

Loneliness, Like Chronic Stress, Taxes the Immune System

New research links loneliness to a number of dysfunctional immune responses, suggesting that being lonely has the potential to harm overall health. Researchers found that people who were more lonely showed signs of elevated latent herpes virus reactivation and produced more inflammation-related proteins in response to acute stress than did people who felt more socially connected.

These proteins signal the presence of inflammation, and chronic inflammation is linked to numerous conditions, including coronary heart disease, Type 2 diabetes, arthritis and Alzheimer's disease, as well as the frailty and functional decline that can accompany aging.

Reactivation of a latent herpes virus is known to be associated with stress, suggesting that loneliness functions as a chronic stressor that triggers a poorly controlled immune response.

"It is clear from previous research that poor-quality relationships are linked to a number of health problems, including premature mortality and all sorts of other very serious health conditions. And people who are lonely clearly feel like they are in poor-quality relationships," said Lisa Jaremka, a postdoctoral fellow at the Institute for Behavioral Medicine Research at Ohio State University and lead author of the research.

"One reason this type of research is important is to understand how loneliness and relationships broadly affect health. The more we understand about the process, the more potential there is to counter those negative effects - to perhaps intervene. If we don't know the physiological processes, what are we going to do to change them?"

The results are based on a series of studies conducted with two populations: a healthy group of overweight middle-aged adults and a group of breast cancer survivors. The researchers measured loneliness in all studies using the UCLA Loneliness Scale, a questionnaire that assesses perceptions of social isolation and loneliness.

Jaremka presented the research on January 19 at the Society for Personality and Social Psychology annual meeting in New Orleans.

The researchers first sought to obtain a snapshot of immune system behavior related to loneliness by gauging levels of antibodies in the blood that are produced when herpes viruses are reactivated.

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Participants were 200 breast cancer survivors who were between two months and three years past completion of cancer treatment with an average age of 51 years. Their blood was analyzed for the presence of antibodies against Epstein-Barr virus and cytomegalovirus.

Both are herpes viruses that infect a majority of Americans. About half of infections do not produce illness, but once a person is infected, the viruses remain dormant in the body and can be reactivated, resulting in elevated antibody levels, or titers – again, often producing no symptoms but hinting at regulatory problems in the cellular immune system.

Lonelier participants had higher levels of antibodies against cytomegalovirus than did less lonely participants, and those higher antibody levels were related to more pain, depression and fatigue symptoms. No difference was seen in Epstein-Barr virus antibody levels, possibly because this reactivation is linked to age and many of these participants were somewhat older, meaning reactivation related to loneliness would be difficult to detect, Jaremka said.

Previous research has suggested that stress can promote reactivation of these viruses, also resulting in elevated antibody titers.

“The same processes involved in stress and reactivation of these viruses is probably also relevant to the loneliness findings,” Jaremka said. “Loneliness has been thought of in many ways as a chronic stressor – a socially painful situation that can last for quite a long time.”

In an additional set of studies, the scientists sought to determine how loneliness affected the production of proinflammatory proteins, or cytokines, in response to stress. These studies were conducted with 144 women from the same group of breast cancer survivors and a group of 134 overweight middle-aged and older adults with no major health problems.

Baseline blood samples were taken from all participants, who were then subjected to stress – they were asked to deliver an impromptu five-minute speech and perform a mental arithmetic task in front of a video camera and three panelists. Researchers followed by stimulating the participants’ immune systems with lipopolysaccharide, a compound found on bacterial cell walls that is known to trigger an immune response.

In both populations, those who were lonelier produced significantly higher levels of a cytokine called interleukin-6, or IL-6, in response to acute stress than did participants who were more socially connected. Levels of another cytokine, tumor necrosis factor-alpha, also rose more dramatically in lonelier participants than in less lonely participants, but the findings were significant by statistical standards in only one study group, the healthy adults.

In the study with breast cancer survivors, researchers also tested for levels of the cytokine interleukin 1-beta, which was produced at higher levels in lonelier participants.

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When the scientists controlled for a number of factors, including sleep quality, age and general health measures, the results were the same.

“We saw consistency in the sense that more lonely people in both studies had more inflammation than less lonely people,” Jaremka said.

“It’s also important to remember the flip side, which is that people who feel very socially connected are experiencing more positive outcomes,” she said.

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