

Human Emotions Really Are Affected by Gut Bacteria, New Study Suggests

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The more we find out about the bacteria that live in our gut, the more we're coming to realise how these microbiota could have an impact on every facet of our lives – and not just our physical health and well-being, but our thoughts and emotions too.

A new study has identified associations between two kinds of gut microbiota and how they affect people's emotional responses, and the researchers say it's the first evidence of behavioural differences related to microbial composition in healthy humans.

Up until now, most research looking into how gut organisms influence emotions has been conducted on animals, with scientists finding that the bacterial composition of rodent guts can have an effect on the animals' behaviour.

Now, a team led by gastroenterologist Kirsten Tillisch at UCLA has shown that the same kind of associations appear to be affecting human emotional reactions.

The researchers took faecal samples from 40 healthy women between the ages of 18 and 55. When the samples were analysed, the participants were divided into two groups based on their microbiota composition.

One of the groups showed a greater abundance of a bacterium genus called *Bacteroides*, while the other group demonstrated more clusters of a genus called *Prevotella*.

Next, the team scanned the brains of the participants via functional magnetic resonance imaging, while showing them images designed to provoke a positive, negative, or neutral emotional response.

What the researchers found was that the group with greater abundance of *Bacteroides* in their gut bacteria showed greater thickness of the grey matter in the frontal cortex and insula – brain regions which process complex information – and also a larger volume of the hippocampus, which is involved with memory.

In contrast, the women with higher levels of *Prevotella* demonstrated lower volume in these areas, and demonstrated greater connections between emotional, attentional and sensory brain regions.

When shown the negative images, the *Prevotella* participants showed lower activity in the hippocampus – but reported higher levels of anxiety, distress and irritability after looking at the photos.

According to the researchers, this could be because the hippocampus helps us to regulate our emotions, and so with less hippocampal volume – which is possibly related somehow to the makeup of our gut microbiota – negative imagery may pack a greater emotional wallop.

"Reduced hippocampal engagement to negative imagery may be associated with increased emotional arousal," the authors write in their paper.

"Such changes have been suggested to result in less specificity of encoding the contextual details of incoming stimuli, a deficit seen in the setting of several psychiatric disorders, including depression, post traumatic stress disorder, and borderline personality disorder. While the subjects in this study were healthy, it is possible that the patterns which emerge from the microbial clustering represent vulnerability factors."

It's important to bear in mind that the sample studied here was very small – a point the researchers freely admit in their paper, acknowledging that further research with larger numbers of participants will be needed before we can really understand what's going on here.

But it's clear that there's something going on between the organisms in our gut and the thoughts and feelings we experience, and the sooner we delve into this, the sooner we'll comprehend just how emotionally powerful our 'second brain' really is.

The findings are reported in *Psychosomatic Medicine: Journal of Behavioral Medicine*.