

This tutorial is going to talk about observational studies. Now, observational studies are a little different than experiments. An observational study is a type of study where the researcher can observe but does not administer any treatment. So whatever would normally happen, the researcher has to allow to happen.

So they can't change anything about the people or whatever they're studying. And the researcher can record the variables of interest, but again, can't affect the study. People have to be allowed to do whatever it is they were going to do anyway.

There are two types of studies that we can do observational studies. We can look to the past to see what's already happened. And that's called a retrospective study. Also sometimes called case control, where you take the people who are already, for instance, sick-- those are called the cases-- versus the people that aren't sick-- which are the controls. And you look back to see what similarities the cases have in common and what similarities the controls have in common.

Or you can do one where you have people that are doing something like smoking, or jogging, or doing something already. And you can look to the future to see what kind of effects those habits may have. And those are called prospective studies. So the individuals participate, and you record what happens as it happens as opposed to trying to look back and trying to figure it out.

And let me give you an example of each. So here's a doctor. And he has a suspicion that smoking may cause cancer. And this is 1929.

And so he's a cancer doctor. And he takes the cancer patients. And those are the subjects in the study, also called the participants in the study. He takes his cancer patients. And he looks back. Hey, did you guys happen to smoke before you got cancer? And what he found was an overwhelming majority of his cancer patients did in fact smoke.

And so this doctor was the very first-- this was a German doctor-- he was the very first person to suggest a link between smoking and cancer. And this was in 1929. That inspired some new studies.

One of the biggest of its kind began in 1934. And it dealt with a lot of physicians. So it was a physicians' smoking study. Now notice, some of these physicians smoke, and some of them don't.

And so what they did was they took several thousand doctors and started in 1934. Now the reason they chose doctors is because doctors are usually very diligent about following protocols. So if this person smoked, he probably would continue to smoke. And if this doctor didn't smoke, he probably would continue not smoking. And typically, these doctors don't drop out of a study, for instance.

So what happened was they did the study. And some of the doctors got cancer. Now, not every doctor who smoked ended up getting cancer. This guy didn't. And not every person who got cancer was a smoker, like this guy.

But what they found was the vast majority of the time, that it was the doctors who smoked that ended up getting cancer in the end. And this was done over a long period of time, a 20 year study. And at the end of it, this was the most convincing evidence that smoking had an effect on cancer. And this is a prospective study, because it started with the doctors and it followed them through to 1954.

Now, neither of these types of studies, a prospective or a retrospective study, can actually prove a cause and effect relationship. The only thing that can prove a cause and effect relationship between two variables is an experiment. And now let's think about that.

Think about what an experiment involving smoking would look like. That would require assigning certain people to smoke and assigning certain people not to smoke. And that just doesn't make any sense. It's unethical to do it that way because we know how unhealthy smoking can be. And so forcing someone to do something that's unhealthy doesn't really seem like it makes a whole lot of sense. And it is unethical.

But because of these studies that were done, and because the link was so strong, and because the link was so consistent over several studies that were done, in 1964 the Surgeon General of the United States released its famous warning about smoking and lung cancer, which looks like this. And this appears on every package of cigarettes.

Now, there are certain variations on this. Something like cigarette smoke contains carbon monoxide. But the one that I chose was smoking causes lung cancer.

And so to recap, in an observational study, it's a type of study where the researcher can observe but not influence the behavior of the participants, or also called subjects. Sometimes, you can do a retrospective study, which looks back. Or you can do a prospective study, where you gather your participants and then follow them along as they live their lives.

And so all of these terms were used in our tutorial. And sometimes, observational studies-- this is worth noting-- are done in place of experiments due to ethical concerns. You can't draw cause and effect relationships, but sometimes they can provide some pretty convincing evidence. Good luck, and we'll see you next time.