous S, Priddis A, Tiedemann A, Clemson L, Lord SR, Mueke S, Close JCT, Lo S, Sherrington C. Trends in fall-related ambulance use and hospitalisation among older adults in NSW from 2006 to 2013: a retrospective, population-based study. *Public Health Research & Practice*. 2017 Oct: 27(4).
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