

Research Abstract

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# The Association Between Balance and Muscular Strength in Healthy Young Adults

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## Abstract

With aging, there are natural physiological declines, such as decreased neuromuscular function, muscular strength, and balance, often preceding a fall, which is indicated as a public health issue. Nevertheless, young adults do not experience such natural declines as rapidly yet encounter falls that may lead to musculoskeletal injuries. Therefore, the objective of this study was to evaluate the relationship between postural sway and muscular strength in healthy young adults using gold-standard measurements.

**Keywords:** falls, balance, strength

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## Methods

The study consisted of thirty-nine healthy adults (mean age  $20.8 \pm 2.8$  years, mean body mass  $78.4 \pm 17.3$  kg.), with no known muscular or bone deficits, uncontrolled medical conditions, high blood pressure, or contraindications to exercise. Static balance was assessed using force plates, measuring vision, vestibular, and proprioception contributions toward balance. Grip strength was assessed using a handgrip dynamometer. After 48 hours, upper and lower body strengths were assessed using a one-repetition maximum bench press and leg press, respectively. To control for effects of body mass on strength, strength measurements were normalized, then transformed into z-scores. The average of the z-scores was computed to form a muscular strength index. Pearson correlation coefficients ( $r$ ) were used to determine the relationship between balance and strength, while controlling for age and sex. The  $p$ -value was set at  $< 0.05$ .

## Results

A negative moderate correlation was found between the proprioceptive contribution toward balance and normalized handgrip strength ( $r = -0.434$ ,  $p < 0.05$ ). There were no other significant relationships between postural sway and strength measurements.

## Conclusions

Our findings indicate that who possess higher handgrip strength may have better balance, however longitudinal studies are needed to determine a causal effect. The lack of association between postural sway and other strength measures suggests that these parameters are independent of each other and may require a separate training form.



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