

1. A team of researchers at Massachusetts Institute of Technology (MIT) conducted a study to determine if debunking a false claim should occur before, during, or after reading the headline. To investigate, researchers performed the experiment with a total of 2,683 people. All participants read 36 news headlines from major media sources; 18 were true news headlines and 18 were false news headlines that had been debunked by a fact-checking website. The participants were randomly assigned into four groups where “true” and “false” tags were shown before reading the headline, at the same time as the headline, after reading the headline, or not shown at all. After one week, the participants were shown the same headlines again and asked to identify them as true or false. The researchers found showing the “true” or “false” labels immediately after reading the headlines reduced misclassification of the headlines by 25.3 percent, compared to 8.6 percent in the group shown the labels alongside the headlines and 5.7 percent in the group shown the labels beforehand.

Describe how this experiment meets each of the following criteria in a well-designed experiment: comparison, random assignment, replication, and control.

2. A statistics teacher wants to conduct a study with her students to determine if completing a review sheet is an effective way to prepare for a test. She has 180 students and would like to randomly assign half of them to complete a review sheet made by the teacher and the other half to study on their own.
 - a. What is the purpose of randomly assigning students to either receive a review sheet to complete or to study on their own?
 - b. Describe a process that would randomly assign the 180 students to the two treatment groups.

3. The Food and Drug Administration (FDA) recently authorized a medication called omalizumab to treat milk, egg, and nut allergies. The authorization came after a study done by clinicaltrials.gov, where “the primary objective was to compare the ability to consume foods without dose-limiting symptoms during a double-blind placebo-controlled food challenge, after treatment with either omalizumab or placebo for omalizumab.” Both the omalizumab and the placebo were administered with an injection.
 - a. Explain what is meant by “double-blind placebo-controlled” in the context of this study.
 - b. What is the importance of blinding in this study?
 - c. What is the importance of using a placebo in this study?
4. A recent study was conducted to investigate the placebo effect. In the study, 80 participants who were diagnosed with Irritable Bowel Syndrome (IBS) were randomly assigned to one of two groups. In Group 1, the 40 participants were given a placebo in the form of a sugar pill to treat their IBS. They were told they were receiving a placebo that had shown improvement in IBS through “mind-body self-healing processes.” The remaining 40 participants received no treatment pill but were given the same quality of interaction with the medical providers. The results of the study showed significant improvement in symptoms for the group who received the placebo compared to those that received no placebo treatment.
 - a. What is the purpose of including a group with no placebo treatment?
 - b. Explain how this study shows the placebo effect in action.
5. A school administrator wants to know if a new method for teaching math is effective for student learning. There are 6 math classes of the same level taught by the same teacher at this school, so she implements the new method in all 6 classes. At the end of the year, final grades are recorded.
 - a. Explain which criteria of a well-designed experiment (comparison, random assignment, replication, control) are not met in this study and provide a solution to each problem.
 - b. Create an outline to show a well-designed experiment.

6. Applying a new medicated hand cream is expected to reduce dry skin. In an experiment to assess reduction in dry skin, volunteer patients will be randomly assigned to one of two treatments. One group will apply the new medicated hand cream and the other group will apply a placebo that looks identical to medicated hand cream but does not contain any medicine. Each patient will then be evaluated by a doctor to determine how much dry skin is present. The doctor recording the data is unaware of whether the patient received the medicated hand cream or the placebo.

Which statement best explains blinding for this scenario?

- A) Both the patient and the doctor are blind to the treatment.
 - B) Neither the patient nor the doctor is blind to the treatment.
 - C) The patient is blind to the treatment, but not the doctor.
 - D) The doctor is blind to the treatment, but not the patient.
7. Some older rugby players complain of muscle pain after practice. A study was conducted to evaluate the effectiveness of a new muscle pain relief cream. Fifty volunteers who were older rugby players agreed to use the new muscle pain relief cream after every rugby practice for one month. At the end of the month, 54% of the volunteers reported that the new muscle pain relief cream was effective in relieving muscle pain. The company that produced the new muscle relief pain cream concluded that the new cream is more effective in relieving muscle pain than using no cream for older rugby players.

Which of the following best explains why the study does not support such a conclusion?

- A) There was no replication.
- B) The study had no control group.
- C) The participants were volunteers.
- D) The participants were all older rugby players.