

AO Foundation Surgeons are our greatest strength!

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Objectives:

The goal of this study was to verify the external validity of the model by Angst et al. within the occupational group of surgeons (403 surgeons of 62 different nationalities agreed to participate) who were interviewed and tested (for their hand strength) during the 2009 AO Courses in Davos, Switzerland. Furthermore, factors associated with surgeon grip and pinch strength were evaluated, and data from our surgeon population were compared with normative data.

Methods:

Grip and key pinch strength testing data were collected using a Jamar dynamometer and a pinch gauge measuring up to 13.6 kg (30lbs) was used. A questionnaire was also administered to collect background information.

The model for grip and pinch strength proposed by Angst et al. was used to evaluate its validity on our study population of surgeons. External validity was evaluated by means of the intraclass correlation coefficient.

Results: Comparison with normative data

1. Hand grip strength

The average grip strength of the dominant hand for the Swiss population was 39 kg (range: 9.3 – 79) compared to the achieved mean surgeon hand strength of 50 kg (range: 22.3 – 90.0).

Comparing surgeon grip strength with that achieved by the light occupational group in the Swiss population, the surgeon population was on average 8.7 kg stronger (range: 6.8 - 10.6) ($p < 0.001$).

2. Key pinch strength

The average key strength of the dominant hand for the Swiss population was 7.8 kg (range: 1.2, 13.7) compared to the average surgeon hand strength of 9.9 kg (range: 5.5, 13.5).

Comparing the mean surgeon key pinch strength with that of the light occupational group in the Swiss population, our surgeons were on average 1.8 kg stronger (range: 1.5 - 2.1) ($p < 0.001$).



Surgeons pictured testing their grip strength at the AO Foundation Davos Courses in Switzerland.

Surgeon characteristics

Age in years (n=358)	Mean (SD)	39.8	(9.5)
	Median (min, max)	37.4	(26.0, 69.8)
Gender, n (%) (n=402)	Female	99	(14.7)
	Male	343	(85.3)
Dexterity, n (%) (n=403)	Right	370	(92)
	Left	24	(6)
	Ambidextrous	9	(2.0)
Height in cm (n=402)	Mean (SD)	173.3	(8.3)
	Median (min, max)	179.0	(150.0, 200.0)
Weight in kg (n=402)	Mean (SD)	80.5	(13.5)
	Median (min, max)	80.0	(50.0, 125.0)
Regional distribution of the participants (n=401)			
Africa		10	(2.5)
Asia Pacific		42	(10.5)
Europe		279	(69.6)
Middle East		41	(10.2)
North America		8	(2.0)
South America		21	(5.2)

Results: Comparison with Angst's model

Angst's model was unable to predict grip strength with adequate accuracy (ICC=0.61) and also failed in the prediction of key pinch strength (ICC<0.01); the model overestimated "real" pinch. In addition to age and gender, body height and weight proved to be the best indicators of hand grip and key pinch strength.

Conclusions:

The model of Angst et al. did not support the external validity when applied to our population sample of AO surgeons. The cofactor "gender" appeared to be by far the most distinct factor in the surgeons' model for determining grip and pinch strength. Overall, our data could show that surgeons were in general stronger compared to normative data.

References:

Angst F, Drerup S, Werle S, Herren DB, Simmen BR, Goldhahn J. (2010): Prediction of grip and key pinch strength in 978 healthy subjects. *BMC Musculoskelet Disord.* 2010;11:94.