

Investigating resilience through intrinsic capacity networks in older adults

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In old age, a tighter interlinkage between different domains of functional capacity may indicate a loss of system resilience. This was observed in a study conducted at the Faculty of Sport and Health Sciences at the

University of Jyväskylä, Finland.

When functional capacity domains are tightly interconnected, a disruption in one domain can affect others and lead to a collapse in functioning. It is, therefore, important to look at functioning as a whole and to take care of the different aspects of physical and mental well-being.

Human functional capacity can be thought of as an ecosystem consisting of different components such as mobility, sensory, cognitive, and mental functions. As a person ages, the resilience of the functional capacity system enables it to maintain and recover when faced with setbacks or challenges.

The population-based study used [network analysis](#) to investigate the interconnectedness of different domains of functional capacity. The results showed that the functional capacity domains were more closely linked in older people and those with poorer [health](#).

The resilience of the functional capacity system may have similar features to resilience in other systems, such as natural systems or the economy.

"For example, a highly networked economy across national borders has been seen to increase the vulnerability of supply chains. The same idea can apply to health and functioning," says postdoctoral researcher Kaisa Koivunen.

"Although the body and mind are interconnected, they must also be sufficiently independent of each other. A tightly interconnected system can lead to a [domino effect](#): a disruption in one area of functioning may spill over to the rest of the system, eventually collapsing it."

A resilient, functional capacity system has, for example, sufficient muscle strength reserves so that its deterioration, for example, during bed rest, does not lead to a loss of walking ability, which in turn could lead to depressive symptoms. Different resources also allow for modifying behavior so that important things can still be done.

"People are generally able to adapt if they have enough reserve capacity. They can compensate for one impaired capacity with other capacities," says the Principal Investigator of the AGNES study, Professor Taina Rantanen.

"For example, it is possible to move around despite reduced mobility if you can drive a car. This is possible if other aspects of functional capacity, such as good levels of information processing and sensory function, allow it. As compensatory mechanisms are depleted, the resilience of functional capacity is reduced."

The conducted research provides a basis for applying approaches to systems [resilience](#) from other disciplines to the study of health and functional capacity.

"As we age, sudden shifts, that is, critical transitions, in health and functioning can occur if a disturbance, such as an illness, exceeds the body systems' capacity to cope," Koivunen says.

"Such tipping points and critical transition phenomena have long been studied, for example, in [natural systems](#) in the context of global warming, but less in the context of human health and functioning."

Koivunen speculates that in the future, it may be possible to determine whether the tipping point between "functional ability" and "impaired functioning" is approaching, for example, by examining the density of the body systems network.

"In aging societies, preserving people's functional capacity for as long as possible is important for maintaining a good quality of life," Koivunen says.

The research is [published](#) in *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*.

More information: Kaisa Koivunen et al, Investigating resilience through intrinsic capacity networks in older adults, *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences* (2024). [DOI: 10.1093/gerona/glae048](https://doi.org/10.1093/gerona/glae048)

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