

## Grip strength in older age

### Introduction

In older age, mastering everyday activities such as walking, climbing stairs, bending, lifting or carrying is an important requirement for independent living.

Mobility and balance are crucial and require sufficient muscle mass and strength (Fuchs et al. 2013). A slowly progressive loss of skeletal muscle mass along with a reduction in muscle strength is a biological hallmark of ageing. This age-related decline may be further exacerbated through illness, injuries or surgery since these are mostly associated with a medium or long-term immobilisation.

Reduced muscle strength is related to loss of autonomy and increased need for care as well as increased mortality (Vermeulen et al. 2011; Cooper et al. 2010; Cooper et al. 2011).

In order to be able to objectively assess and measure physical function in the clinical setting (“geriatric assessment”) as well as in epidemiological studies, a set of functional tests are used. These include the “Timed-Up-and-Go-Test” (Podsiadlo, Richardson 1991; Shumway-Cook et al. 2000), the Chair-Rise-Test (Guralnik et al. 1994), Balance Tests (Guralnik et al. 1994; Stevens et al. 2008) as well as isometric hand grip strength measurement (Hank et al. 2009; Rantanen et al. 2003; Mohd Hairi et al. 2010).

Grip strength is an established objective indicator for general muscle strength. Decreased grip strength has not only been shown to predict health decline, but is also used as a proxy for measuring sarcopenia (Cooper et al. 2011; Hank et al. 2009; Bohannon 2008).

Sarcopenia is defined as the presence of both low muscle mass and low muscle function resulting in declined physical capability. Reduced hand grip strength (lower than 20 kg for women and 30 kg for men) is an indicator for sarcopenia (Cruz-Jentoft et al. 2010).

This fact sheet describes up-to-date population based representative data for grip strength among adults aged 65 to 79 years in Germany within strata of sex and age. Further the indicator “grip strength” is presented in relation to body height, since grip strength is also generally dependent on the body height of the individual: the taller a person is, the more muscle mass he or she possesses.

### Indicator

In the “German Health Interview and Examination Survey for Adults (DEGS1)” grip strength was measured using the Smedley Dynamometer (Scandidact, Denmark, 100 kg) (Fuchs et al. 2013). Grip strength was measured while the participant was standing upright if possible and if no health impairments restricted the measurement.

The upper arm of the participant rested against the upper part of the body with the elbow raised at 90°. The dynamometer was squeezed with maximum strength for approximately 5 seconds. Two values were recorded for each hand.

For analyses, the maximum grip strength attained was used, regardless of which side, measurement sequence and body position. People suffering from severe pain in their fingers, hands or arms and those who reported upper extremity surgery or injuries within the past 6 months were excluded from the test. Further exclusion criteria were upper extremity amputations or paresis as well as the presence of acute swelling, inflammation or injury. If just one side was affected, measurements were made at the unaffected hand only (Fuchs et al. 2013). The table shows mean maximum grip strength in kilograms among adults aged 65 to 79 years, according to sex and age. The figure shows the relationship between mean maximum grip strength and body height by sex. Measurements are adjusted to account for socio-economic status (Lampert et al. 2013).

### Key results

- ▶ The overall average maximum grip strength for persons aged 65 to 79 years is 32.3 kg.
- ▶ Women have significantly lower average maximum grip strength (25.0 kg) than men (40.5 kg).
- ▶ Overall, 9.5% of women and 5.1% of men have severely reduced grip strength (<20 kg for women and <30 kg for men).
- ▶ Grip strength increases with increasing body height in both women and men.

## Conclusion

The overall average maximum grip strength for adults aged 65 to 79 years is 32.3 kg. Women show significantly lower average maximum grip strength (25.0 kg) than men (40.5 kg). In addition, the results of DEGS1 demonstrate that grip strength decreases significantly with increasing age (Table 1). Severely reduced grip strength, which may be an indicator of sarcopenia, is found in 7.5% of survey participants (9.5% of women and 5.1% of men).

Figure 1 shows the association between maximum mean grip strength and body height among persons aged 65 to 79 years. Grip strength increases with increasing height. Similar results to those in DEGS1 were observed in the “Survey of Health, Ageing and Retirement in Europe” (SHARE) and in the main survey of the Socio-Economic Panel (SOEP) 2006, which introduced grip strength measurement of the hand for the first time in a population-based survey in Germany (Hank et al. 2009). In SHARE, a representative sample of the population aged 50 years and older was examined and mean maximum grip strength was found to be 37.1 kg (Hank et al. 2009). In the 2006 SOEP main survey, mean grip strength among persons 50 years and older was 35.6 kg (Hank et al. 2009). Results of these previous studies confirm age and sex specific differences in grip strength observed in DEGS1 as well as the observed relationship between grip strength and body height. In conjunction with results from other performance-based tests of physical functioning applied in DEGS1, results on grip strength provide comprehensive information on functional capacities in a sample representative of the German resident population 65-79 years of age. These results contribute towards characterising the health status and care requirements of older people and assessing potentials for prevention (Fuchs et al. 2013).

Note: A detailed description of the study as well as explanations on the method are available on the DEGS study website [www.degs-studie.de](http://www.degs-studie.de) and in Scheidt-Nave et al. (2012).

Further results regarding physical function of the elderly can be found at Fuchs et al. (2013).

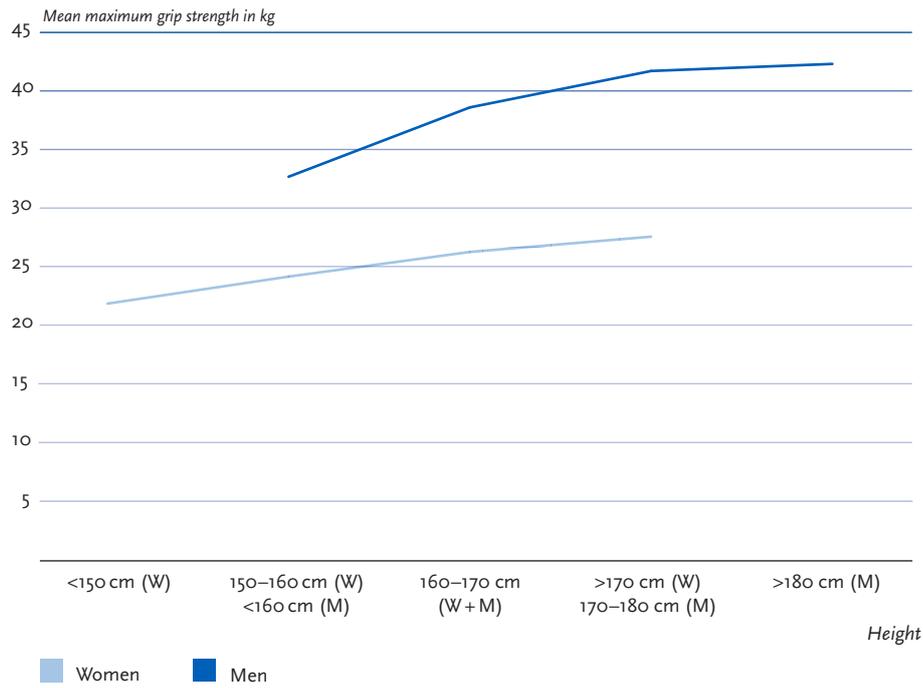
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**Table 1**  
**Mean maximum grip strength in kilograms among 65 to 79-year-old adults, according to gender and age**

	Women (n=886)		Men (n=888)		Total (n=1,774)	
	Mean value	(95%-CI)	Mean value	(95%-CI)	Mean value	(95%-CI)
<b>Age</b>						
65–69 years	26.0	(25.3–26.7)	42.5	(41.7–43.4)	34.1	(33.2–35.0)
70–74 years	25.2	(24.6–25.7)	40.8	(39.6–42.0)	32.5	(31.6–33.4)
75–79 years	23.2	(22.5–24.0)	36.5	(35.4–37.6)	29.0	(28.1–30.0)
<b>Total</b>	<b>25.0</b>	<b>(24.6–25.4)</b>	<b>40.5</b>	<b>(39.8–41.3)</b>	<b>32.3</b>	<b>(31.7–32.9)</b>

**Figure 1**  
**Mean maximum grip strength (in kg) according to height (in cm) among 65 to 79-year-old women and men**



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