

Factors that undermine Internal and External Validity¹

Internal Validity—whether the independent variable really affects the dependent variable.

1. **History:** specific events occurring during the measurement phase of the study which, in addition to the independent variable, might affect the dependent variable.
2. **Maturation:** processes influencing the dependent variable that take place over time, such as growing older, hungrier, more tired, losing motivation, etc.
3. **Measurement:** the effects of the measuring devices themselves, independent of what they purport to measure.
4. **Instrumentation:** changes in the measurement devices during a study which affect the dependent variable.
5. **Statistical regression:** the natural tendency of people who are selected for a sample because they measure extreme on some variable, to measure less extreme on subsequent measures.
6. **Selection:** the effect of selecting respondents in different groups for different reasons.
7. **Mortality:** loss of sample members due to nonrandom causes during a study, such as refusals to answer questions, or withdrawing from a study before it's finished.
8. **Interaction:** between various combinations of the above problems that mimics the effects of the independent variable(s).

External Validity—whether one can generalize from the results of the study to a wider population.

1. **Sampling bias:** the sample was chosen in such a manner that, as a group, it is different in one or more ways from the population from which it was drawn. Usually, random sampling methods are used to insure against this problem.
2. **Interaction:** interaction between various aspects of the study, such as different questions on a questionnaire, or questions interacting with aspects of their presentation that affect the dependent variable for the sample group, but because these conditions are not present in the population outside the sample group, the effect will not be present, preventing one from generalizing from the research.
3. **Multiple treatments or measurements:** the effect of exposing research subjects to repeated treatments or measurements. One can't erase past research effects on subjects, hence they are contaminated by any previous participation in studies. This is especially problematic when researching students because they are frequent participants in studies.

¹ The information this document is based on is from *Experimental and Quasi-experimental Designs for Research*, by Donald T. Campbell and Julian C. Stanley, Chicago: Rand McNally and Co., 1966.