

**Exercise after stroke to prevent falls,
enhance mobility and increase physical
activity:**

The Stroke Club Trial

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NSW FALLS PREVENTION NETWORK FORUM 2011

OVERVIEW

- Background
- Stroke Club Trial
- Translation into practice

BACKGROUND

Stroke facts

1. Stroke is Australia's second single greatest killer after coronary heart disease and a leading cause of disability.
2. In 2010, Australians will suffer around 60,000 new and recurrent strokes – that's one stroke every 10 minutes.
3. One in five people having a first-ever stroke die within one month and one in three die within a year.
4. The number of strokes will increase each year due to the ageing population
5. The FAST test is an easy way to recognise and remember the signs of stroke.
 - Face – Check their face. Has their mouth drooped?
 - Arms – Can they lift both arms?
 - Speech – Is their speech slurred? Do they understand you?
 - Time – Time is critical. If you see any of these signs call 000 now!

Source: www.strokefoundation.com.au

BACKGROUND

Stroke facts

6. In the next ten years more than half a million people will suffer a stroke.
7. Stroke kills more women than breast cancer.
8. **About 88 per cent of stroke survivors live at home and most have a disability.**
9. Close to 20 per cent of all strokes occur to people under 55 years old.
10. Strokes cost Australia an estimated \$2.14 billion a year.

Source: www.strokefoundation.com.au

BACKGROUND

Stroke in NSW

- Acute Stroke Units have been introduced
- Discharge Location¹
 - 52% directly home
 - 27% inpatient rehabilitation
 - 21% aged care facilities

¹Cadilhac DA et al Qual Saf Health Care. 2008 Oct;17(5):329-33.

BACKGROUND

Mobility

Poor mobility common after stroke

- walking speed and walking capacity is markedly reduced
- over 90% are unable to walk well enough to function effectively in the community¹

Physical activity levels are low

- as low as 1,389 steps/day²
- activity counts:

Stroke 5656 (SD 4091) vs Control:10,964 (SD 3804)³

1. Hill K et al Aust J Physio 1997; 43:173-180

2. Michaels K et al Top Stroke Reh 2007;14;5 -12

3. Alzahrani M et al JoP 2011;57: 47-51

Falls are common after stroke

- 50-73% will fall within 6 months of discharge from hospital^{1,2,3}
- 1 in 2 female stroke survivors continue to fall each year⁴
- people after stroke are 4 times more likely to suffer a fracture in a fall⁵

¹ Mackintosh SFH et al Aging Clin Exp Res 2005; 17:2 1-8

² Batchelor F et al Stroke 2010; 41:1715-1722

³ Macintosh SFH et al Clin Rehab 2005; 19:441-451

⁴ Lamb SE et al Stroke 2003 34:494-501

⁵ Ramnemark A et al Osteoporos Int 1998;8;2-95

BACKGROUND

Research

- **Good evidence exercise can enhance mobility after stroke¹⁻⁴**
 - yet ongoing exercise opportunities are non-existent
- **Good evidence that well-designed exercise programs can prevent falls in older people^{5,6}**
 - ?? whether exercise can prevent falls after stroke⁷

¹Outpatient Service Trialists. *Lancet*. 2004 Jan 31;363:352-356.

²Dean CM et al *Arch of Phys Med Rehabil*. 2000;81:409-17.

³Ada L et al *Arch Phys Med Rehabil*. 2003;84:1486-91.

⁴Pang MY et al *J Am Geriatr Soc*. 2005;53:1667-1674.

⁵Sherrington C et al *J Am Geriatr Soc*. 2008;56:2234-2243

⁶Gillespie LD, *Cochrane Database Syst Rev*. 2009 Apr 15;(2):CD007146.

⁷Batchelor F et al *Stroke* 2010; 41:1715-1722

The Stroke Club Trial Investigators

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- Catherine Kirkham
- Sandra O'Rourke
- Ruth Barker
- Funding: NSW Health Promotion Research Demonstration Grant



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Questions

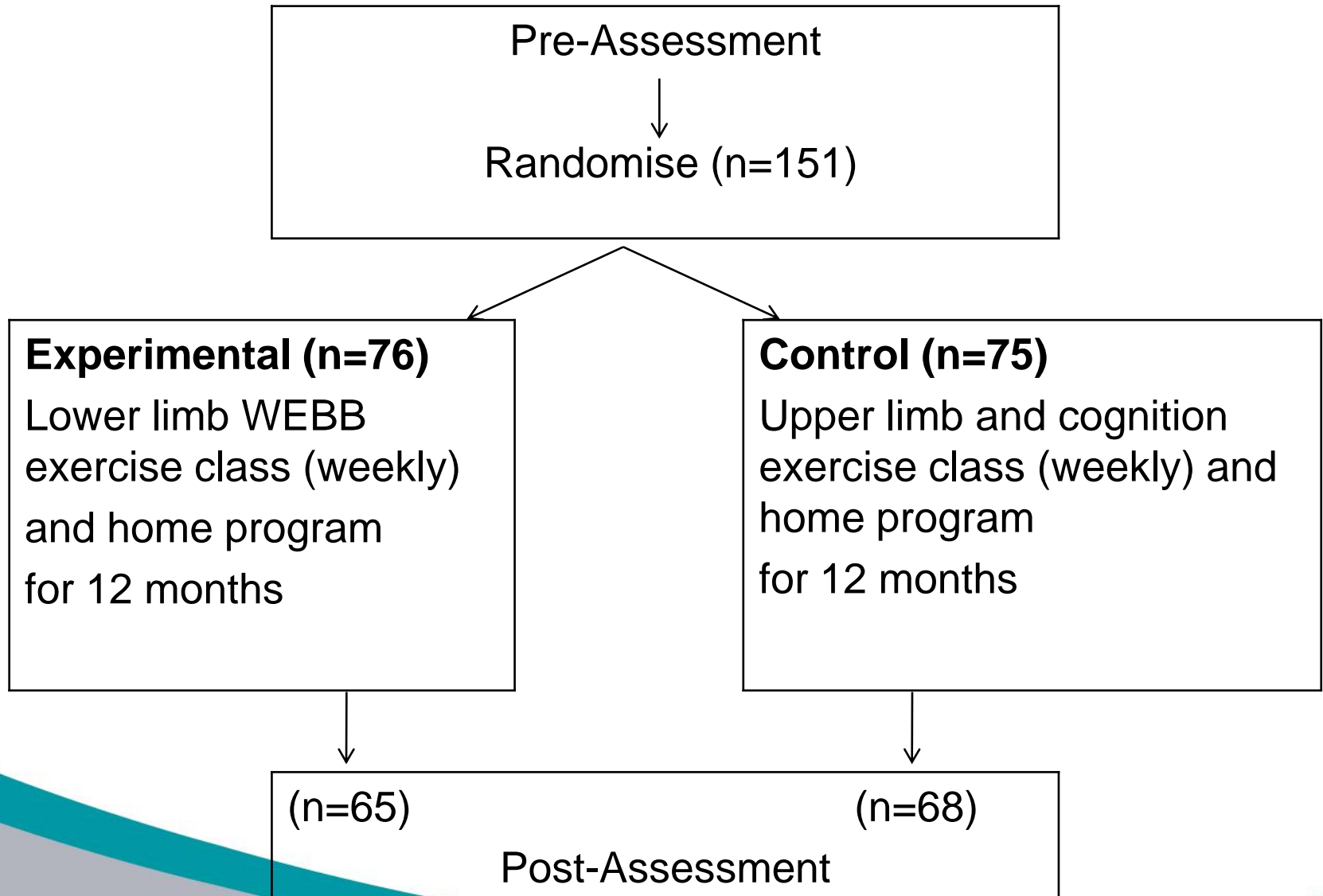
Primary Research Question

- Effect of the **Weight-bearing Exercise for Better Balance (WEBB) program** on falls, walking capacity and speed, among community dwelling stroke survivors

Secondary Research Questions

- Effect of the WEBB program on physical activity levels, community participation, health status and health service utilisation
- Is the network of the NSW Stroke Recovery Association's Stroke clubs an effective and sustainable way of providing an ongoing exercise intervention?

Design



Participants

Inclusion criteria

- attend local stroke club
- one or more strokes
- able to walk 10 m independently
- medical clearance
- informed consent

Exclusion criteria

- cognitive impairment (MMSE <20)
- insufficient communication skills to participate safely
- medical condition which precludes exercise

Intervention

Experimental

WEBB program

- Sit-to-stand
- Semi squats
- Reaching in standing
- Walking in different directions
- Stepping up onto blocks
- Stairs
- Resistance training

Dose

- Exercise class 40 x 45-60 min
- Home program 3 x 45 min/wk
- Advice to walk



Intervention

Control

Upper limb and cognitive exercise

- strengthening exercises
- dexterity training
- task practice
- management of contracture
- sorting tasks
- matching tasks
- sequencing tasks

Dose

- Exercise class 40 x 45-60 min
- Home program 3 x 45 min/wk
- Advice to use arm



Primary Outcomes

Falls

- proportion of fallers, rate of falls

Walking capacity

- 6-min walk test → distance in m

Walking speed

- 10-m walk test → speed in m/s

Secondary Outcomes

Physical activity

- 7 day pedometer count (steps/day)

Falls risk

- PPA Score

Quality of life

- SF 12v2

Participation

- Adelaide Activities Profile

Impairment measures

- Choice stepping reaction time (s)
- Knee extensor strength (kg)
- Maximal sway (mm)
- Coordinated stability test (errors)
- Single leg stance time (s)

Activity measures

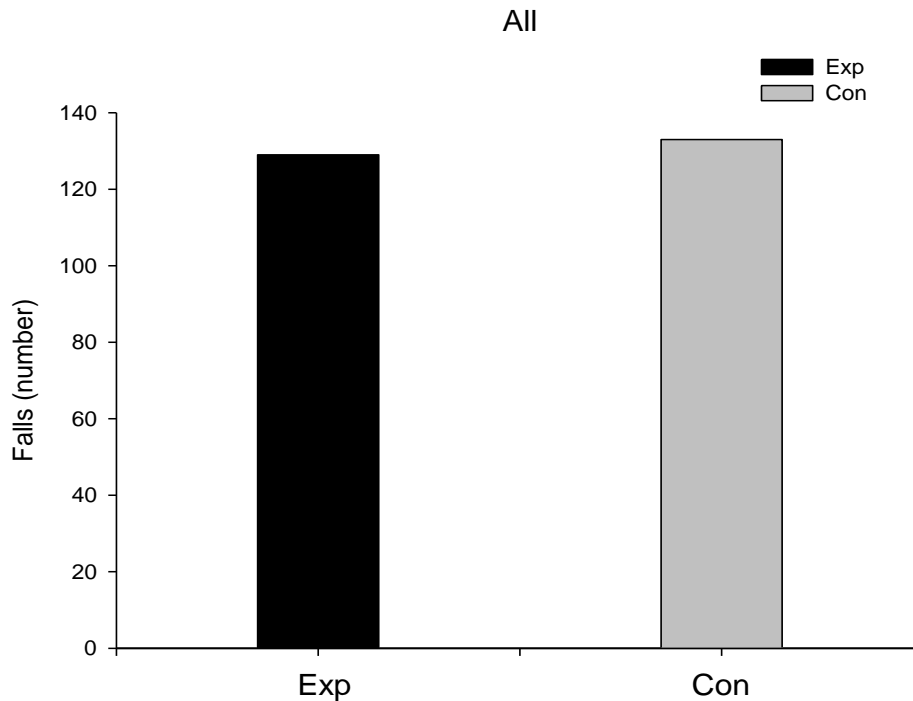
- Timed 5 STS (s)
- TUG (s)
- Step test (#)

Flow through trial

- 309 participants screened
- 151 randomised, 18 withdrew
 - Mean age: 67 years (SD 12, range 31-91)
 - Time since stroke: 6 years (SD 6, range 0 -25)
- 11 Stroke Clubs, 1 withdrew
- 8 physiotherapists
- Adherence
 - Exp 51% (SD 26)
 - Con 49% (SD 29)

Results

Falls



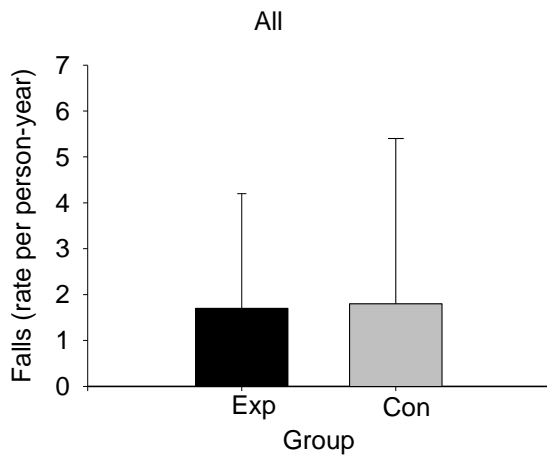
Experimental group n=76
47 (62%) people fell

Control group n=75
38 (51%) people fell

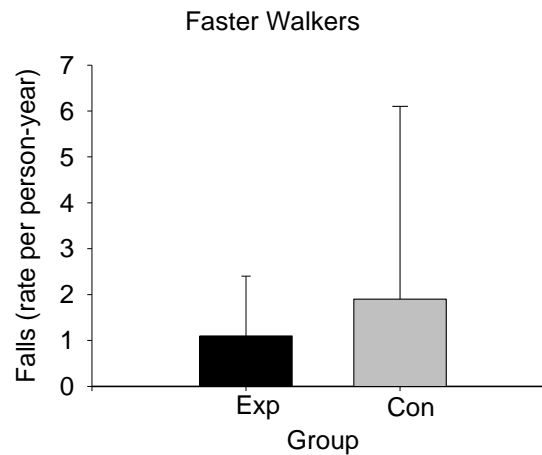
RR (of being a faller) 1.22
(95% CI 0.91-1.62, p=0.19)

Results

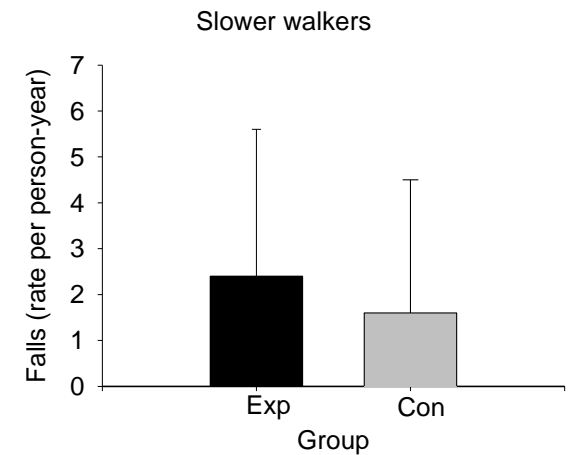
Rate of Falls



IRR 0.96
(95% CI 0.59 to 1.51)



IRR 0.58
(95% CI 0.28 to 1.17)

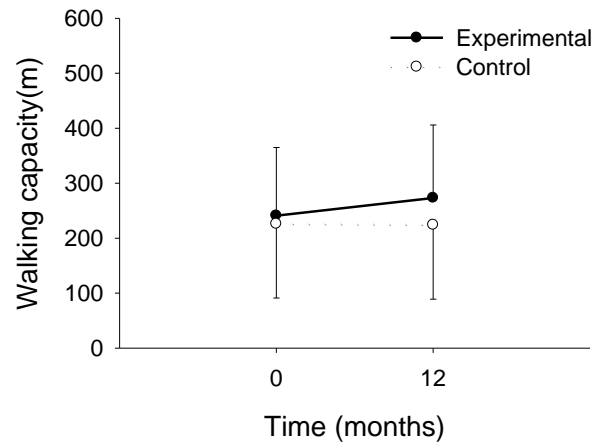


IRR 1.46
(95% CI 0.77 to 2.80)

Results

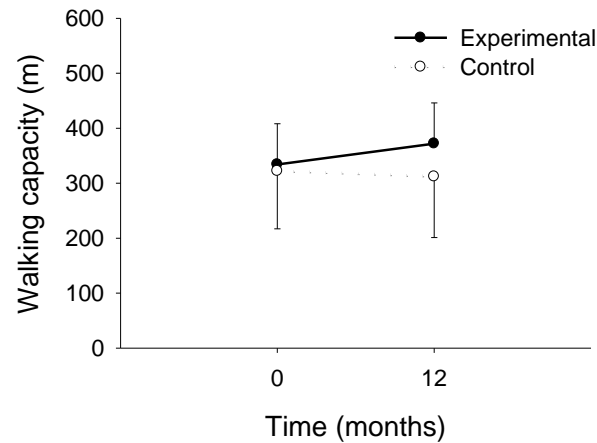
Walking capacity

All



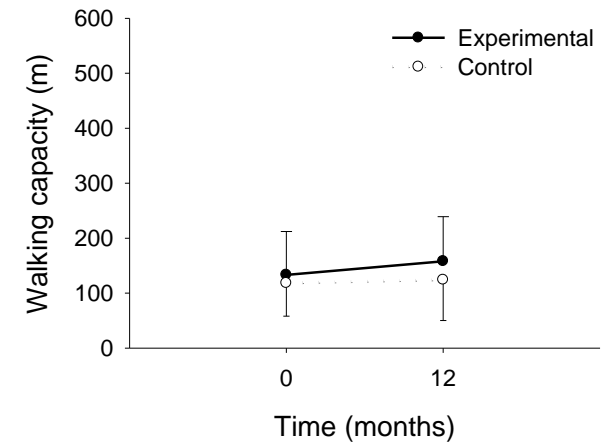
MD 34m
(95% CI 19 to 50)

Faster walkers



MD 49m
(95% CI 25 to 72)

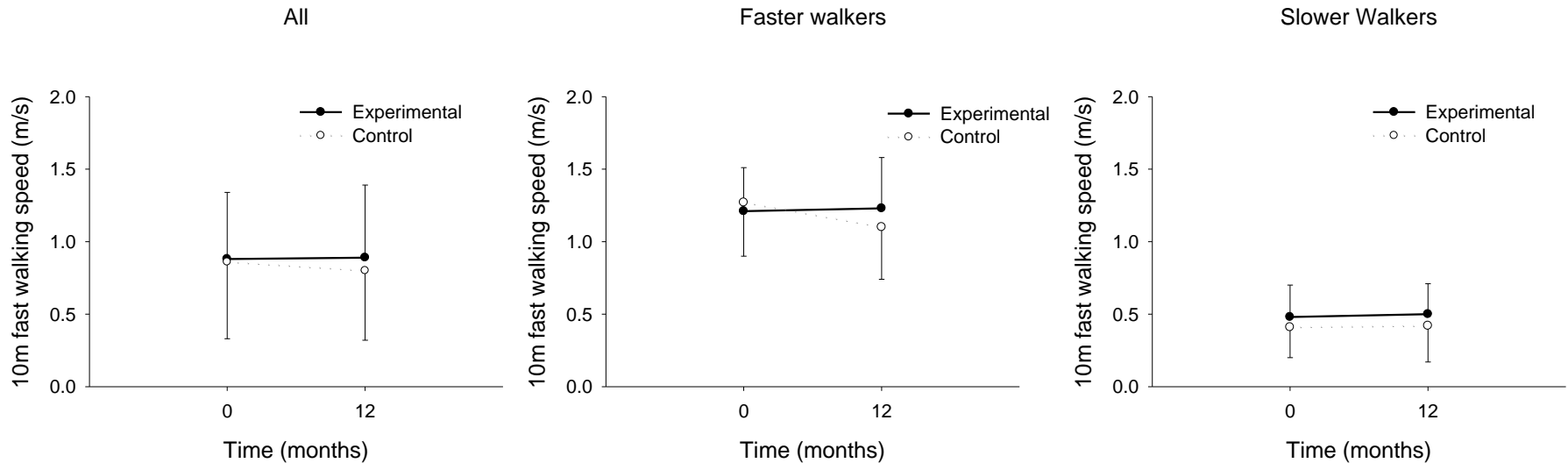
Slower walkers



MD 17m
(95% CI -1 to 36)

Results

Walking speed



MD 0.07m/s
(95% CI
0.01 to 0.14)

MD 0.12m/s
(95% CI
0.03 to 0.21)

MD 0.01m/s
(95% CI
-0.07 to 0.1)

Results

Secondary outcomes

Secondary outcomes	Groups				Difference within groups		Difference between groups Month 12 adjusted for Month 0 Exp minus Con
	Month 0		Month 12		Month 12 minus Month 0		
	Exp (n=76)	Con (n=75)	Exp (n=76)	Con (n=75)	Exp (n=76)	Con (n=75)	
<i>Falls Risk</i>							
Physiological Profile assessment (Score)	3.1 (1.3)	2.8 (1.2)	3.0 (1.6)	2.9 (1.4)	0.0 (1.1)	0.1 (1.2)	-0.02 (-0.4 to 0.4, p=0.93)
<i>Physical Activity</i>							
7 day Pedometer count (steps/day)	3,417 (2,702)	3,284 (3,325)	4,365 (3,350)	3,357 (3,256)	738 (2056) n=64	148 (1963) n=62	622 (-88 to 1332, p=0.09)
<i>Quality of Life</i>							
SF12v2 Physical Composite (0-100)	37 (10)	33 (9)	37 (9)	35 (10)	0 (9)	2 (9)	0 (-3 to 3, p=0.98)
SF12v2 Mental Composite (0-100)	50 (11)	50 (12)	50 (10)	50 (11)	0 (11)	0 (12)	0 (-3 to 3, p=0.96)
<i>Participation: Adelaide Activities Profile Domains*</i>							
AAP Domestic Chores (0-24)	12.0 (6.9) n=70	10.8 (7.3) n=68	12.7 (7.8) n=62	10.4 (7.3) n=67	-0.1 (4.3) n=58	-0.4 (4.1) n=61	0.4 (-1.1 to 1.9, p=0.63)
AAP Household Maintenance (0-21)	7.5 (5.1) n=69	7.7 (5.1) n=69	8.3 (5.1) n=61	7.1 (5.1) n=65	0.4 (3.6) n=56	-0.8 (4.3) n=60	1.2 (-0.2 to 2.5, p=0.09)
AAP Service to Others (0-15)	4.5 (2.9) n=69	4.7 (3.3) n=68	5.5 (3.1) n=62	4.5 (2.5) n=64	0.5 (2.7) n=57	-0.4 (2.6) n=59	0.9 (0 to 1.7, p=0.04)
AAP Social Activities (0-12)	5.1 (1.6) n=67	4.8 (2.0) n=69	5.0 (2.1) n=62	5.5 (2.2) n=66	-0.3 (2.2) n=55	0.6 (2.4) n=61	-0.8 (-1.6 to -0.1, p=0.04)

Results

Secondary outcomes

Impairment and activity Outcomes	Groups				Difference within groups		Difference between groups
	Month 0		Month 12		Month 12 minus Month 0		Month 12 adjusted for Month 0
	Exp (n = 76)	Con (n = 75)	Exp (n = 65)	Con (n = 68)	Exp (n = 65)	Con (n = 68)	Exp minus Con
Impairment: Dexterity							
Choice Stepping Reaction Time (s)	63.5 (30.8)	61.0 (29.4)	58.7 (31.4)	67.7 (34.6)	-4.4 (28.9)	6.6 (33.5)	-10.3 (-20.0 to -0.5, p=0.04)
Impairment: Strength							
Affected Knee Strength (kg)*	19.9 (10.2)	18.3 (8.7)	20.5 (8.4)	18.6 (8.4)	0.4 (7.7)	0.1 (6.9)	0.95 (-1.2 to 3.1, p=0.38)
Intact Knee Strength (kg)*	25.0 (10.7)	23.9 (10.1)	26.6 (8.5)	23.0 (10.6)	1.2 (7.3)	-1.3 (9.5)	3.0 (0.4 to 5.5, p=0.03)
Impairment :Balance							
Maximum Sway Range (mm)	114 (57)	117 (61)	123 (70)	118 (67)	9.3 (60.7)	2.7 (61.0)	6 (-13 to 26, p=0.53)
Coordinated stability (error)	211 (197)	201 (193)	194 (208)	233 (223)	-12 (12)	26 (151)	-38 (-91 to 15, p=0.16)
Single Leg Stance-Intact (s)	5.0 (8.0)	5.5 (8.6)	6.2 (8.9)	6.5 (13.5)	1.2 (10.0)	0.9 (8.4)	0.1 (-3.0 to 3.3, p=0.93)
Single Leg Stance-Affected (s)	1.5 (2.4)	1.8 (4.5)	3.1 (6.6)	2.2 (6.2)	1.5 (5.5)	0.3 (2.8)	1.3 (-0.1 to 2.8, p=0.08)
Activities							
Timed 5 STS (s)	23.7 (14.3)	24.2 (13.9)	20.4 (12.6)	23.4 (15.9)	-1.9 (6.0)	-1.2 (12.9)	-1.1 (-4.5 to 2.4, p=0.54)
Timed Up and Go (s)	25.0 (28.3)	30.2 (32.9)	26.3 (34.7)	28.6 (28.3)	4.2 (27.1)	-1.2 (18.3)	5.1 (-2.9 to 13.1, p=0.21)
Step test Intact (#)	5.7 (4.5)	5.9 (4.4)	6.3 (5.1)	6.0 (6.0)	0.6 (2.9)	0.1 (3.5)	0.5 (-0.6 to 1.6, p=0.37)
Step Test Affected (#)	5.4 (4.0)	5.2 (4.1)	5.8 (4.5)	5.4 (5.3)	0.4 (2.8)	0.2 (3.2)	0.3 (-0.8 to 1.3, p=0.60)

Conclusion

- WEBB program improves walking capacity and speed
- WEBB program tends to decrease falls in faster walkers and increase them in slower walkers
- Therefore, implement in faster walkers, be cautious in moderate walkers and find alternative mobility and falls prevention programs for slower walkers

Translation into practice

Challenges during trial

- Recruitment
- Adherence
- Sustainability

Translation into practice

Recruitment

- 350 recruitment target, only screened 309
 - In Australia, 350,000 stroke survivors, 88% at home, 80% disability
- Issue of identifying stroke survivors
 - Australian Stroke Clinical Registry (AuSCR)
- Overcoming barriers to exercise

Translation into practice

Adherence

- Dosage
- Modest class adherence and diminishing concordance with home program
 - 50% of intended classes or 60% available classes
 - Records of home program poor
- Strategies to increase adherence

Translation into practice

Sustainability

- 69 participants offered ongoing exercise
 - 26 participants (38%) completed a class
 - 18 participants (26%) participated regularly
 - \$6.00 class fee, \$1,272 collected = 212 class fees
- 5 clubs expressed interest in ongoing exercise
 - Only 1 club secured an exercise professional
- 61 participants referred to Heartmoves,
 - 9 (14%) had taken up the referral
 - 3 (5%) at a venue outside stroke club

Translation into practice

Overcoming barriers to exercise

- **Four main barriers to exercise after stroke have been identified^{1,2,3}**
 - Physical disability
 - Lack of knowledge about appropriate programs
 - Lack of motivation
 - Lack of transport

¹Rimmer JH et al *J Rehabil Res Dev* 2008; 45; 315-22.

²Damush Tet al *Rehabilitation Nursing* 2007; 32(6): 253-262

³National Stroke Foundation *Stroke Support Strategy* (2008)

Translation into practice

- Implementation considerations
 - Slower vs Faster walkers
 - Dose
 - Supervision
 - Nature of the program

Future research

- Falls are a significant issue after stroke
- Other studies
 - FLASSH- Batchelor F et al BMC Neurol. 2009 Mar 31;9:14.
 - LEAPS – Duncan P et al
- Further research needed
- Contact
 - catherine.dean@mq.edu.au

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- Physiotherapists: Cath Kirkham, Fran Moran, Heidi Janssen, Monte Elissa, Doris Lee, Enid Schafer, Meredith Schwilk, Jan Macphail, Sharon Czerniec and Rachelle Love
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- Members and volunteers of the following Stroke clubs: Blacktown, Bowral, Cronulla, Hornsby, Liverpool, Merewether, Mortdale, Mosman, Orange, Windsor and Woy Woy
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- Members of the Project Advisory Committee