

# Pain, emotions and the placebo effect

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In a pioneering study, researchers at the University of Luxembourg used fMRI technology to show that a person's ability to reinterpret negative events and to control feelings influences how strongly a placebo will work to reduce pain. Dr Marian van der Meulen gave us additional input.

"Brain scans showed researchers that specific regions in the brain react when a person receives a placebo and as a result experiences less pain," explains Dr Marian van der Meulen, neuropsychologist at the University of Luxembourg. "The regions in the brain that process pain become less active, which demonstrates that the placebo effect is real. But the psychological mechanism is still very little understood, and it is unclear why some people show a much stronger placebo response than others. We suspected that the way we can regulate our emotions plays a role and set out to investigate this."

## Why is it important to better understand the placebo effect?

"It's important to understand that the placebo effect is not only an imagined improvement when we believe we receive a medication.

The placebo effect had traditionally a negative reputation. During the last decade however, researchers have investigated the placebo effect itself. They have shown that placebos can trigger real biological changes in the body, including the brain, and that the placebo effect plays a role every time we receive a medical treatment. The placebo effect not only happens when administering a bogus treatment, but is a part of every

medical procedure. It is triggered by the presence of a white coat and other signs of medical authority, verbal suggestions of improvement and previous experiences with a treatment. Clinicians or psychiatrists may be able to improve the outcome of a medical intervention by optimising the contribution of the placebo effect."

## **How was the study carried out and what are the key findings?**

"The study was conducted in collaboration with the ZithaKlinik and uses fMRI (functional [magnetic resonance imaging](#)) of the brain to show a relationship between the regions in the brain that respond to a placebo and the ability to regulate emotions.

First, we assessed participants' ability for 'cognitive reappraisal', which means how well they can reinterpret [negative emotions](#). Participants looked at images that create negative emotions. Their task was to come up with ideas or interpretations that made them feel more positive about an image and we measured how well they managed to do this. At the ZithaKlinik, participants were then put in the MRI scanner and they received painful heat stimuli on their arms. They were then told that they received a powerful pain-relieving cream, which in reality was just a simple skin moisturiser.

All participants reported less pain: the placebo effect was working. Interestingly, those with a higher capacity to control their negative feelings showed the largest responses to the placebo cream in the brain. Their activity in those brain regions that process pain was most reduced. This suggests that your ability to regulate emotions affects how strong your response to a [placebo](#) will be."

## **Which role does brain imaging play?**

"When a brain area is more active, it consumes more oxygen and more blood will flow to this area. fMRI measures this change in blood flow and detects which areas of the brain are involved in a certain mental process. In our research we were able to detect decreases in activation in pain-processing regions but also increases in an area involved in emotion regulation.

This is the first study using functional [brain](#) imaging that was conducted in Luxembourg. Our next research project will use fMRI to assess, amongst others, the [placebo effect](#) in elderly people. We know that older people perceive and report pain differently than young people, yet why this is the case remains poorly understood. With improved understanding, clinicians and caretakers may be able to better diagnose and treat [pain](#) conditions in elderly people."

Provided by University of Luxembourg

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