

Is muscle weakness the new smoking? Grip strength tied to accelerated biological age, study shows

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Credit: Justine Ross, Michigan Medicine

Everyone ages at a different pace. That's why two 50-year-olds, despite living the same number of years, may have different biological ages—meaning that a host of intrinsic and extrinsic factors have caused them to age at varying paces with different levels of risk for disease and

early death.

Lifestyle choices, such as diet, and smoking, and illness all contribute to [accelerating biological age beyond one's chronological age](#). In other words, your body is aging faster than expected. And for the first time, researchers have found that [muscle weakness](#) marked by grip strength, a proxy for overall strength capacity, is associated with accelerated biological age. Specifically, the weaker your grip strength, the older your biological age, according to results published in the *Journal of Cachexia, Sarcopenia and Muscle*.

Researchers at Michigan Medicine modeled the relationship between biological age and grip strength of 1,274 middle aged and older adults using three "age acceleration clocks" based on DNA methylation, a process that provides a molecular biomarker and estimator of the pace of aging. The clocks were originally modeled from various studies examining diabetes, [cardiovascular disease](#), cancer, [physical disability](#), Alzheimer's disease, inflammation and early mortality.

Results reveal that both older men and women showed an association between lower grip strength and biological age acceleration across the DNA methylation clocks.

"We've known that muscular strength is a predictor of longevity, and that weakness is a powerful indicator of disease and mortality, but for the first time, we have found strong evidence of a biological link between muscle weakness and actual acceleration in [biological age](#)," said Mark Peterson, Ph.D., M.S., lead author of the study and associate professor of physical medicine and rehabilitation at University of Michigan.

"This suggests that if you maintain your [muscle strength](#) across the lifespan, you may be able to protect against many common age-related diseases. We know that smoking, for example, can be a powerful

predictor of disease and mortality, but now we know that muscle weakness could be the new smoking."

The real strength of this study was in the 8 to 10 years of observation, in which lower grip strength predicted faster biological aging measured up to a decade later, said Jessica Faul, Ph.D., M.P.H., a co-author of the study and research associate professor at the U-M Institute for Social Research.

Past studies have shown that low grip strength is an extremely strong predictor of adverse health events. One study even found that it is [a better predictor of cardiovascular events](#), such as myocardial infarction, than systolic blood pressure—the clinical hallmark for detecting heart disorders. Peterson and his team have previously shown a robust association between weakness and [chronic disease](#) and [mortality](#) across populations.

This evidence coupled with their study's recent findings, Peterson says, shows potential for clinicians to adopt the use of grip strength as a way to screen individuals for future risk of functional decline, chronic disease and even early mortality.

"Screening for grip strength would allow for the opportunity to design interventions to delay or prevent the onset or progression of these adverse 'age-related' health events," he said. "We have been pushing for clinicians to start using grip strength in their clinics and only in geriatrics has this sort of been incorporated. However, not many people are using this, even though we've seen hundreds of publications showing that grip strength is a really good measure of health."

Investigators say future research is needed to understand the connection between grip strength and age acceleration, including how inflammatory conditions contribute to age-related weakness and mortality. Previous

studies have shown that chronic inflammation in aging—known as "inflammaging"—is a significant risk factor for mortality among [older adults](#). This [inflammation](#) is also associated with lower grip strength and may be a significant predictor on the pathway between lower grip strength and both disability and chronic disease multimorbidity.

Additionally, Peterson says, studies must focus on how lifestyle and behavioral factors, such as physical activity and diet, can affect grip strength and age acceleration.

"Healthy dietary habits are very important, but I think regular [exercise](#) is the most critical thing that somebody can do to preserve health across the lifespan," he said. "We can show it with a biomarker like DNA methylation age, and we can also test it with a clinical feature like [grip strength](#)."

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More information: Mark D. Peterson et al, Grip strength is inversely associated with DNA methylation age acceleration, *Journal of Cachexia, Sarcopenia and Muscle* (2022). [DOI: 10.1002/jcsm.13110](https://doi.org/10.1002/jcsm.13110)

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