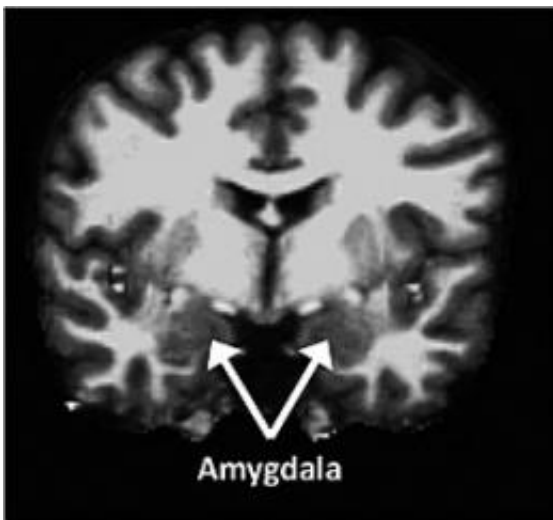


Personality may influence brain shrinkage in aging

March 30 2010, By Tony Fitzpatrick



The amygdala, which is part of the medial temporal region and involved in emotion processing, was larger in conscientious individuals but smaller in neurotic individuals.

(PhysOrg.com) -- Psychologists at Washington University in St. Louis have found an intriguing possibility that personality and brain aging during the golden years may be linked.

Studying MRI images of 79 volunteers between the ages of 44 and 88 — who also had provided [personality](#) and demographic data — the researchers found lower volumes of [gray matter](#) in the frontal and medial temporal brain regions of volunteers who ranked high in neuroticism

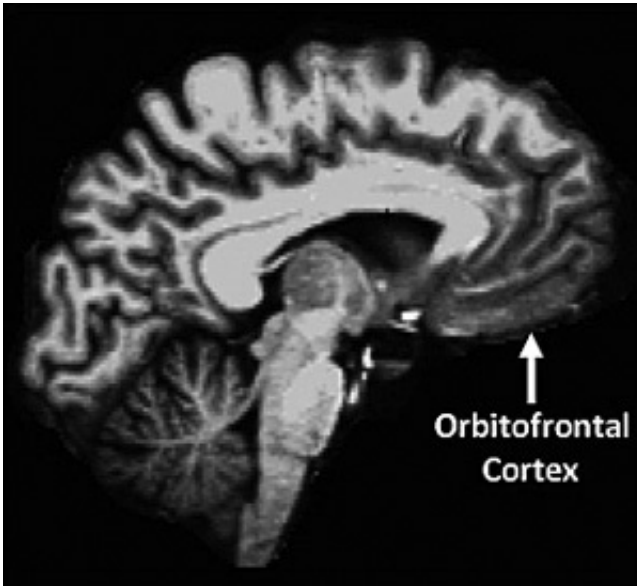
traits, compared with higher volumes of gray matter in those who ranked high in conscientious traits.

“This is a first step in seeing how personality might affect brain aging,” says Denise Head, PhD, assistant professor of [psychology](#) in Arts & Sciences at Washington University. “Our data clearly show an association between personality and brain volume, particularly in [brain regions](#) associated with emotional and social processing. This could be interpreted that personality may influence the rate of brain aging.”

She notes also that the results could be seen as “the tail wagging the dog.” That is, it is actually brain changes during aging that influence personality.

“Right now, we can’t disentangle those two, but we plan to in the future by conducting ongoing studies of the volunteers over time to note future structural changes,” Head says.

Head’s graduate student Jonathan Jackson, first author of a recently published paper on the research in *Neurobiology in Aging*, says that he, and co-authors Head and David A. Balota, PhD, professor of psychology, tested the hypotheses that aging individuals high in neuroticism would show lower brain volume, while those high in either conscientiousness or extroversion would have larger brain volume. The extroversion results were not clear, but the data validated the other two hypotheses.



The orbitofrontal cortex, which is part of the prefrontal region and involved in social/emotional processing, showed similar associations with personality.

“There are lots of nonhuman animal studies that suggest that chronic stress is associated with deleterious effects on the brain, and this helped us form the hypothesis that we’d see similar effects in older adults.” Jackson says.

“We assumed that neuroticism would be negatively related to structural volume,” Jackson says. “We really focused on the prefrontal and medial temporal regions because they are the regions where you see the greatest [age](#) changes, and they are also seats of attention, emotion and memory. We found that more neurotic individuals had smaller volumes in certain prefrontal and medial temporal parts of the brain than those who were less neurotic, and the opposite pattern was found with conscientiousness.”

“A unique thing that we’ve done is to reliably measure personality differences and associate them with age-related effects on brain

structures in healthy middle-aged and older adults” Head says.

“Specifically, we found that neuroticism was associated with greater age-related decline in [brain volume](#), whereas conscientiousness was associated with less age-related decline.”

The researchers were interested in healthy aging brains because, down the road, the findings might serve as a useful marker for later diagnosis of dementia. The volunteers they studied are normal control participants at Washington University’s Alzheimer’s Disease Research Center (ADRC), led by John C. Morris, MD, the Friedman Distinguished Professor of Neurology and director of the ADRC.

One of the first changes in Alzheimer's disease may be in personality. There is accumulating research from the ADRC and other institutions that suggest that people tend to become more neurotic and less conscientious in early-stage Alzheimer's.

“It might be that changes in personality track onto those people more likely to develop Alzheimer's,” Jackson says. “It’s why we looked at older healthy adults because it’s important to track these relationships in healthy populations before you look at pathological ones.

“We know that there are degenerative processes going on before the diagnosis of Alzheimer's. We want to be able to see if the subtle personality changes might be particular to an early clinical picture and possibly see if one can predict who will become demented based on personality changes,” Jackson says.

Another way of looking at the findings, Head says, is that neuroticism might add an increasing vulnerability to the pathological processes that go on in aging, particularly in Alzheimer's.

“We will continue to pursue the relationship between personality and

brain structure as one of the earlier processes in Alzheimer's and hence a possible risk factor,” Head says.

Provided by Washington University in St. Louis

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