

What researchers mean by...confounding variables

In the simplest experiment, one investigates the relationship between two things by deliberately producing change in one of them and...observing the change in the other. These “things” in which change takes place are called “variables.”

– Robson, 1994

Are workers who wear supportive back belts on the job less prone to back strain compared to those who don't?

Before researchers design a study to answer this question, they must carefully consider all the variables that could affect their findings. If they fail to do so, the results of their study might not be valid.

Let's say a study* found that, over a 12-month period, one group of lumber-yard workers who wore back belts had half the rate of back strain compared to another group of workers who didn't wear the belts. (In this case, wearing the belts is what researchers call the “independent variable,” while the occurrence of back strain is the “dependent variable.”)

Based on this finding, it would be tempting to recommend that all lumberyard workers protect themselves from back strain by wearing supportive belts. But are the study results valid? Was one group of workers protected by the independent variable — their use of back belts — or was something else going on?

The “something else” would be a confounding variable, defined as “an unforeseen and unaccounted-for variable that jeopardizes the reliability and validity of an experiment's outcome.”

Before designing their study, the researchers should have known that the two groups of workers — who were employed in different lumberyards — didn't do the same amount of heavy lifting. One lumberyard typically used forklifts to load and deliver orders by truck, while the workers at the other location were sometimes expected to load orders into the customers' vehicles. So this variable — the amount of lifting — rather than back belt use could explain the different rates of back strain in the two groups.

When researchers design a study or interpret data, they must make every effort to account for variables that might introduce errors into the results. These include participant variables like age, gender and education, situational variables — some aspect of the task or environment — or even temporary variables like hunger or fatigue that might influence what happens during the study.

It's important to understand that while many such variables exist, they are not necessarily confounding in each and every study. Also, it would be impossible for researchers to control for every possible confounding variable. In the real world, they try to control only those variables that might be relevant to the outcome.

One way researchers try to avoid confounding variables is to use a randomized experiment design. With randomization, all the background characteristics should be similar in the groups being studied, which minimizes the influence of confounding factors.

In the back belt study, they might have observed or surveyed the workers at both lumberyards to determine how much lifting they actually did and then designed the study comparing the effects of back belt use in two more similar groups of workers. Researchers can also use a number of analytic and statistical strategies such as stratified analysis and multivariate analysis to control for certain variables and thus protect the validity of their findings.

* The case example presented here is fictional. However, in their 2003 report “The use of back belts for prevention of occupational low-back pain,” Institute

researchers Carlo Ammendolia, Mickey Kerr and Claire Bombardier stated that most randomized controlled trials reviewed failed to show positive results with the use of a back belt. The Canadian Centre for Occupational Health and Safety and the U.S. National Institute for Occupational Safety and Health currently do not support the use of back belts as a measure to prevent back pain.

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