

Stress-related cell damage links to negative mental and physical health effects among caregivers

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It's no secret that the caregivers of spouses with memory impairment face enormous amounts of stress. Researchers at Rice University have

found that this intense pressure can be felt at the cellular level and is linked to negative physical and mental health effects, including dementia and Alzheimer's disease.

The study titled "[Mitochondrial health, physical functioning, and daily affect: Bioenergetic mechanisms of dementia caregiver well-being.](#)" is published online in the journal *Psychosomatic Medicine*. It is one of the first studies to examine how cellular health may impact the well-being of spousal dementia caregivers who are experiencing significant daily stress.

"This work builds on our previous research on chronic stress and immunity by highlighting the crucial role of cellular health in the mind-body connection," said Chris Fagundes, professor of psychological sciences at Rice and one of the study's authors.

"We've discovered that [chronic stress](#) impacts not only immune function but also the health of [individual cells](#), suggesting a deeper, more intricate relationship between our mental state and physical well-being."

Specifically, the researchers investigate the link between mitochondria—essentially the engines that power individual cells—and mental and physical health. Energy produced by mitochondria is necessary for people to engage in [daily activities](#) such as walking, shopping and driving. One way to gauge a person's cellular health is to determine how much energy is left over after these activities.

Fagundes compared cellular health to a car's fuel efficiency.

"The more energy or fuel you have left over after a drive is an indicator of how good your mileage is—or how good things are working," he said. "It's more or less the same idea when it comes to the health of your cells."

Like cars that lose fuel efficiency over time, it is normal for cells to have less leftover energy as a person ages. Chronically [stressful situations](#) like caregiving also affect cellular health negatively. However, some individuals' cells are naturally more resilient to aging and stress than others.

The researchers found that caregivers with less leftover cellular energy were less able to engage in physical activities such as walking and carrying groceries than caregivers with more leftover energy. They also found that these caregivers experienced fewer positive emotions—such as feelings of excitement, inspiration and alertness—compared to caregivers with more cellular energy.

While more leftover cellular energy is associated with better mental and physical health outcomes, less leftover cellular energy is linked to higher inflammation, which can result in a host of negative mental and physical health problems, including eventual diagnosis of conditions like dementia or Alzheimer's.

The researchers say they hope the findings in this study could lead to the development of pharmaceutical or therapeutic interventions targeting cellular health, which may allow caregivers to avoid the negative outcomes that can result from the stress they face.

The study was coauthored by Cobi Heijnen, Jensine Paoletti-Hatcher, Itee Mahant and Vincent Lai from Rice; Jennifer Stinson from Baylor College of Medicine, Dr. Paul Schulz from the University of Texas Health Science Center in Houston, and Luis Medina from the University of Houston.

More information: E. Lydia Wu-Chung et al, Mitochondrial Health, Physical Functioning, and Daily Affect: Bioenergetic Mechanisms of Dementia Caregiver Well-Being, *Psychosomatic Medicine* (2024). [DOI:](#)

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