

**TYPES of STUDIES and DATA COLLECTION METHODS**

1. **Observational Study:** This type of study attempts to understand a cause and effect relationship but the researcher is not able to control how the groups are assigned or the treatment each group receives. The researcher also usually attempts to minimize any influence the study may have on the subjects.
2. **Experimental Study:** This type of study also attempts to understand a cause and effect relationship. The researcher usually selects groups from the population and assigns treatment to one or more groups. The researcher also commonly uses a control group that receives a placebo.

**Treatment Group:** The group that actually receives real treatment.

**Control Group & Placebo:** The group that receives a fake treatment, called a placebo.

3. **Simulations:** A way to model random events in a statistical study, such that simulated outcomes closely match real-world outcomes in a safer or more efficient way.
4. **Census:** A study that uses counts or measures of the entire population.
5. **Sampling:** A study that selects a subset of the population to estimate the characteristics of the whole population.

Choose the type of Study that is most likely to be used (each is used just once).

~~(E) Experimental~~   ~~(SIM) Simulation~~   ~~(C) Census~~   ~~(SMP) Sampling~~   ~~(O) Observational~~

- C 6. You want to know how many pets the teachers at Phoenix High School own.
- E 7. A drug is given to 15 patients and a placebo to another group to determine its effect on an illness.
- O 8. You are doing a study at a mall in which you are counting the number of men that wash their hands after using the restroom.
- SIM 9. You want to know the g-forces a person would experience during a fall from a 90 foot high bridge into a lake.
- SMP 10. You need data on the average number of hours worked per week by an American teenager with a part-time job.

## Experimental Study

A 17-year-old student designed a science fair project with 72 mice randomly assigned to three groups: hard rock music, Mozart, and no music at all (called a **control group**). The mice in the first two groups were exposed to music 10 hours a day. Three times a week, all of the groups were timed as they ran through a maze. An analysis of results showed that the 24 mice in the no-music group averaged about a 5-minute improvement in their maze completion time, while the Mozart mice improved 8.5 minutes. The hard rock mice actually got slower—an average of four times slower! Another interesting fact: The student had to start his experiment over because all the hard-rock mice killed each other. None of the classical mice did that.

(Wertz, M. [1998]. *Why classical music is key to education*. From [www.schillerinstitute.org/programs/program\\_symp\\_2\\_7\\_98\\_tchor\\_.html#Music\\_Mice\\_Mazes](http://www.schillerinstitute.org/programs/program_symp_2_7_98_tchor_.html#Music_Mice_Mazes))

11. Describe the **independent variable**: (sometimes referred to as the treatment variable).

TYPE OF MUSIC & DURATION OF EXPOSURE.

12. Describe the **dependent variable** (sometimes referred to as the variable of interest).

THE TIME IMPROVED IN THE MAZE.

13. Which group(s) would be considered the **treatment group**?

2 GROUPS THAT WERE EXPOSED TO MUSIC.

14. Which group(s) would be considered the **control group**?

THE GROUP THAT DIDN'T LISTEN TO ANY MUSIC

A researcher wanted to study the effects of the amount of time of physical exercise and academic grade point average for a statistics class. The researcher found that the students that exercised also slept more as a result of their exhaustion from exercise and therefore couldn't only attribute the increase in the grade point average to physical exercise.

15. Describe the **independent variable** (sometimes referred to as the treatment variable).

THE AMOUNT & TYPE OF EXERCISE.

16. Describe the **dependent variable** (sometimes referred to as the variable of interest).

IMPROVEMENT OF GRADES

17. A **confounding variable** is sometimes an unexpected variable that can adversely affect the relation between the designed independent and dependent variables which may cause the researcher to analyze the results incorrectly. What is the confounding variable in this study?

THE AMOUNT OF SLEEP.

18. Describe how the researcher might instead conduct an **observational study** about the effect of exercise and physical exercise.

INVESTIGATE GROUPS OF PARTICIPANTS BY USING A SURVEY, TO FIND GROUPS OF STUDENTS THAT ALREADY REGULARLY EXERCISE OR DON'T EXERCISE.

## Additional Experimental Study Types:

**Blind Study:** An experimental study that is done in such a way that the patients or subjects do not know if they are receiving the placebo or the actual treatment but the researcher does know which subjects are receiving. This is done to ensure the results are not affected by a placebo effect.

**Double Blind Study:** An experimental study that is done in such a way that both the primary researcher and the subjects (patients) do not know which subjects are receiving the placebo or the actual treatment. This is done to ensure the results are not affected by a placebo effect and also help ensure that the researcher doesn't have bias to the control group.

**Placebo Effect:** The beneficial effect produced by a placebo, that cannot be attributed to the properties of the placebo itself and must therefore be due to the patient's belief in that treatment.

A researcher wanted to study the effects of a motion sickness medicine. The primary researcher had a third independent party create 25 containers containing a placebo and 25 containers containing the actual medicine. The containers were all numbered. The researcher then gave a medicine to 50 patients that suffer from motion sickness on a cruise ship. The researcher nor the participants knew which participants received the placebo and which received the actual treatment. The researcher conducted the study and only after the initial study was completed did the third party reveal which numbered containers were the placebo and which were not.

19. What type of experimental study was used in this study? **DOUBLE BLIND STUDY**

A researcher wanted to study the effects of a new migraine headache medicine at a neurologist's clinic. The researcher found 50 patients agreed to participate in the clinical trials. The researcher gave the first 25 patients the real treatment medicine and labeled those participants treatment group 'A'. The researcher gave a placebo to the next 25 patients a placebo that looked like and tasted like the real medicine. These participants were labeled the control group 'B'.

20. What type of experimental study was used in this study? **BLIND STUDY**