

Researchers shed new light on connection between brain and loneliness

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Social isolation affects how people behave as well as how their brains operate, a study at the University of Chicago shows.

The research, presented Sunday at a symposium, "Social Emotion and the Brain," at the annual meeting of the American Association for the Advancement of Science, is the first to use fMRI scans to study the connections between perceived social isolation (or loneliness) and activity in the brain. Combining fMRI scans with data relevant to social behavior is part of an emerging field examining brain mechanisms—an approach to psychology being pioneered at the University of Chicago.

Researchers found that the ventral striatum—a region of the brain associated with rewards—is much more activated in non-lonely people than in the lonely when they view pictures of people in pleasant settings. In contrast, the temporoparietal junction—a region associated with taking the perspective of another person—is much less activated among lonely than in the non-lonely when viewing pictures of people in unpleasant settings.

"Given their feelings of social isolation, lonely individuals may be left to find relative comfort in nonsocial rewards," said John Cacioppo, the Tiffany and Margaret Blake Professor in Psychology at the University. He spoke at the briefing along with Jean Decety, the Irving B. Harris Professor in Psychology and Psychiatry at the University.

The ventral striatum, which is critical to learning, is a key portion of the

brain and is activated through primary rewards such as food and secondary rewards such as money. Social rewards and feelings of love also may activate the region.

Cacioppo, one of the nation's leading scholars on loneliness, has shown that loneliness undermines health and can be as detrimental as smoking. About one in five Americans experience loneliness, he said. Decety is one of the nation's leading researchers to use fMRI scans to explore empathy.

They were among five co-authors of a paper, "In the Eye of the Beholder: Individual Differences in Perceived Social Isolation Predict Regional Brain Activation to Social Stimuli," published in the current issue of the *Journal of Cognitive Neuroscience*.

In the study, 23 female undergraduates were tested to determine their level of loneliness. While in an fMRI scanner, the subjects were shown unpleasant pictures and human conflict as well as pleasant things such as money and happy people.

The subjects who rated as lonely were least likely to have strong activity in their ventral striata when shown pictures of people enjoying themselves.

Although loneliness may be influence brain activity, the research also suggests that activity in the ventral striatum may prompt feelings of loneliness, Decety said. "The study raises the intriguing possibility that loneliness may result from reduced reward-related activity in the ventral striatum in response to social rewards."

In addition to differing responses in the ventral striatum, the subjects also recorded differing responses in parts of the brain that indicated loneliness played a role in how their brain operates.

Joining Decety and Cacioppo in writing the Journal of Cognitive Science paper were Catherine Norris, Assistant Professor of Psychology at Dartmouth College; George Monteleone, a graduate student at the University of Chicago; and Howard Nusbaum, Chair of Psychology at the University of Chicago.

Decety and Cacioppo discussed the new field of brain mechanism in a paper in the current issue of Perspectives on Psychological Science, "What Are the Brain Mechanisms on Which Psychological Processes are Based?" The new field extends the work of Charles Darwin, who "regarded the brain as a product of evolution and the science of psychology as concerned with these foundations," they wrote.

By studying brain mechanisms, researchers hope to gain new insights by examining mental activities surrounding consciousness, perception and thought through an understanding of how columns of neurons stacked next to each other form elementary circuits to function as a unit, they wrote.

New visualization tools such as three-dimensional imaging will help scholars develop a new way of studying psychology, they said.

"Psychological science in the 21st century can, and should, become not only the science of overt behavior, and not only the science of the mind, but also the science of the brain," they concluded.

Source: University of Chicago

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