



Balance Confidence and Functional Ability in Older Adults Aged 77-100 Years

Michael E. Rogers	Department of Human Performance Studies, Center for Physical Activity and Aging, Wichita State University, Wichita, KS, USA
Nicole L. Rogers	Department of Public Health Sciences, Wichita State University, Wichita, KS, USA
Eiji Fujita	Department of Sport and Life Science, National Institute of Fitness and Sports in Kanoya, Kanoya, JAPAN
Nobuo Takeshima	Department of Sport and Life Science, National Institute of Fitness and Sports in Kanoya, Kanoya, JAPAN

ABSTRACT

Balance confidence is a concern about falling that often restricts daily activities and functioning in older adults. This study examined the relationships between functional fitness, daily activities, and balance confidence in 92 (35 men, 57 women) adults aged 77 to 100 years ($M = 85.7$, $SD = 5.1$). Participants were dichotomized into groups (low or high balance confidence) utilizing the median score (85.6/100) as the dividing point. Results indicated that older adults with high scores also had low functional abilities and greater self-reported difficulty performing activities of daily living. Further research is needed to assess the effects of specific intervention programs to improve function and balance confidence in older adults.

KEYWORDS

Falls, Aging, Fear, Physical Activity, Fitness

Falls by older adults are a significant public health issue. One-third of adults aged 65 and older fall each year. For older adults, the most frequent cause of admission to a hospital for injury or trauma is a fall, and falls are the leading cause of injury-related death for adults in this age group (Centers for Disease Control and Prevention, 2007). Falls can lead to a loss of independence, a decline in physical function and activity, higher rates of nursing home placement, and major economic consequences for individuals and families (Bell et al., 2000; Stevens et al., 2006).

Due to the high incidence and severity of fall-related injuries, many perceive a fall as the end of independence and the beginning of a more dependent lifestyle. Physical injury is only one aspect of the consequences of a fall. The fear of suffering a fall often severely restricts travel, social activities, and exercise, resulting in social isolation and depression. One quarter of elderly people who have fallen report that they avoid essential activities such as mobility in the home, bathing, and dressing because they fear another fall (Tinetti et al., 1988).

Fear of falling (FOF) is common among older adults, even among those who have not experienced a fall. A product of this fear is decreased activity. Believed to be a strategy to reduce falls, restricted activity will likely result in physical deconditioning, consequently increasing the risk of falling. Therefore, by restricting physical activity, FOF presents serious health consequences including functional decline, frailty, decreased mobility, isolation, and lower life satisfaction in older adults. Thus, it is possible that those with a greater FOF would demonstrate lower functional fitness. If this were true, it is possible that physical activity programs may in turn reduce the FOF by increasing physical abilities and self-confidence. To better understand older adults' FOF, this study investigated the relationships between physical abilities and FOF.

Method

A total of 92 independently living older adults (men, $n = 35$; women, $n = 57$) aged 77-100 years ($M = 85.7$, $SD = 5.1$)

were recruited from a retirement community near Wichita, KS. To determine their FOF, participants completed the Activities-Specific Balance Confidence (ABC) Scale (Powell, & Myers, 1995). The ABC Scale examines the degree of confidence (ranked 1-10: 1 = no confidence, 10 = extreme confidence) an individual has for completing 16 activities of daily living performed inside and outside the home. Some of these activities include bending over to pick up a slipper from the floor, standing on the tip toes to reach for something above the head, walking across a parking lot to the mall, and stepping on or off of an escalator.

Participants also completed a series of assessments to evaluate mobility, balance, strength, flexibility, and ability to perform activities of daily living. The assessments included grip strength, tandem balance, 8' and 20' walking speed, timed up-&-go, chair stand, dumbbell curl, sit-&-reach, scratch test, and activities of daily living (ADL)/instrumental ADL (IADL) scales. Grip strength was measured with a handgrip dynamometer (Jamar, Inc.) according to the protocol established by Caldwell et al. (1974). The following tests were chosen because they have been shown to be valid measures of physical function in older adults (Guralnik et al., 1995; Rikli & Jones, 1999). Ability to maintain a standing position with one foot placed directly in front of the other (tandem balance rated on a Likert scale), the time to walk distances of 8' and 20' at a fast pace, and the time to rise from a chair, walk around a cone 8 feet in front of the chair, and return to the chair (timed up-&-go) were used to assess balance, agility, and mobility. Upper body strength and endurance were assessed by the number of times a dumbbell (5 pounds for women, 8 pounds for men) was curled in 30 seconds using the dominant arm. The number of stands from a chair completed in 30 seconds was used to assess lower body strength and endurance. Lower body flexibility was measured using a chair-based modification of the sit-and-reach test. Upper body flexibility was assessed by measuring the distance between the middle fingers when reaching over the shoulder with one arm and behind the back with the other arm (scratch test). The Katz ADL Scale (Katz et

al., 1963) was used to measure impairment in bathing, dressing, eating, continence, transferring, and toileting. One question was added about walking impairment. The seven tasks were scored from 0 (completely unable to perform) to 3 (able to perform without help), with a score of 21 representing the highest level of ability (i.e., least impairment). The Lawton IADL Scale (Lawton & Brody, 1969) was used to evaluate the ability to perform more advanced tasks including shopping, performing housework, and preparing meals. Eight activities were scored from 0 (completely unable to perform) to 2 (able to perform without help).

Results

Individual responses on the ABC Scale were averaged and converted to a percentage to give a total score. Scores ranged from 6.9 to 100%. Using the median ABC score (85.6/100) as a dividing point, subjects were dichotomized into groups that had either low or high FOF.

Functional fitness levels of the two groups were compared using one-way ANOVA. Results (Table 1) indicated that older adults with high fear of falling exhibit low functional abilities and greater self-reported difficulty performing ADL and IADL.

Table 1. Comparison of functional fitness between high and low fear of falling groups.

	Low FOF	High FOF	
Tandem balance (Likert)	2.3	3.1	p<0.001
Timed 8' walk (seconds)	2.2	3.5	p<0.001
Timed 20' walk (seconds)	5.3	8.3	p<0.001
Timed up-and-go (seconds)	7.3	16.0	p<0.001
30-sec chair rise (reps)	12.4	8.9	p<0.001
30-sec dumbbell curl (reps)	14.8	11.8	p<0.001
Grip strength (kilograms)	23.8	19.2	p<0.01
Chair sit-&-reach (inches)	-2.8	-4.6	p=0.02
Scratch test (inches)	-4.4	-6.8	p=0.04
ADL (points)	20.7	19.8	p<0.01
IADL (points)	13.4	10.4	p<0.001

Discussion

Among these very old adults living independently, those with high FOF had much lower functional fitness. In addition, those with high FOF report lower abilities to perform ADL and IADL, indicating increased difficulty completing common tasks. To reduce the risk of falling, older adults often avoid everyday activities such as walking to the store or climbing stairs. Many older adults also begin to avoid social activities outside the home. It is this inactivity, not aging per se, which often results in a loss of strength and balance, and may actually increase the risk of falling.

These findings support the expanding awareness that FOF is associated with impaired quality of life, and emphasizes the importance of interventions aimed at preventing and managing FOF as well as falling itself. Given the relationship between functional fitness and FOF, it is likely that appropriate physical activity programs designed to improve functional fitness could reduce FOF. The efficacy of intervention programs (e.g., exercise and balance training) to increase functional fitness levels in people who have reached the 9th and 10th decade of life requires attention. Programs that positively impact the functional fitness of those with high FOF may increase older adults' confidence when performing activities that contain components of physical balance; thus, enhancing the quality of life for this segment of the population. To improve functional status, intervention programs may include progressive exercises designed to improve balance and mobility skills. Such exercises could develop coordinated movement strategies for recovery of balance, improve the ability to anticipate postural adjustments prior to voluntary movements, and incorporate sensory (e.g., visual, vestibular, somatosensory) and motor strategies for controlling posture and balance. In addition, intervention programs may also include cognitive restructuring techniques to address negative thoughts or fears in older adults. However, further research is needed to determine the efficacy of such programs.

REFERENCES

- Bell, A.J., Talbot-Stern, J.K., & Hennessy, A. (2000). Characteristics and outcomes of older patients presenting to the emergency department after a fall: a retrospective analysis. *Medical Journal of Australia*, 173, 179-182. | Caldwell, L.S., Chaffin, D.B., Dukes-Dobos, F.N., Kroemer, K.H.E., Laubach, L.L., Snook, S.H., & Wasserman, D.E. (1974). A proposed standard procedure for static muscle strength testing. *American Industrial Hygiene Journal*, 35, 201-206. | Centers for Disease Control and Prevention. (2007). *The State of Aging and Health in America 2007*, Merck Company Foundation, Whitehouse Station, NJ, USA, 2007. | Guralnik, J.M., Ferrucci, L., Simonsick, E.M., Salive, M.E., & Wallace, R.B. (1995). Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. *New England Journal of Medicine*, 332, 556-561. | Katz, S., Ford, A.B., Moskowitz, A.W., Jackson, B.A., & Jaffe, M.W. (1963). Studies of illness in the aged. The index of ADL: A standardized measure of biological and psychosocial function. *Journal of the American Medical Association*, 185, 914-919. | Lawton, M.P. & Brody, E.M. (1969). The Instrumental Activities of Daily Living Scale. *Gerontologist*, 9, 179-186. | Powell, L.E., & Myers, A.M. (1995). The activities-specific balance confidence (ABC) scale. *Journal of Gerontology*, 50A, M28-M34. | Rikli, R., & Jones, J. (1999). Development and validation of a functional fitness test for community-residing older adults. *Journal of Aging and Physical Activity*, 7, 129-161. | Stevens, J.A., Corso, P.S., Finkelstein, E.A., & Miller, T.R. (2006). The costs of fatal and non-fatal falls among older adults. *Injury Prevention*, 12, 290-295, 2006. Tinetti, M.E., Speechley, M., & Ginter, S.F. (1988). Risk factors for falls among elderly persons living in the community. *New England Journal of Medicine*, 319, 1701-1707. |