

# How does your brain process emotions? Answer could help address loneliness epidemic

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Research over the last decade has shown that loneliness is an important determinant of health. It is associated with considerable physical and mental health risks and increased mortality. Previous studies have also shown that wisdom could serve as a protective factor against loneliness. This inverse relationship between loneliness and wisdom may be based in different brain processes.

In a study published in the March 5, 2021 online edition of *Cerebral Cortex*, researchers at University of California San Diego School of Medicine found that specific regions of the [brain](#) respond to [emotional stimuli](#) related to loneliness and wisdom in opposing ways.

"We were interested in how loneliness and wisdom relate to emotional biases, meaning how we respond to different positive and [negative emotions](#)," said Jyoti Mishra, Ph.D., senior author of the study, director of the NEATLabs and assistant professor in the Department of Psychiatry at UC San Diego School of Medicine.

The study involved 147 participants, ages 18 to 85. The subjects performed a simple cognitive task of determining which direction an arrow was pointed while faces with different emotions were presented in the background.

"We found that when faces emoting anger were presented as distractors, they significantly slowed simple cognitive responses in lonelier individuals. This meant that lonelier individuals paid more attention to threatening stimuli, such as the angry faces."

"For wisdom, on the other hand, we found a significant positive relationship for response speeds when faces with happy emotions were shown, specifically individuals who displayed wiser traits, such as empathy, had speedier responses in the presence of happy stimuli."

Electroencephalogram (EEG)-based brain recordings showed that the part of the brain called the temporal-parietal junction (TPJ) was activating differently in lonelier versus wiser individuals. TPJ is important for processing theory of mind, or the degree of capacity for empathy and understanding of others. The study found it more active in the presence of angry emotions for lonelier people and more active in the presence of happy emotions for wiser people.

Researchers also noted greater activity to threatening stimuli for lonelier individuals in the left superior parietal cortex, the brain region important for allocating attention, while wisdom was significantly related to enhanced happy emotion-driven activity in the left insula of the brain, responsible for social characteristics like empathy.

"This study shows that the inverse relationship between loneliness and [wisdom](#) that we found in

our previous clinical studies is at least partly embedded in neurobiology and is not merely a result of subjective biases," said study author Dilip V. Jeste, MD, senior associate dean for the Center of Healthy Aging and Distinguished Professor of Psychiatry and Neurosciences at UC San Diego School of Medicine.

"These findings are relevant to the mental and physical health of individuals because they give us an objective neurobiological handle on how lonelier or wiser people process information," said Mishra. "Having biological markers that we can measure in the brain can help us develop effective treatments. Perhaps we can help answer the question, 'Can you make a person wiser or less lonely?' The answer could help mitigate the risk of loneliness."

The authors say next steps include a [longitudinal study](#) and an intervention study.

"Ultimately, we think these evidence-based cognitive brain markers are the key to developing better health care for the future that may address the [loneliness](#) epidemic," said Mishra.

**More information:** *Cerebral Cortex* (2021).  
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