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# Stress linked to worse outcomes for young women with heart disease

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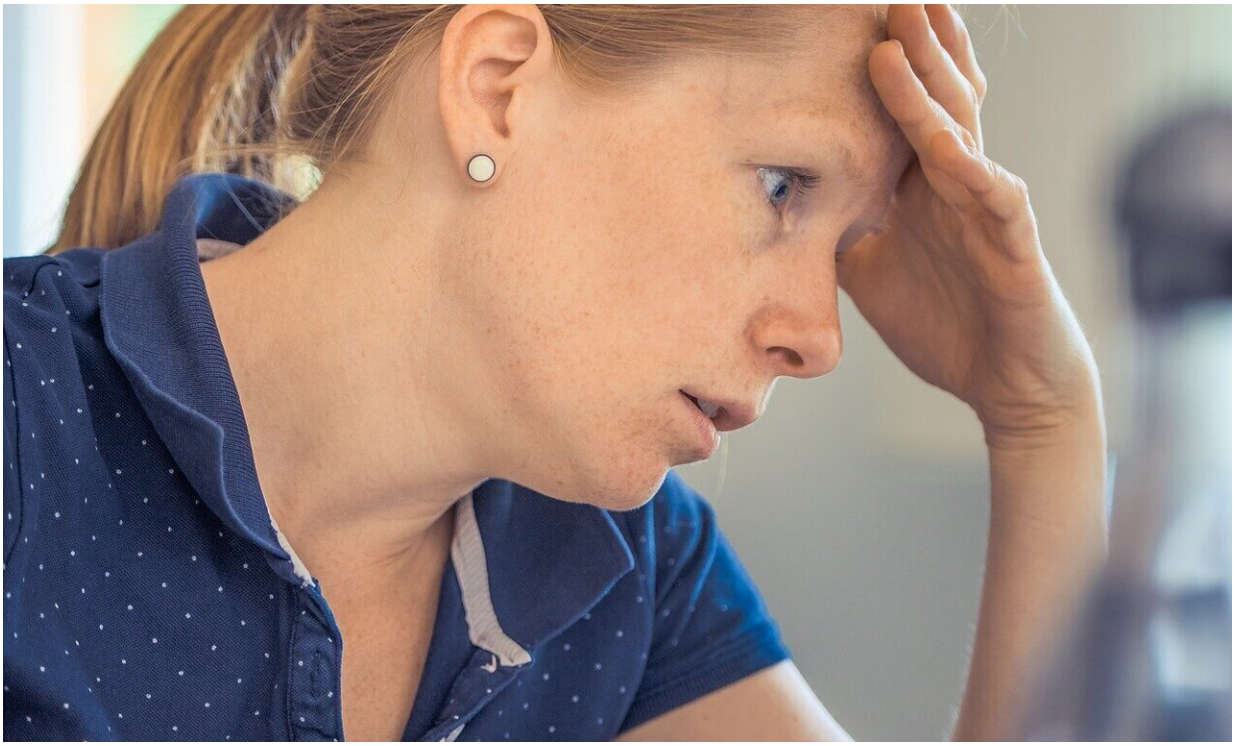

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Stress is much more harmful for young and middle-aged women with cardiovascular disease than for other patients, new research indicates.

"Younger women under the age of 55 tend to do worse than older individuals and men," said University of Alberta cardiologist Paolo

Raggi. "The long-term complication rate and the recurrence rate for heart attacks are much higher."

Researchers followed 662 heart patients for up to three years. Each person was assessed for symptoms of mental illness, including depression, post-traumatic stress disorder (PTSD), anxiety, anger, hostility and perceived stress.

The researchers found that in women, higher stress was associated with higher rates of adverse outcomes including death, myocardial infarction, stroke, heart failure or unstable angina. In fact, each measured increase of stress on a psychological distress score was associated with a 44 percent increase in further cardiovascular events.

The study is one of dozens of papers produced by a group of 80 psychologists, psychiatrists, radiologists and heart specialists, including Raggi, who have spent nearly a decade working together to understand the link between heart disease and mental illness.

"Why do patients with heart disease and associated depression or stress fare worse than patients with the same heart condition but no mental disorders? What are the mechanisms?" Raggi asked."We don't yet know whether mental disorders are the cause of or worsen cardiovascular disease, or if cardiovascular diseases induce mental disorders."

While women in general, and specifically young women, are less likely than men to develop cardiovascular disease, the researchers found that when they do, they tend to have more serious outcomes. They postulate it may be because of differences in the way men and women react to stress. In one study, they examined which parts of men's and women's brains were activated by taking brain scans while patients completed difficult math problems or were asked to give speeches, both considered forms of simulated mental stress.

The researchers found that men activate centres that are responsible for computation, defence and alertness, whereas women activate centres that are more responsible for emotional responses such as sadness, anxiety and depression.

"The emotional response of women to stress may be one of the causes of their predisposition to more complications once they develop coronary heart disease," Raggi said.

He explained that in a separate investigation, his team found strong emotional stress response in women can lead to excessive stimulation of the sympathetic nervous system, which speeds the heart rate during stress, and less activation of the parasympathetic nervous system, which slows the heart rate and modulates other important physiological functions.

In another study, the researchers found that women who suffered a heart attack are twice as likely as men to experience mental stress-induced myocardial ischemia, which means the blood supply to the heart is reduced under conditions of stress.

"In the long range, women with prior heart attacks who suffer from prolonged stress may suffer recurrent episodes of reduced blood supply to the heart and eventually experience another cardiac event," Raggi said.

He added the researchers are still investigating the underlying causes of the fundamental differences between men and women, with work funded by the U.S. National Institutes of Health. In one study, they found higher biomarkers of inflammation in the blood of young women with coronary artery disease than in men of the same age. Based on those findings, the team will do further testing using simultaneous scans of the brain and heart to determine the role of inflammation in stress responses.

Raggi said that so far, medications to treat stress or other mental disorders have not been shown to be effective in reducing adverse heart outcomes. However, in a pilot study in which they trained eight patients with coronary artery disease to control their neurological responses to stress using biofeedback, the researchers showed blood flow to the heart was increased compared with the control group. Raggi intends to pursue further investigation along those lines.

The researchers conclude that patients with coronary artery disease, especially women, should be assessed and treated for psychological distress in addition to traditional heart disease therapy.

**More information:** Pratik Pimple et al. Psychological Distress and Subsequent Cardiovascular Events in Individuals With Coronary Artery Disease, *Journal of the American Heart Association* (2019). DOI: 10.1161/JAHA.118.011866

Nicole Kasher et al. Sex differences in brain activation patterns with mental stress in patients with coronary artery disease, *Biology of Sex Differences* (2019). DOI: 10.1186/s13293-019-0248-4

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Viola Vaccarino et al. Mental Stress–Induced-Myocardial Ischemia in Young Patients With Recent Myocardial Infarction, *Circulation* (2018). DOI: 10.1161/CIRCULATIONAHA.117.030849