

Hand Grip Strength

Hand grip strength (HGS) is a simple and inexpensive measure of muscular capacity. HGS is traditionally used to assess physical function and is linked to a range of health outcomes. However, increasing evidence suggests low HGS is strongly associated with **poor brain health**¹, which may include accelerated cognitive decline, higher incidence of dementia, and dementia-related mortality.

HGS represents more than a marker of physical capacity; it is a window into vascular health and an early, accessible indicator of poor brain health. As a biomarker for brain health, HGS reflects mitochondrial dysfunction characterized by calcium dysregulation, impaired mitophagy, mitochondrial fragmentation, and increased mitochondrial reactive oxygen species (mtROS)². These mitochondrial abnormalities contribute to key pathological features of poor brain health, including plaque accumulation and neurofibrillary tangles, linking physical frailty with cognitive decline.

HGS is typically measured using dynamometers that are hydraulic, pneumatic, or mechanical. Measuring HGS as a clinical vital sign enables early identification and monitoring of poor brain health risk prior to symptom onset, assisting with the identification of at-risk individuals, promoting timely interventions, and contributing to healthier aging trajectories. Below is the VMR (Voloridge Modeled Range) for HGS by sex with Health Multiplier rates.

Biomarker Strength: Brain Health = 10 Cardiovascular Health = 5 Longevity = 5

Male VMR: 87 to 139 lbs

Range	CV	Metabolic	Resp	Liver	Kidney	Brain	Longevity	Peer Distribution	
33-45	0.7	0.6	0.6	0.6	0.5	0.5	0.6	0.019	2%
45-60	0.9	0.7	0.8	0.7	0.8	0.7	0.8	0.063	6%
60-75	1	0.9	0.9	0.9	0.9	0.9	0.9	0.196	20%
75-90	1	1	1	1	1.1	1	1	0.282	28%
90-105	1.1	1.1	1.2	1.1	1.1	1.3	1.1	0.268	27%
105-139	1.1	1.2	1.2	1.2	1.2	1.5	1.2	0.172	17%

Female VMR: 53 to 88 lbs

Range	CV	Metabolic	Resp	Liver	Kidney	Brain	Longevity	Peer Distribution	
12-20	0.6	0.5	0.4	0.6	0.5	0.6	0.6	0.017	2%
20-30	0.8	0.6	0.7	0.6	0.7	0.7	0.8	0.045	5%
30-40	0.9	0.8	0.8	0.8	0.9	0.8	0.9	0.142	14%
40-50	1	1	1	1	1	1	1	0.252	25%
50-60	1.1	1.1	1.2	1.1	1.1	1.2	1.1	0.286	29%
60-88	1.2	1.2	1.3	1.2	1.2	1.3	1.2	0.258	26%



(1) GeroScience, 44(4), 2007–2024

(2) Frontiers in Aging Neuroscience, 13, 617588

Summary of Hand-Grip Strength Measurements

by sex and age-group

		Percentile				
Age		10	25	50	75	90
Male	18-24	80	91	105	113	128
	25-29	74	95	109	131	146
	30-34	69	80	102	124	139
	35-39	67	88	110	120	134
	40-44	76	88	101	120	139
	45-49	69	79	90	106	131
	50-54	67	86	99	115	125
	55-59	62	71	85	105	124
	60-64	51	67	89	99	116
	65-69	39	69	81	101	110
	70-74	37	65	80	91	101
75-79	41	57	74	81	96	
80-84	34	47	65	76	84	
Female	18-24	39	49	63	75	84
	25-29	45	56	65	74	88
	30-34	45	53	66	73	82
	35-39	44	54	67	73	84
	40-44	50	58	67	75	82
	45-49	39	56	63	76	83
	50-54	43	54	62	72	78
	55-59	37	46	53	67	71
	60-64	35	42	54	62	70
	65-69	26	43	49	55	69
	70-74	34	43	50	53	61
	75-79	28	35	40	49	61
	80-84	32	37	43	48	60

Weight in pounds

Terminology

Health Multiplier

A metric measuring the degree to which the individual's biomarker value is impacting the health domain. Biomarker Health Ratios above 1.0 indicate increased health to the domain, whereas values below 1.0 indicate decreased health within the domain. A biomarker Health Ratio of 1.15, has a 15 percent better health than the average expected for age and sex as defined above. A score of 0.8 reflects a 20 percent decrease from the average expected health for age and sex.

Voloridge™ Modeled Range (VMR)

VMR represents a sex-specific biomarker range associated with the highest level of health and wellness in the health domains listed. It is derived from Voloridge Health models, which utilize multiple biomarkers across the six major health domains and a 15-year timeframe. Laboratory reference ranges often focus on single biomarker-disease relationships. The VMR is derived from unbiased, data-driven analyses across multiple biomarkers and health domains.

Note: The VMR is a research-based insight tool still under development, not a medical recommendation, and may differ from laboratory reference values seen on standard reports.

Biomarker Strength

Indicates how strongly a biomarker correlates to a specific health domain ranging from 1 (weakest) to 10 (strongest), based on the Voloridge Health models, which are still in development. This allows you to see which biomarkers contribute the most to your VoloScore.

This information is not intended to substitute professional medical advice, screening, or diagnostic testing; nor be the basis for medical decisions. This information does not account for all important factors, and cannot rule out the presence or absence of disease or other medical conditions. The Volo™ Scores and Volo™ Age are produced by models that are still in development and have not been launched commercially.