

# Loneliness impacts DNA repair

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Lonely parrots have shorter telomeres than those living in groups. Credit: Denise Aydinonat

Scientists at the Vetmeduni Vienna examined the telomere length of captive African grey parrots. They found that the telomere lengths of single parrots were shorter than those housed with a companion parrot, which supports the hypothesis that social stress can interfere with

cellular aging and a particular type of DNA repair. It suggests that telomeres may provide a biomarker for assessing exposure to social stress. The findings have been published in the journal *PLOS ONE*.

In captivity, grey parrots are often kept in [social isolation](#), which can have detrimental effects on their health and wellbeing. So far there have not been any studies on the effects of long term social isolation from conspecifics on cellular aging. Telomeres shorten with each cell division, and once a critical length is reached, cells are unable to divide further (a stage known as 'replicative senescence'). Although [cellular senescence](#) is a useful mechanism to eliminate worn-out cells, it appears to contribute to aging and mortality. Several studies suggest that telomere shortening is accelerated by stress, but until now, no studies have examined the effects of social isolation on telomere shortening.

## **Using molecular genetics to assess exposure to stress**

To test whether social isolation accelerates telomere shortening, Denise Aydinonat, a doctorate student at the Vetmeduni Vienna, conducted a study using DNA samples that she collected from African grey parrots during routine check-ups. African greys are highly social birds, but they are often reared and kept in isolation from other parrots (even though such conditions are illegal in Austria). She and her collaborators compared the telomere lengths of single birds versus pair-housed individuals with a broad range of ages (from 1 to 45 years). Not surprisingly, the telomere lengths of older birds were shorter compared to younger birds, regardless of their housing. However, the important finding of the study was that single-housed birds had [shorter telomeres](#) than pair-housed individuals of the same age group.

## **Reading signs of stress by erosion of DNA**

"Studies on humans suggest that people who have experienced high levels of social stress and deprivation have shorter telomeres," says Dustin Penn from the Konrad Lorenz Institute of Ethology at the Vetmeduni Vienna. "But this study is the first to examine the effects of social isolation on [telomere length](#) in any species." Penn and his team previously conducted experiments on mice, which were the first to show that exposure to crowding stress causes telomere shortening. He points out that this new finding suggests that both extremes of social conditions affect telomere attrition. However, he also cautions "further 'longitudinal' studies, in which changes in telomeres of the same individuals over time, are needed to investigate the consequences of stress on telomere shortening and the subsequent effects on health and longevity."

Co-author, Franz Schwarzenberger from the Department of Biomedical Sciences at the Vetmeduni Vienna, points out that their results are exciting because they suggest, "telomere length may be useful as a 'biomarker' that enables to assess an individual's exposure to chronic [social stress](#)."

**More information:** The article "Social isolation shortens telomeres in African Grey Parrots (*Psittacus erithacus erithacus*)" by Aydinonat, D., Penn, D.J.\*, Smith, S., Moodley, Y. Hoelzl, F., Knauer, F. & Schwarzenberger, F. was published online on 4 April 2014 in the open access journal *PLOS ONE*. [dx.plos.org/10.1371/journal.pone.0093839](https://doi.org/10.1371/journal.pone.0093839)

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