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Confounding, mediator and moderator variables

Study Development Factsheet

Confounding variables, mediators and moderators are things that you may need to consider when you are studying links between other variables.

People can sometimes easily spot when there might be something wrong with a claim. For example, if a headline claims that “a new study finds that people who garden regularly are less likely to have vitamin D deficiency”, many people would spot that people who garden regularly would generally spend more time outside in the sun (which in this case is a mediating variable), which would lead to higher vitamin D levels for those individuals. For some other “hidden” variables, it might be quite hard to tell. In all cases, there are a variety of statistical analyses that you can perform to check whether another variable is affecting the relationship you have observed.

This factsheet is a first step to understand what these terms mean but will not go into the analyses.

Note: The studies and relationships mentioned in this factsheet are fictional examples, not based on actual data.

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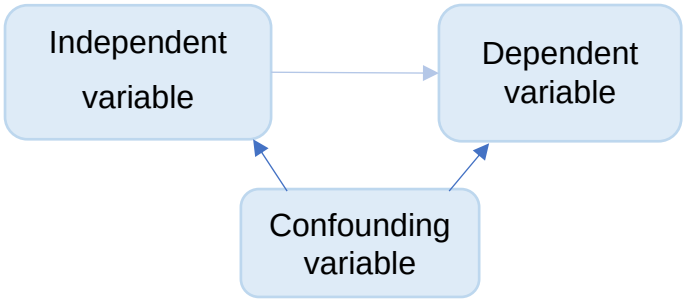
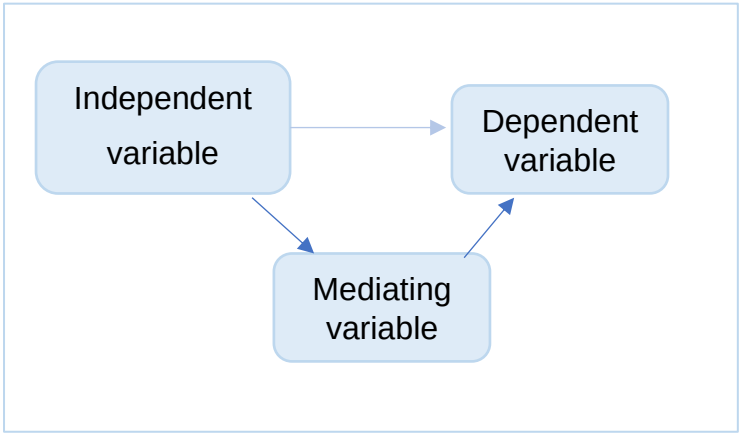
Confounding variable: this is a variable that is correlated with the independent variable and affects the dependent variable. For example, we review some data and find that when sales of iced coffee increase, there is also an increase in the number of cases of heat stroke. This does not mean that iced coffee is causing the heat stroke. There is a **confounding** variable of temperature that is affecting both the iced coffee sales and the number of cases of heat stroke.

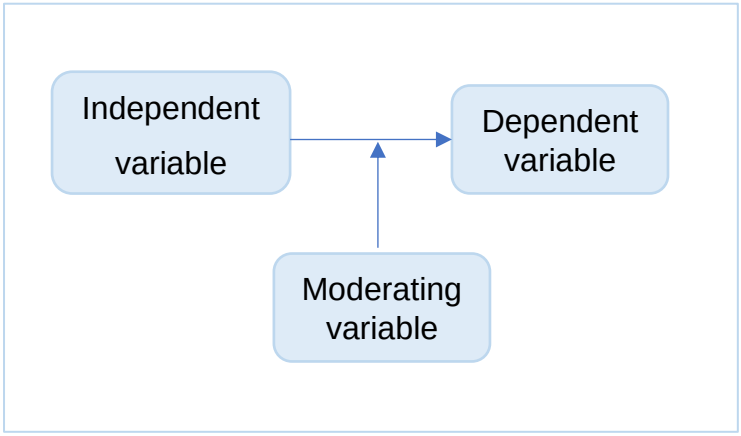


Mediating variable: this is a variable that explains the relationship between two others. The independent variable affects the mediator, which then causes the change in the dependent variable. For example, I may observe a relationship between hours spent using social media and reported feelings of loneliness. It wouldn't be quite correct/complete to say that using social media makes you feel lonely as there is a mediator that the more time someone spends using social media, the less time they have to spend with other people, or the time they are spending with other people may be lower quality, so they feel lonelier.

These two variables (confounding and mediating) are sometimes misnamed accidently. Often someone will call a mediator a confounding variable. The difference is: a confounding variable changes both the independent and dependent variable, whereas a mediator is changed by the independent, which then changes the dependent.



Moderating variable: This is a variable that either strengthens or weakens the relationship between the independent variable and the dependent. For example, there is a relationship between number of hours practicing driving and driving test performance, but this relationship is weakened if the person is already a good driver when they start the practice hours.



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