

## BASICS

# Internal Validity vs. External Validity in Research

Both help determine how meaningful the results of the study are

By [Arlin Cuncic](#) | Updated on October 17, 2022

✓ [Medically reviewed by Rachel Goldman, PhD, FTOS](#)



Verywell / Bailey Mariner

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Internal validity is a measure of how well a study is conducted (its structure) and how accurately its results reflect the studied group.

External validity relates to how applicable the findings are in the real world. These two concepts help researchers gauge if the results of a [research study](#) are trustworthy and meaningful.

### Internal Validity

- Conclusions are warranted
- Controls extraneous variables
- Eliminates alternative explanations
- Focus on accuracy and strong research methods

### External Validity

- Findings can be generalized
- Outcomes apply to practical situations
- Results apply to the world at large
- Results can be translated into another context

## What Is Internal Validity in Research?

Internal validity is the extent to which a research study establishes a trustworthy cause-and-effect relationship. <sup>[1]</sup> This type of validity depends largely on the study's procedures and how rigorously it is performed.

Internal validity is important because once established, it makes it possible to eliminate alternative explanations for a finding. If you implement a smoking cessation program, for instance, internal validity ensures that any improvement in the subjects is due to the treatment administered and not something else.

Internal validity is not a "yes or no" concept. Instead, we consider how confident we can be with study findings based on whether the research avoids traps that may make those findings questionable. The less chance

Confounding refers to uncontrollable [variables](#) that come into play and can confuse the outcome of a study, making us unsure of whether we can trust that we have identified the cause-and-effect relationship.

In short, you can only be confident that a study is internally valid if you can rule out alternative explanations for the findings. Three criteria are required to assume cause and effect in a research study:

The cause preceded the effect in terms of time.

The cause and effect vary together.

There are no other likely explanations for the relationship observed.

## Factors That Improve Internal Validity

To ensure the internal validity of a study, you want to consider aspects of the research design that will increase the likelihood that you can reject alternative hypotheses. Many factors can improve internal validity in research, including:

**[Blinding](#):** Participants—and sometimes researchers—are unaware of what intervention they are receiving (such as using a placebo on some subjects in a medication study) to avoid having this knowledge bias their perceptions and behaviors, thus impacting the study's outcome

**[Experimental manipulation](#):** Manipulating an independent variable in a study (for instance, giving smokers a cessation program) instead of just observing an association without conducting any intervention (examining the relationship between exercise and smoking behavior)

**[Random selection](#):** Choosing participants at random or in a manner in which they are representative of the population that you wish to study

**Randomization or [random assignment](#):** Randomly assigning participants to treatment and control groups, ensuring that there is no systematic bias between the research groups

**Strict study protocol:** Following specific procedures during the study so as not to introduce any unintended effects; for example, doing things

## Internal Validity Threats

Just as there are many ways to ensure internal validity, there is also a list of potential threats that should be considered when planning a study. <sup>[2]</sup>

**Attrition:** Participants dropping out or leaving a study, which means that the results are based on a biased sample of only the people who did not choose to leave (and possibly who all have something in common, such as higher motivation)

**Confounding:** A situation in which changes in an outcome variable can be thought to have resulted from some type of outside variable not measured or manipulated in the study

**Diffusion:** This refers to the results of one group transferring to another through the groups interacting and talking with or observing one another; this can also lead to another issue called resentful demoralization, in which a control group tries less hard because they feel resentful over the group that they are in

**Experimenter bias:** An experimenter behaving in a different way with different groups in a study, which can impact the results (and is eliminated through blinding)

**Historical events:** May influence the outcome of studies that occur over a period of time, such as a change in the political leader or a natural disaster that occurs, influencing how study participants feel and act

**Instrumentation:** This involves "[priming](#)" [participants](#) in a study in certain ways with the measures used, causing them to react in a way that is different than they would have otherwise reacted

**Maturation:** The impact of time as a variable in a study; for example, if a study takes place over a period of time in which it is possible that participants naturally change in some way (i.e., they grew older or became tired), it may be impossible to rule out whether effects seen in the study were simply due to the impact of time

**Statistical regression:** The natural effect of participants at extreme ends of a measure falling in a certain direction due to the passage of time rather than being a direct effect of an intervention

**Testing:** Repeatedly testing participants using the same measures influences outcomes; for example, if you give someone the same test three

## What Is External Validity in Research?

External validity refers to how well the outcome of a research study can be expected to apply to other settings. This is important because, if external validity is established, it means that the findings can be generalizable to similar individuals or populations.

External validity affirmatively answers the question: Do the findings apply to similar people, settings, situations, and time periods?

Population validity and ecological validity are two types of external validity. Population validity refers to whether you can generalize the research outcomes to other populations or groups. Ecological validity refers to whether a study's findings can be generalized to additional situations or settings.

Another term called transferability refers to whether results transfer to situations with similar characteristics. Transferability relates to external validity and refers to [a qualitative research](#) design.

### Factors That Improve External Validity

If you want to improve the external validity of your study, there are many ways to achieve this goal. Factors that can enhance external validity include:

**Field experiments:** Conducting a study outside the laboratory, in a natural setting

**Inclusion and exclusion criteria:** Setting criteria as to who can be involved in the research, ensuring that the population being studied is clearly defined

**Psychological realism:** Making sure participants experience the events of the study as being real by telling them a "cover story," or a different story about the aim of the study so they don't behave differently than they

**Replication:** Conducting the study again with different samples or in different settings to see if you get the same results; when many studies have been conducted on the same topic, a [meta-analysis](#) can also be used to determine if the effect of an independent variable can be replicated, therefore making it more reliable

**Reprocessing or calibration:** Using statistical methods to adjust for external validity issues, such as reweighting groups if a study had uneven groups for a particular characteristic (such as age)

## External Validity Threats

External validity is threatened when a study does not take into account the interaction of variables in the real world. <sup>[2]</sup> Threats to external validity include:

**Pre- and post-test effects:** When the pre- or post-test is in some way related to the effect seen in the study, such that the cause-and-effect relationship disappears without these added tests

**Sample features:** When some feature of the sample used was responsible for the effect (or partially responsible), leading to limited generalizability of the findings

**Selection bias:** Also considered a threat to internal validity, selection bias describes differences between groups in a study that may relate to the independent variable—like motivation or willingness to take part in the study, or specific demographics of individuals being more likely to take part in an [online survey](#).<sup>[3]</sup>

**Situational factors:** Factors such as the time of day of the study, its location, noise, researcher characteristics, and the number of measures used may affect the generalizability of findings

While rigorous research methods can ensure internal validity, external validity may be limited by these methods.

## Internal Validity vs. External Validity

## Similarities

One of the similarities between internal validity and external validity is that both factors should be considered when designing a study. This is because both have implications in terms of whether the results of a study have meaning.

Both internal validity and external validity are not "either/or" concepts. Therefore, you always need to decide to what degree a study performs in terms of each type of validity.

Each of these concepts is also typically reported in research articles published in [scholarly journals](#). This is so that other researchers can evaluate the study and make decisions about whether the results are useful and valid.

## Differences

The essential difference between internal validity and external validity is that internal validity refers to the structure of a study (and its variables) while external validity refers to the universality of the results. But there are further differences between the two as well.

For instance, internal validity focuses on showing a difference that is due to the independent variable alone. Conversely, external validity results can be translated to the world at large.

Internal validity and external validity aren't mutually exclusive. You can have a study with good internal validity but be overall irrelevant to the real world. You could also conduct a field study that is highly relevant to the real world but doesn't have trustworthy results in terms of knowing what variables caused the outcomes.

## Examples of Validity



## Internal Validity Example

An example of a study with good internal validity would be if a researcher hypothesizes that using a particular [mindfulness](#) app will reduce negative mood. To test this hypothesis, the researcher randomly assigns a sample of participants to one of two groups: those who will use the app over a defined period and those who engage in a control task.

The researcher ensures that there is no systematic bias in how participants are assigned to the groups. They do this by blinding the research assistants so they don't know which groups the subjects are in during the experiment.

A strict study protocol is also used to outline the procedures of the study. Potential confounding variables are measured along with [mood](#), such as the participants' socioeconomic status, gender, age, and other factors. If participants drop out of the study, their characteristics are examined to make sure there is no systematic bias in terms of who stays in.

## External Validity Example

An example of a study with good external validity would be if, in the above example, the participants used the mindfulness app at home rather than in the laboratory. This shows that results appear in a real-world setting.

To further ensure external validity, the researcher clearly defines the population of interest and chooses a [representative sample](#). They might also replicate the study's results using different technological devices.

## A Word From Verywell

[Setting up an experiment](#) so that it has both sound internal validity and external validity involves being mindful from the start about factors that can influence each aspect of your research.

It's best to spend extra time designing a structurally sound study that has far-reaching implications rather than to quickly rush through the design



results.

**Read Next:** [An Overview of the Scientific Method](#)

3 Sources 



By [Arlin Cuncic](#)

Arlin Cuncic, MA, is the author of "Therapy in Focus: What to Expect from CBT for Social Anxiety Disorder" and "7 Weeks to Reduce Anxiety."



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