

Acute psychological stress reduces ability to withstand physical pain

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Traffic slows to a crawl, then a stop. You are trapped in a bottleneck nightmare, and late for a meeting. The stress takes a toll on you psychologically - but your body is at risk as well, according to a Tel Aviv University researcher.

A new study by Prof. Ruth Defrin of the Department of Physical Therapy at TAU's Sackler Faculty of Medicine published in the journal *PAIN* finds that acute [psychosocial stress](#) has a dramatically deleterious effect on the body's ability to modulate pain. Prof. Defrin, together with TAU doctoral student Nirit Geva and Prof. Jens Pruessner of McGill University, applied [acute stress](#) tests on a large group of healthy young

male adults to evaluate the behavior of the body's pain modulation mechanisms prior to and after the induction of stress.

The researchers found that although pain thresholds and [pain tolerance](#) seemed unaffected by stress, there was a significant increase in pain intensification and a decrease in pain inhibition capabilities.

Doing the math

For the purpose of the study, 29 healthy men underwent several commonly accepted pain tests to measure their heat-pain thresholds and pain inhibition, among other factors. In one test, for example, subjects were asked to signal the moment a gradually increasing heat stimulus became painful to identify their respective pain thresholds. They underwent a series of pain tests before and immediately after exposure to the Montreal Imaging Stress Task (MIST), a computer program of timed arithmetic exercises, designed to induce acute psychosocial stress.

In a way, the stress test is a psychological trick. MIST provides live feedback on submitted responses, registering only 20-45% of the responses as correct, whether or not a submitted response is the right answer. Because the subject has been previously informed that the average participant tends to score 80%-90%, he is reminded of his "poor performance" but has no way of improving his score, despite his best efforts. This provides the "stress" element of the experiment.

"To further test the effect of stress on pain, we divided the group according to stress levels," said Prof. Defrin. "We found that not only does psychosocial stress reduce the ability to modulate pain, the changes were significantly more robust among subjects with stronger reaction to stress ('high responders'). The higher the perceived stress, the more dysfunctional the pain modulation capabilities became. In other words, the type of stress and magnitude of its appraisal determine its interaction

with the pain system.

"We know from our previous studies and studies of others that chronic stress is far more damaging than acute stress, associated not only with dysfunctional pain modulation capabilities but also with chronic pain and systemic illnesses," said Prof. Defrin.

Defining stress

"Stress is defined as a sense of uncontrollability and unpredictability, precisely like being stuck in traffic where you are helpless and have no control over the situation," said Prof. Defrin. "Stress can have positive repercussions in a challenging work environment, for example, but overall it has primarily negative effects."

The results were also somewhat surprising. "We were sure we would see an increased ability to modulate pain, because you hear anecdotes about people who are injured during fighting or sports having greater pain modulation," said Prof. Defrin. "But we were surprised to find quite the opposite. While there was no visible effect of acute stress on the subject's pain threshold or tolerance, pain modulation decreased in a very dramatic way.

"Modern life exposes individuals to many, recurrent stressful situations," Prof. Defrin observes. "While there is no way to predict the type of stress we will feel under different circumstances, it is advisable to do everything in our power - adopt relaxation and stress reduction techniques as well as therapy - to reduce the amount of stress in our lives."

Provided by Tel Aviv University

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