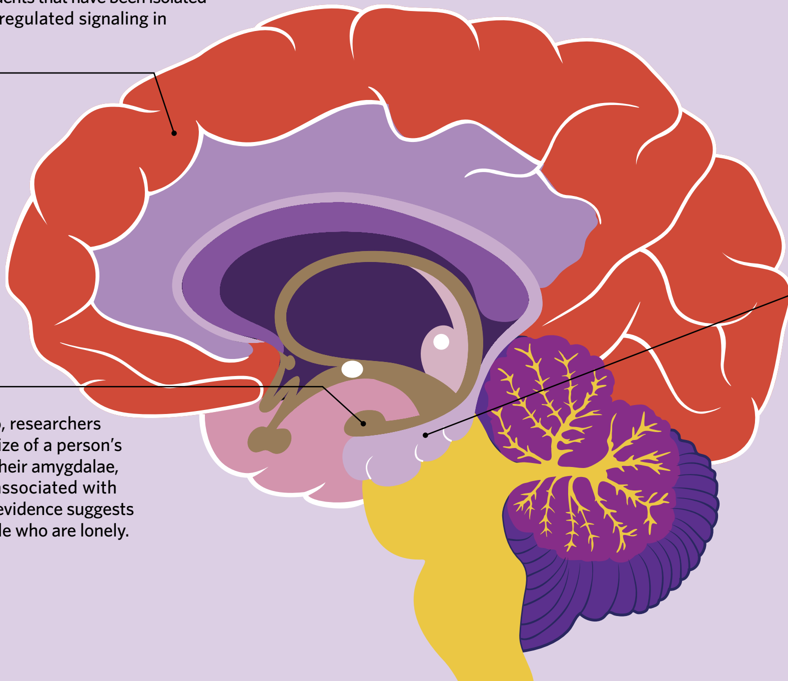
THE ISOLATED BRAIN

Studies of animals and people experiencing isolation have identified several brain structures that appear to be affected by a lack of social interaction. Although these studies can't identify causal relationships—and don't always agree with one another—they shine a light on some of the mechanisms by which physical isolation, or feelings of loneliness, could impair brain function and cognition.

PREFRONTAL CORTEX: In some studies, people who are lonely have been found to have reduced brain volumes in the prefrontal cortex, a region important in decision making and social behavior, although other research suggests this relationship might be mediated by personality factors. Rodents that have been isolated from their conspecifics show dysregulated signaling in the prefrontal cortex.



HIPPOCAMPUS: People and other animals experiencing isolation may have smaller-than-normal hippocampi and reduced concentrations of brain-derived neurotrophic factor (BDNF), both features associated with impaired learning and memory. Some studies indicate that levels of the stress hormone cortisol, which affects and is regulated by the hippocampus, are higher in isolated animals.

AMYGDALA: About a decade ago, researchers found a correlation between the size of a person's social network and the volume of their amygdalae, two almond-shaped brain areas associated with processing emotion. More-recent evidence suggests the amygdalae are smaller in people who are lonely.