

# Stimulating the gut–brain nerve can influence emotion

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Stimulating the vagus nerve, which provides a direct link between the gut and brain, makes people pay less attention to sad facial expressions. This research study by psychologists Katerina Johnson and Laura Steenbergen is published in the journal *Neuroscience*.

Katerina Johnson explains that "there is growing interest in the way that our gut, and the microbes living in it, might be able to affect our mood and [emotional states](#). We know that in animals the gut microbiome can affect emotional behavior via the vagus nerve. So in this study we

wanted to investigate whether stimulating this gut–brain nerve in people can also influence emotion."

## **Nervus vagus**

The researchers used a [non-invasive method](#) (called transcutaneous [vagus nerve stimulation](#)) to lightly stimulate the vagus nerve by applying a small electric current to the skin in the ear and measured whether, compared to a "placebo-stimulation," this changed how participants processed emotional stimuli. Laura Steenbergen commented that "we can study how much attention people pay to different emotions and whether they are biased towards certain emotions. For example, people who have stronger negative biases and pay more attention to negative emotions like sadness, are known to be more at risk of suffering from [psychiatric disorders](#) such as depression."

## **Reduced attention to sad faces**

The key finding from this study was that stimulating the vagus nerve reduced the attention participants paid to sad faces. Johnson added that "this is the first study to investigate whether vagal signaling in healthy people alters emotional processing. Our results demonstrate the role that vagal signaling can play in influencing [human emotion](#) and highlight the need to further investigate the importance of this neural pathway in mediating the connection between the [gut microbiome](#) and our brain."

## **Reduced attention to happy faces**

Interestingly, stimulation also reduced the attention participants paid to happy faces. Steenbergen explained that "this indicates a general emotional blunting effect, akin to what is commonly seen with antidepressants where patients report a reduction in both negative and

[positive emotions](#)." Vagus nerve stimulation is sometimes given to patients with severe treatment-resistant depression but its use is limited as currently only invasive stimulation is prescribed, requiring surgical implantation. Steenbergen added that their "findings suggest that this non-invasive form of vagus nerve stimulation could be a promising therapy for intermittent use by patients, alongside pharmacotherapy."

## Next step

Johnson concluded that "now we know that vagus nerve stimulation can affect emotional processing, the next step would be to understand how the microbiome stimulates the [vagus nerve](#). This may help us find microbiome-inspired ways to increase vagal signaling and potentially improve mood."

**More information:** Katerina V.A. Johnson et al, Gut feelings: vagal stimulation reduces emotional biases, *Neuroscience* (2022). [DOI: 10.1016/j.neuroscience.2022.04.026](#)

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