

Exercise Interventions to Improve Balance Among Community-Dwelling Older Adults: A Systematic Review

Peg Allen, BSN, MPH; Wendy Auslander, PhD; The Brown School of Social Work, Washington University in St. Louis

Purpose of the Review

- Assess recent evidence on interventions to improve observed balance in community-dwelling seniors
- Build upon the Cochrane Musculoskeletal Workgroup's systematic review (Howe et al, 2007)
- Research questions:
 - What is the methodological rigor of the intervention studies?
 - Does type of exercise interventions influence outcome attainment?
 - Does intervention setting influence outcome attainment?
 - Does interventionist licensure influence outcome attainment?

Background



- Falls with hip fractures are a major threat to independent living
- Clinical trials in controlled settings are efficacious in improving balance among older adults, yet less is known about real world settings
- Howe et al (2007) found small but meaningful between-group balance improvements among older adults in studies published through June 2007

Methods: Literature Search

Inclusion Criteria

- Exercise intervention designed to improve balance
- Primary or secondary outcome measure of balance
- RCT or quasi-experimental design with control group
- Aged ≥ 60 and older, living independently
- N > 30 participants
- Intervention settings home, community, or outpatient
- Publication date July 2007 through April 2009
- Peer-reviewed journal articles only

Exclusion Criteria

- Study excluded if in 2007 or 2002 Cochrane review
- If study participants were in long-term care, assisted living, or rehabilitation facilities
- In physical therapy for condition affecting balance (Parkinson's disease, multiple sclerosis)

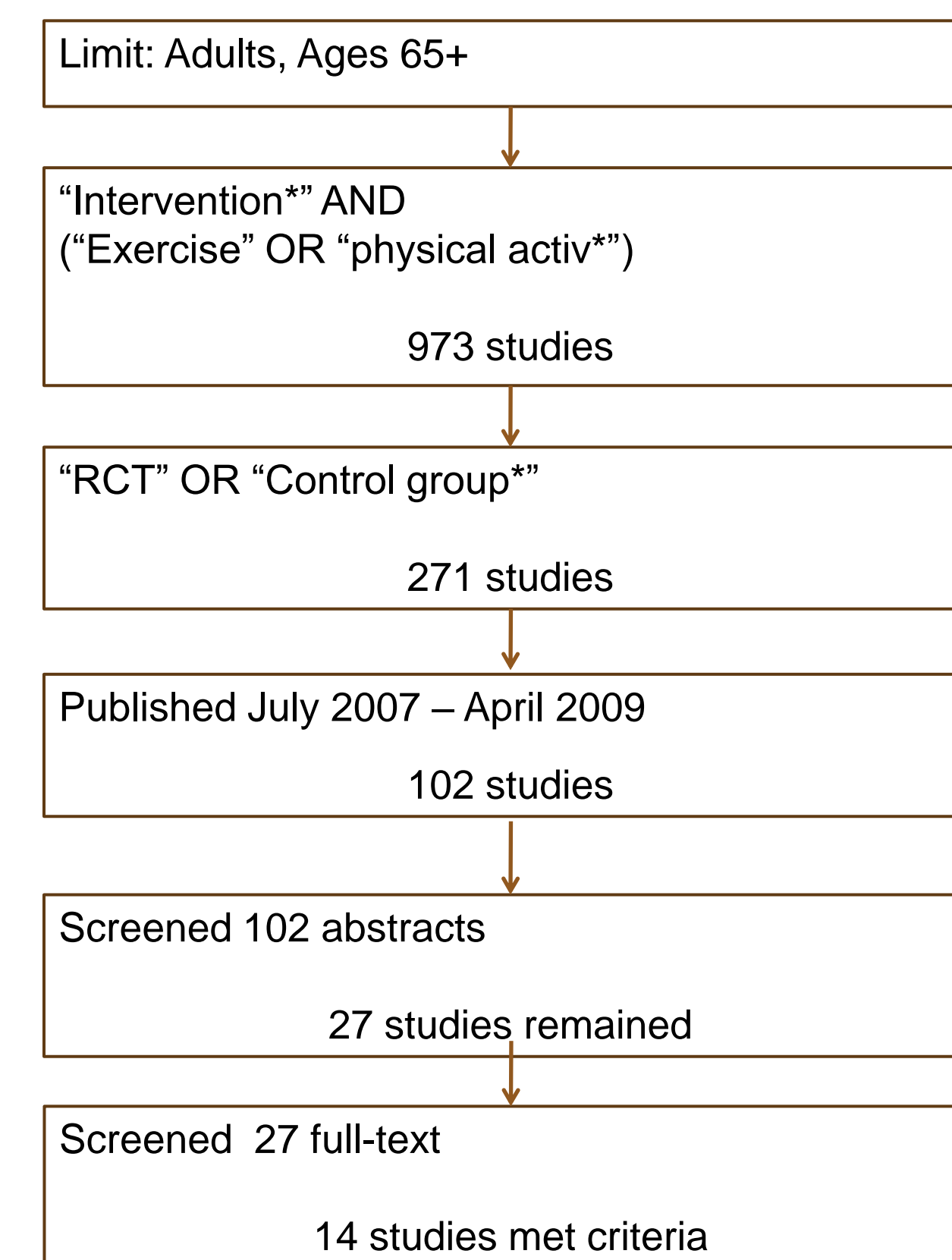
Databases Searched

- PubMed, CINAHL, PsychInfo, SociIndex, Academic Search Premier
- Manual search of bibliographies of studies found

Methods: Outcome Attainment Scale

Between-group differences in balance at follow-up were scored as:
 4 = Significant, with rigorous methods MQRS ≥ 11
 3 = Significant, MQRS < 11
 2 = Not significant, MQRS < 11
 1 = Not significant, MQRS ≥ 11

Methods: Literature Search



Methods: Description of Included Studies (N=14)

- 12 RCTs, 2 quasi-experimental study designs
- Intervention length ranged from 6 weeks to 6 months
- Follow-up varied from 6 weeks to 12 months

Results: Methodological Quality Rating Scale (MQRS)

Possible scores: 0 poor methods – 17 rigorous methods
 Observed range: 5 – 15 Median score: 10

Dimension	Maximum Points Assigned If:	Maximum Possible Points	# Studies Max Points	%
Analyses	Appropriate consideration of between-group differences	2	12	86%
Measures	Widely used previously tested measures	2	11	79%
Study Design	RCT, no baseline group differences	2	10	71%
Quality Control	Intervention standardized manual, procedures or training	1	10	71%
Follow-up Length	Followed for ≥ 9 months	2	8	57%
Statistical Power	Adequate power	1	6	43%
Adverse Effects	Described details, number and type of injuries if any	2	4	28%
Independence	Follow-up blind to intervention status	1	4	28%
Control Group	Attention control group	2	3	21%
Attrition	Random attrition only or corrected	2	2	14%

MQRS adapted from Miller et al, 1995

Results: Balance Outcome Attainment

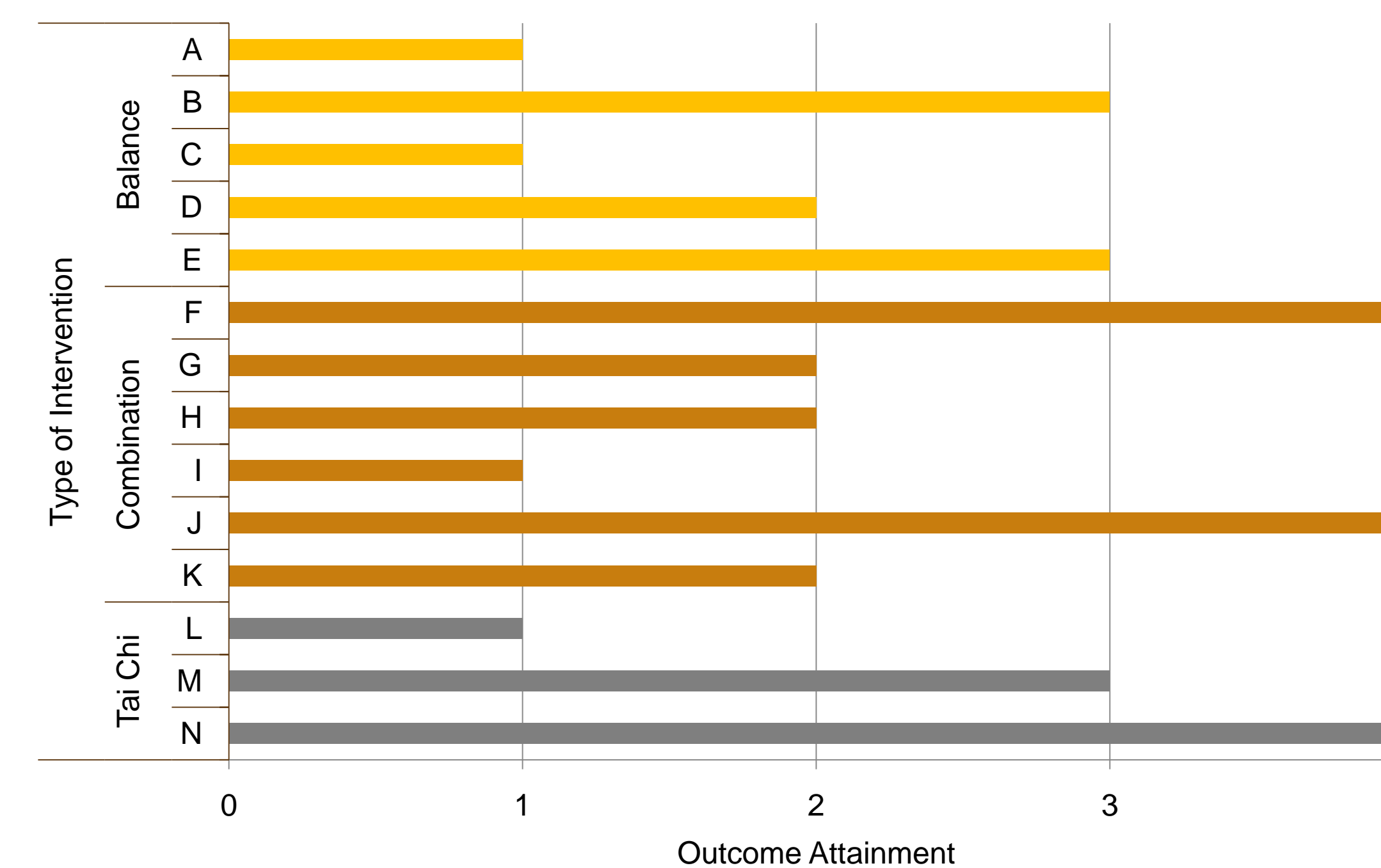
Primary outcome: Observed balance (multiple methods used)

Mean balance improvement differences between intervention and control groups were small but potentially clinically significant in 6 studies

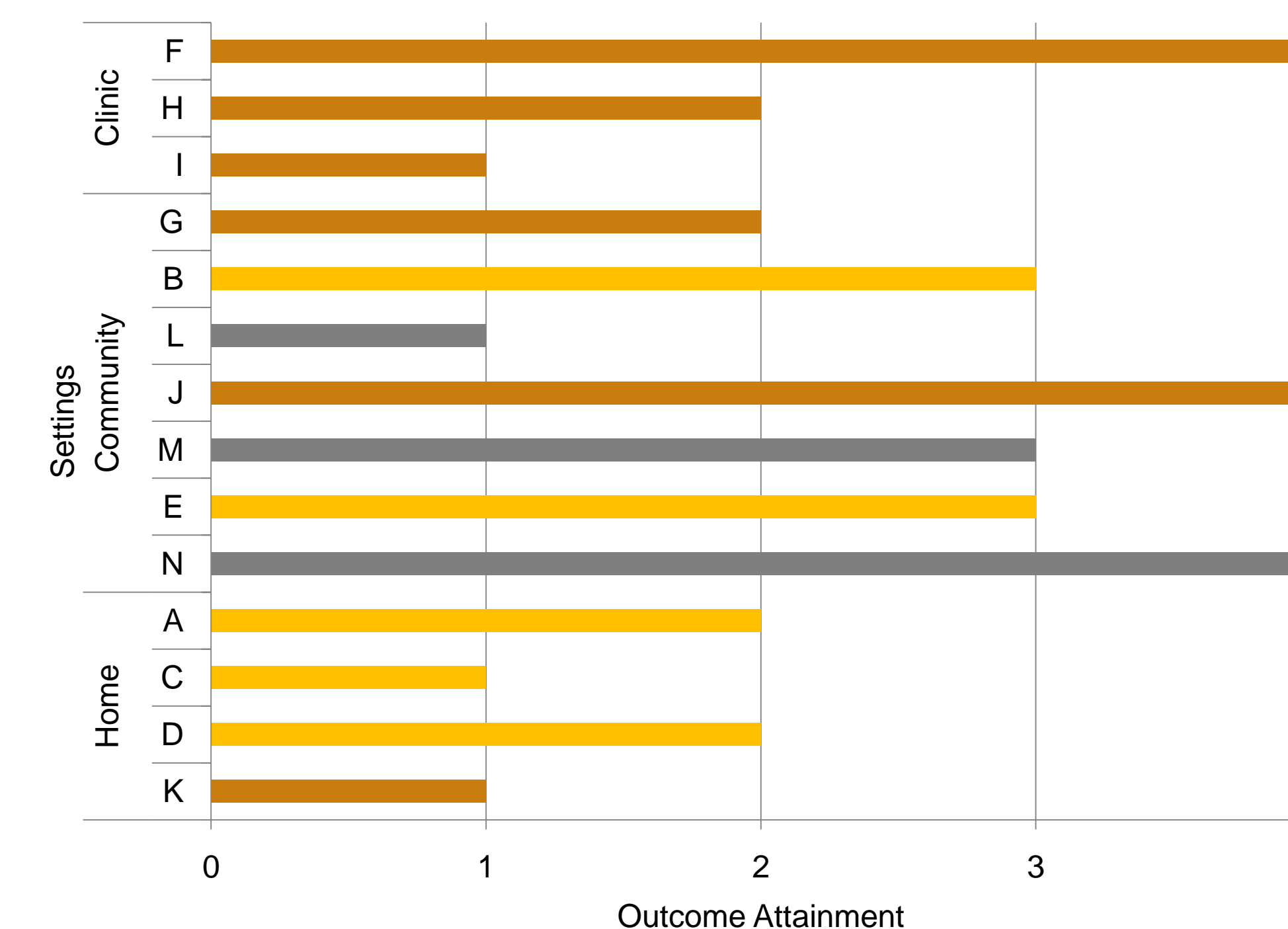
Of the 6 studies with significant between-group balance improvement, 3 were methodologically rigorous.

Results: Outcome Attainment Evidence for Improved Balance

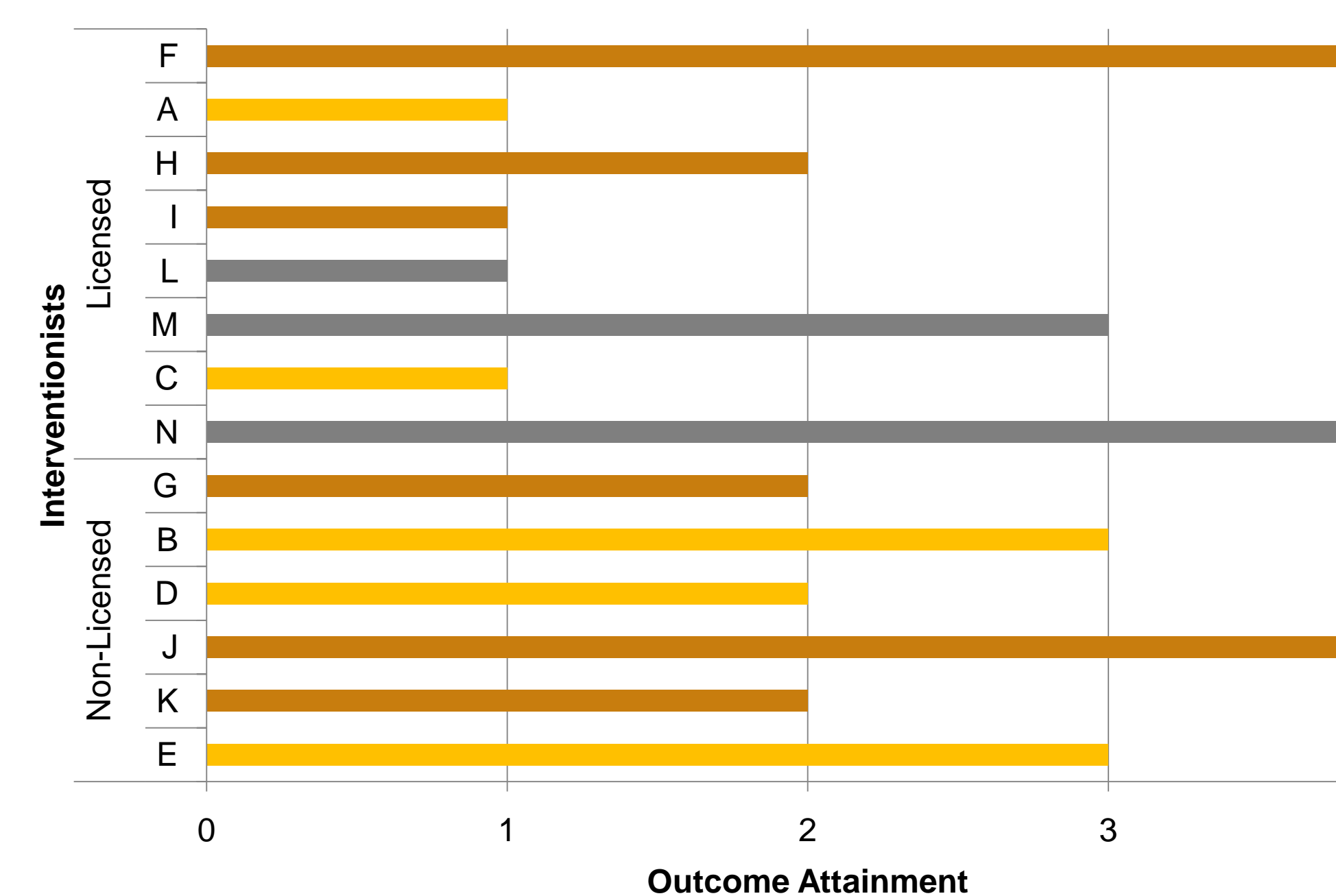
By Type of Intervention



By Setting



By Interventionist Licensure



Results: Falls (Secondary Outcome)

One of five studies that also measured the number of falls showed fewer falls in the intervention group than in the control group. Zero of five studies found differential improvement in falls efficacy scores.

Results: Outcome Attainment Evidence for Improved Balance

By Type of Intervention

- There was slightly stronger evidence for combined exercise interventions than for balance or Tai Chi exercise alone
- Combination interventions included walking, balance, and core and/or lower extremity strengthening exercises

By Setting

- All but one of the community-based studies were group interventions
- More evidence for community-based group interventions than with individuals in their homes

By Interventionist Licensure

- Studies with non-licensed interventionists were as effective as those with licensed personnel such as physical therapists or registered nurses

Limitations of the Review

- One person rated the 14 studies with the MQRS; thus we did not compute inter-rater reliability
- Observed balance was measured numerous ways, so no pooled effect sizes were possible
- External validity was not considered

Conclusions

- Group community-based interventions show potential, whether provided by licensed or trained non-licensed interventionists
- More community-based evidence is needed from studies with rigorous methods, especially those with adequate sample sizes per group

References

- Auslander, W., Ollie, M., Tracey, C., & Yu, M. (2004). Teaching Social Work Students To Synthesize and Evaluate Evidence-Based Interventions. Oral Presentation at the Council of Social Work Education, February, 29, Anaheim, CA.
- Howe, T. E., Rochester, L., Jackson, A., Banks, P. M., & Blair, V. A. (2007). Exercise for improving balance in older people. *Cochrane Database of Systematic Reviews* (4), CD004963.
- Miller, W.R., et al. (1995). What works? A methodological analysis of the alcohol treatment outcome literature. In R.K. Hester & W.R. Miller (eds), *Handbook of Alcoholism Treatment Approaches: Effective Alternatives*. (2nd ed., pp 12-44). Needham Heights, MA: Allyn & Bacon.
- Studies:
- Beyer, et al. (2007). *Aging and Clinical Experimental Research*, 19(4), 300-309.
- Cyarto, et al. (2008). *American Journal of Health Promotion*, 23(1), 13-17.
- Elley, et al. (2008). *Journal of the American Geriatrics Society*, 56(8), 1383-1389.
- Filiatrault, et al. (2008). *Archives in Physical Medicine and Rehabilitation*, 89(10), 1948-1957.
- Liu-Ambrose, et al. (2008). *Journal of the American Geriatrics Society*, 56(10), 1821-1830.
- Logghe, et al. (2009). *Journal of the American Geriatrics Society*, 57(1), 70-75.
- Rosie & Taylor. (2007). *Age and Ageing*, 36(5), 555-562.
- Rydwik, et al. (2008). *Aging and Clinical Experimental Research*, 20(2), 159-170.
- Sherrington, et al. (2008). *Clinics in Rehabilitation*, 22(6), 493-502.
- Shumway-Cook, et al. (2007). *Journal of Gerontology Series A Biological Sciences and Medical Sciences*, 62(12), 1420-1427.
- Vestergaard, et al. (2008). *Aging and Clinical Experimental Research*, 20(5), 479-486.
- Voukelatos, et al. (2007). *Journal of the American Geriatrics Society*, 55(8), 1185-1191.
- Westlake & Culham. (2007). *Physical Therapy*, 87(10), 1274-1283.
- Yang, et al. (2007). *Medical Sciences Monitor*, 13(8), CR339-348

Contact Information

Peg Allen pallen@qwbmail.wustl.edu Wendy Auslander wendyaus@wustl.edu