

The Placebo Effect and Double-Blind Studies

What is the Placebo Effect?



A placebo is a non-medical treatment.

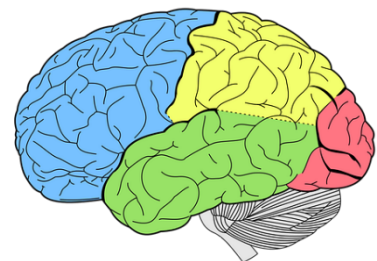
The **placebo effect** occurs when people given a false treatment – a **placebo** – experience improvement. This effect has even been recorded in patients who know they are receiving a placebo. But the effects are greater the more strongly people believe the treatment will work. Placebos don't only produce psychological responses. If people are told they are taking a sleeping pill, their pulse slows, blood pressure decreases, and their reactions become slower. On the other hand, if told they've been given a stimulant, the opposite occurs. Placebos are used in **clinical trials** to test the effectiveness of new medical treatments, such as drugs. They can be anything inactive (i.e., that won't have any true effect). Typically, studies use sugar, saline solution, or water. If people on the true drug improve significantly more than those on the placebo, it suggests that the drug is effective. A significant placebo effect doesn't necessarily mean a drug doesn't work, but it does mean that something else may be involved. Such a result merits further study.

The Powerful Placebo

Though discussed in doctor's offices and medical conferences for years, the placebo effect was introduced into mainstream scientific discourse in 1955 with publication of a paper by Dr. Henry K. Beecher, an anesthesiologist. The paper, "The Powerful Placebo", discussed the millennia-long use of placebos in and outside of medicine as well as their utility in clinical trials. Beecher found that across 15 studies covering over 1,000 patients, a placebo was effective in 35% of cases. He further notes that patients on placebos also experienced "side effects", much like one might expect from true medications. Such side effects included nausea, dry mouth, diarrhea, drowsiness, headache, difficulty concentrating, and rash. These responses are called the **nocebo effect**.

The Placebo Effect and the Brain

Placebos can't cure patients and their effects are generally temporary. But they affect symptoms controlled by the brain such as pain, stress, fatigue, and nausea. The human body naturally releases chemicals that temporarily alleviate pain and some other symptoms. Placebos seem to enhance that ability. They have been shown to increase certain neurotransmitters in the brain such as endorphins and dopamine. Both of these neurotransmitters are associated with positive feelings. **Endorphins** act like natural pain-killers, blocking pain signals heading to the brain. **Dopamine** is responsible for feelings of reward and pleasure as well as enabling us to recognize and seek out things that return a reward or pleasurable feeling. In terms of the pain response, the placebo effect seems to begin before the signal from external stimuli reaches the brain. Typically, a painful



Placebos are known to affect certain regions of the brain.

stimulus is applied (e.g., a burn, prick, or electric shock) and the signal travels from the site of stimulus to the brain, where it is processed as pain. In the placebo effect, however, the signal

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hormone levels – and they responded to fake treatments in the ways they had learned. Patients in another study were conditioned to feel less pain from electric shocks on one wrist than the other after cream was applied to each wrist and they were told that one helped alleviate pain. The cream on both wrists was in fact the same substance. By the end of the study, even strong electric shocks elicited very light pain responses.

A doctor at Walter Reed National Military Medical Center in Bethesda, MD, uses conditioning to treat his patients. Dr. Christopher Spevak learns about his patients' favorite smells or childhood memories and uses them in his treatment. When patients begin treatment with prescription pain medication, Dr. Spevak administers the drugs along with a specific scent, food, sound, or other positive stimulus. The non-medical stimulus conditions such a strong response in patients over time that Dr. Spevak



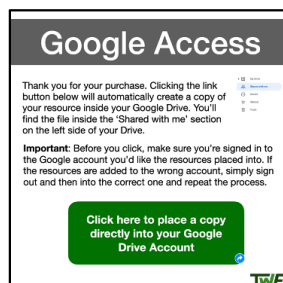
With conditioning, scents associated with positive memories can have a placebo effect.

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In a double-blind study, neither the subject nor the researcher knows which treatment is being administered.

What is a double-blind study?

In a **double-blind study**, neither the subjects nor the researchers know who is getting the real drug and who is getting the placebo. Subjects do know, however, that they may get a placebo. Each group is randomly selected. The group getting the placebo is considered the **control group**, or the baseline against which any effect of the medicine will be tested. Results from each

group are compared to determine if the treatment's effect was significantly better or longer-term than that of the placebo.

Because the subjects don't know if they're getting a real drug or the placebo, any effects due to belief or expectations will be the same across the groups. This includes placebo and nocebo effects. It is important that the researchers also not know so that they don't accidentally give subjects subtle hints as to which group they're in or unknowingly process the data differently. The alternative is a single-blind study, in which the subjects don't know what treatment they're receiving but the researchers do.

When testing a new treatment against an existing treatment, subjects are given the old treatment in place of a placebo.

A 1970s double-blind study on the placebo effect and pain found that medication can reverse the placebo effect. Patients who had recently had their wisdom teeth removed were given morphine, a placebo, or a drug called naloxone, which reverses the effect of strong pain-killers. Even some patients who did not receive morphine experienced pain relief. Naloxone was then administered to everyone who had felt better and all of them reported a return of their pain.

In 1986, a pain medication study split up 254 patients who had recently been treated for broken bones into three groups. One group received the anti-inflammatory drug dipyrone, one group received aspirin, and the third group received a placebo. Both medications significantly improved patients' pain over the placebo and dipyrone performed better than aspirin.

Vaccines are also tested using double-blind studies. A malaria vaccine was studied in Thai children in the mid-1990s using a hepatitis B vaccine in place of a placebo. Of 1221 children, 379 exhibited malaria symptoms. 195 of those patients had received the malaria vaccine and 184 had received the hepatitis B vaccine. These results showed no significant effect of the malaria vaccine. Due to previous trials with similar results, it was declared ineffective.



A malaria vaccine was declared ineffective after a double-blind study.

Double-blind studies are considered the best and most reliable way to test a new medical treatment. A good study should have at least 100 subjects, preferably up to 300.

Reading Comprehension Questions

1. What
2. What
3. What are some common placebos?
4. In what
5. What is the nocebo effect?
6. Can a
7. Why might people with Alzheimer disease experience less pain relief from medicines?
8. List
9. What is conditioning? Give one example.
10. What is a
11. What is a control group?
12. Why is it
13. How many participants should a good double-blind study have?

Extension Questions

14. Based on what you have read,
15. Have you ever experienced the placebo effect? If so, what placebo did you receive and how did it help you?
16. Create an
17. Could the placebo effect be dangerous? Explain your answer.

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