

Learning and unlearning pain from others. Verification and extension of the social learning model of placebo effects in pain

Pain is a subjective experience, which results in that the same stimulus may induce different pain sensations in different persons as well as different pain sensations in the same person at different time moments. For example, the same flu shot applied in the same body area and the same manner may be experienced as more or less painful by different persons as well as by the same person. Many psychological characteristics and processes (e.g., personality, attention, emotions) may be responsible for the differences in pain experience.

One of the powerful methods of pain reduction and pain worsening is a placebo. Even though the placebo is usually a pharmacologically inert substance (e.g., a sugar pill, a saline injection), it may produce significant effects on health. When this effect is positive, it is called the placebo effect, in contrast to negative effect, which is then called the nocebo effect. When the placebo results in pain reduction, the observed effect is called placebo hypoalgesia. On the other hand, when the placebo produces pain worsening, this effect is called nocebo hyperalgesia.

The question arises, how is it possible that an inert substance produces such significant effects on health? There is growing evidence that placebo and nocebo effects are the results of learning of responding to the placebo. For example, when somebody has experienced pain reduction after the application of a potent pain killer in the form of a white, round pill, they may also experience pain reduction in the future when they are administered a placebo in a similar way, i.e., white, round pill, however containing no pain killer. There is also some evidence that pain itself may be a learning phenomenon, i.e., we may learn to respond with pain to the nonpainful stimulation. For example, if the previous flu shot was very painful, we may feel pain next time while being vaccinated, although this time the injection is administered by a more experienced nurse and should not cause any pain.

As people are social animals, they do not learn by direct experiences only, but also from others. We do not need to touch a hot iron to learn to avoid touching it in the future. Instead, we can rely on other people's experiences and if we see that somebody gets burnt because of reaching the hot iron, we may avoid doing the same in the future. This process is called observational learning and is a core subject of research in this project.

Although we have learned a lot on the role of observational learning in many different areas of human life (e.g., aggressive behavior, problem-solving), surprisingly little is known on its effects in pain. In fact, only one study has been conducted to date, showing that pain can be learned from others, and several studies showed that placebo and nocebo effects in pain could be induced by observational learning. In other words, we know something about the effects of observational learning in pain when a placebo is applied and hardly something on the role of observational learning in pain induction without application of a placebo. Thus, the project is aimed to extend our understanding of the role of observational learning in pain both when a placebo is administered and when it is not.

We will start the project with the review of the current state of the art in the field of placebo hypoalgesia and nocebo hyperalgesia induced by observational learning to answer the question 1) whether placebo and nocebo effects produced by observational learning differ in the magnitude. Then we will conduct six experimental studies aimed to answer the following questions: 2) what is induced by observational learning when the placebo is applied? Does the observer learn to experience less pain when the placebo is applied, or rather to experience more pain when the placebo is not used; 3) whether observational learning can cause pain without the application of a placebo; 4) whether empathy of the observer influences the placebo effects induced by observational learning; 5) whether the model's characteristics (social status, self-confidence, and competence) influence the placebo effects caused by observational learning; 6) whether observational learning produces placebo and nocebo effects by changing the expectations of pain.

We believe that by answering the above-enlisted questions, our project will help to understand the role of observational learning in pain induction and placebo and nocebo effects in pain. We also do believe that the project's results will contribute to the development of effective methods of pain management based on observational learning, which will be of help for people suffering from pain.