

Poor sense of smell linked to increased risk of depression in older adults

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In a study that followed more than 2,000 community-dwelling older

adults over eight years, researchers at Johns Hopkins Medicine say they have significant new evidence of a link between decreased sense of smell and risk of developing late-life depression.

Their findings, published June 26 in *The Journals of Gerontology: Series A*, do not demonstrate that loss of smell causes depression, but suggests that it may serve as a potent indicator of overall health and well-being.

"We've seen repeatedly that a poor [sense of smell](#) can be an early warning sign of neurodegenerative diseases such as Alzheimer's disease and Parkinson's disease, as well as a mortality risk. This study underscores its association with depressive symptoms," says Vidya Kamath, Ph.D., associate professor of psychiatry and behavioral sciences at the Johns Hopkins University School of Medicine. "Additionally, this study explores factors that might influence the relationship between olfaction and depression, including poor cognition and inflammation."

The study used data gathered from 2,125 participants in a federal government study known as the Health, Aging and Body Composition Study (Health ABC). This cohort was composed of a group of healthy [older adults](#) ages 70–73 at the start of the eight-year study period in 1997–98. Participants showed no difficulties in walking 0.25 miles, climbing 10 steps or performing normal activities at the start of the study, and were assessed in person annually and by phone every six months. Tests included those for the ability to detect certain odors, depression and mobility assessments.

In 1999, when smell was first measured, 48% of participants displayed a normal sense of smell, 28% showed a decreased sense of smell, known as hyposmia, and 24% had a profound loss of the sense, known as anosmia. Participants with a better sense of smell tended to be younger than those reporting significant loss or hyposmia. Over follow-up, 25% of participants developed significant depressive symptoms. When

analyzed further, researchers found that individuals with decreased or significant loss of smell had increased risk of developing significant depressive symptoms at longitudinal follow-up than those in the normal olfaction group. Participants with a better sense of smell tended to be younger than those reporting significant loss or hyposomia.

Researchers also identified three depressive symptom "trajectories" in the [study group](#): stable low, stable moderate and stable high depressive symptoms. Poorer sense of smell was associated with an increased chance of a participant falling into the moderate or high depressive symptoms groups, meaning that the worse a person's sense of smell, the higher their [depressive symptoms](#). These findings persisted after adjusting for age, income, lifestyle, health factors and use of antidepressant medication.

"Losing your sense of smell influences many aspects of our health and behavior, such as sensing spoiled food or noxious gas, and eating enjoyment. Now we can see that it may also be an important vulnerability indicator of something in your health gone awry," says Kamath. "Smell is an important way to engage with the world around us, and this study shows it may be a warning sign for late-life depression."

Humans' sense of smell is one of two chemical senses. It works through specialized sensory cells, called [olfactory neurons](#), which are found in the nose. These neurons have one odor receptor; it picks up molecules released by substances around us, which are then relayed to the brain for interpretation. The higher the concentration of these smell molecules the stronger the smell, and different combinations of molecules result in different sensations.

Smell is processed in the brain's olfactory bulb, which is believed to interact closely with the amygdala, hippocampus and other brain structures that regulate and enable memory, decision-making and

emotional responses.

The Johns Hopkins researchers say their study suggests that olfaction and depression may be linked through both biological (e.g., altered serotonin levels, brain volume changes) and behavioral (e.g., reduced social function and appetite) mechanisms.

The researchers plan to replicate their findings from this study in more groups of older adults, and examine changes to individuals' olfactory bulbs to determine if this system is in fact altered in those diagnosed with depression. They also plan to examine if smell can be used in intervention strategies to mitigate risk of late-life depression.

More information: Vidyulata Kamath et al, Olfactory Dysfunction and Depression Trajectories in Community-Dwelling Older Adults, *The Journals of Gerontology: Series A* (2023). [DOI: 10.1093/gerona/glad139](https://doi.org/10.1093/gerona/glad139)

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