Treatment-related pain may be 'socially contagious'

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Single trial structure presented simultaneously to Demonstrators and Observers within the same dyad. Credit: Communications Psychology (2024). DOI: 10.1038/s44271-024-00069-6

An individual's experience of pain from medical treatment can be
heightened by witnessing other people's responses to the same treatment, with this negative experience subsequently spreading to others, scientists have discovered.

You may have heard of the placebo effect—a beneficial effect produced by a patient's positive beliefs about a treatment. The "nocebo" effect describes the opposite, where negative expectations about treatment can cause harmful side effects.

New research, published recently in Communications Psychology, found that the nocebo effect has the capacity to spread beyond the original "harmful" experience, and that this is heightened in cases when the physiological response of two individuals was more similar or "synchronized"; a phenomenon associated with increased social connection.

"We found that expectations formed about a treatment can go on to influence both our self-perceived experience of that treatment as well as our physiological response to it," says Dr. Kirsten Barnes, from the School of Psychology at UNSW Sydney, and lead author on the study.

These results are significant as treatments and therapy can often occur in communal settings. In group rehabilitation sessions, or on shared hospital wards, where patients may form a connection with one another, witnessing painful treatment experiences could be particularly harmful.

The team hopes that this latest study will address gaps in our understanding of the social aspects of pain management and could be used to guide treatment decisions.

**A universal human experience**

Pain is a near universal human experience that comes not only from
physiological processes inside our bodies, but is also influenced by psychological and social factors. In Australia, 1 in 5 people suffer from chronic pain and 80% of people experience acute pain after medical interventions like surgery.

One of the primary ways we learn about the negative effects of medical intervention, such as increased pain, is through observing others.

Dr. Barnes wanted to demonstrate whether observing someone experiencing the nocebo effect could cause negative expectations about that treatment to spread to another person, who then goes on to express a second nocebo effect that would transfer to someone else.

"Because if that's the case, there's the potential for the rapid propagation of these negative treatment experiences independent of any kind of active component of a treatment itself," says Dr. Barnes.

**The experiment**

The study was completed while Dr. Barnes was conducting postdoctoral research at the University of Sydney and was approved by the university Human Research Ethics Committee. The team recreated a situation in the lab that enabled them to measure whether a nocebo effect was being passed down through a chain of participants.

Before the experiment, participants were instructed that a treatment applied to their arm would exacerbate their experience of pain, and this was reinforced with a short handout that they read during the set-up procedure.

They were also told that once the treatment was calibrated, they wouldn't be able to feel it. Instead, a blue or green square would appear on their computer screen when the treatment was either active or inactive and
they had to discover, either through demonstrating or observing, which was associated with treatment activity.

The first participant—the demonstrator—was paired with another participant who observed their reactions to the treatment. This first demonstrator was fitted with a thermode, similar to a small heat plate, which pulsed a rapid burst of heat against their skin. When the blue square was presented, the intensity of this heat was surreptitiously increased so it was noticeably more painful.

Next it was the observer's turn to become the demonstrator, while a new participant was introduced to the experiment in the observer's chair. The process was then repeated three times, each time with a new observer.

Unknown to the participants, the treatment was actually a sham. While the intensity of the heat was surreptitiously changed for the first demonstrator, making it appear as if the treatment was effective, an identical intensity was applied for all other demonstrators irrespective of whether they saw the green or blue square.

Interestingly, as each observer moved to the demonstrator's chair, many reported more pain when they saw the blue square, even though the intensity of the heat delivered to their arm was identical to when they saw the green square. These participants were experiencing a nocebo effect when they believed that the treatment was active.

**Measuring a nocebo effect**

While this social interaction was happening, the team was recording a host of changes in the participants.

"We know that certain muscles in the face are activated during pain. We recorded activity in these muscles from both the demonstrator and
observer when the 'treatment' was being delivered, so we could see how both were responding when they experienced or witnessed more pain to treatment," says Dr. Barnes.

"We also recorded the physiological response of both the demonstrator and observer, via their skin conductance—the sweat gland activity on their fingertips."

The team asked the demonstrator to give a self-report measure of the pain they were experiencing when they saw the blue or green square. "After analyzing the results, we found that witnessing treatment-related pain exacerbated the observer's own pain to a sham treatment, demonstrating that nocebo effects can be transmitted socially between people and passed successively along a chain."

Interestingly, the participants showed genuine physiological changes in their skin conductance, and their pain-related facial expressions, when they thought that they were receiving treatment. "This means that the nocebo effect is not just psychological, but can cause real changes in your body that alter the experience of pain," says Dr. Barnes.

They also found that the more "synchronous" or similar the physiological response of the demonstrator and observer were during the treatment session, the larger the nocebo effect of the observer when they subsequently experienced the "treatment."

"While more research is needed, this suggests that those closest to us may transmit their symptoms most readily, even in the case of the nocebo effect," says Dr. Barnes.

*Previous research* suggests that a good patient-practitioner relationship can lead to better health outcomes. "If you're a patient in a group setting, such as participating in group therapy or experiencing an intervention for
pain, it is generally believed that having social support is a good thing," says Dr. Barnes.

"But this study suggests that forming those close relationships may paradoxically end up making pain worse if you witness someone having a bad experience of treatment."

**Research in a real-life context**

This work contributes more broadly to an area of research that explores how the social transmission of negative health information may be impacting our health outcomes.

"Given that our social networks are ever expanding, with personal health experiences regularly shared on social media, it is important to understand the impact of this information, especially where it may be generating negative expectations about the effects of treatment."

While this research has provided new insight into the influence of social connections on pain management, Dr. Barnes highlights the need for further research.

In this study, the team tested healthy participants and the thermal stimuli that they experienced induced transient pain that they knew would end. This is not comparable to clinical settings where the time course of pain is often unpredictable and unknown. "Ideally, data is required from real treatment contexts to better understand the nocebo effect," says Dr. Barnes.

"Results of this study do not mean that there aren't genuine active effects of treatment, or that the pain you experience is all in your head. But if we can help to reduce these negative expectations, hopefully we can minimize the experience of the nocebo effect and improve patient
experiences in the future."

**More information:** Rodela Mostafa et al, Interpersonal physiological and psychological synchrony predict the social transmission of nocebo hyperalgesia between individuals, *Communications Psychology* (2024). DOI: 10.1038/s44271-024-00069-6

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