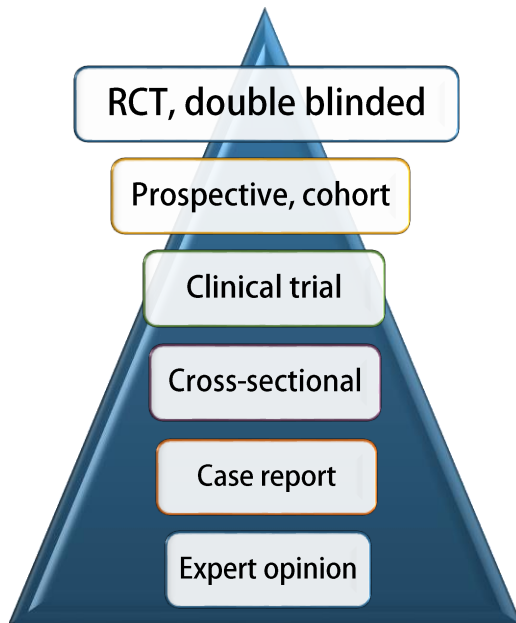


Hierarchy of Scientific Evidence

When examining the strength of scientific evidence, a number of factors come into play. Of the most important factors, however, is study design.

In the hierarchy of evidence, the strongest evidence results from randomized controlled trials (RCT) and intervention studies. By comparison, weaker evidence results from case reports and expert opinion.



Types of Scientific Journal Articles

Full-length research paper: the majority of articles published in scientific journals. These include presentation of relevance for a specific study, methods used to perform the study, presentation of results gathered, and a discussion of conclusions about the study.

Industry interest piece: summary of the work conducted in a study and discusses recommendations (resulting from the research work) that may be helpful to a specific scientific industry. It does not include a detailed account of the study.

Hot topic: report on a study that is not complete at time of publication. Because the study topic is so ground-breaking or important to the field, the journal will allow publication of the preliminary results.

Technical note: report on a new or improved method in the specific scientific field.

Invited review: written by authors suggested by journal editors and usually summarizes a specific scientific topic or recent symposia.

Letter to the Editor: usually has a short word limit (~300 words) and reflects topics of concern for the readers. It may include corrections made to articles after publication or even rebuttals from disagreeing scientists.

Evaluating Evidence

*"The important thing is not to stop questioning. Curiosity has its own reason for existing."
– Albert Einstein*

Not all research is created equal. Many times, scientific studies conclude results that contradict each other, and scientists express opposing viewpoints on subject matter. This can lead to confusion for consumers and increased perceptions of risk or hazard.



This brochure provides a greater understanding of what can seem like a mysterious scientific process and context for critical evaluation of scientific literature.



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Glossary of Scientific Terms

Association

A relationship. In research studies, association means that two characteristics (sometimes also called variables or factors) are related so that if one changes, the other changes in a predictable way. An association does not necessarily mean that one variable causes the other.

Bias

Any factor, recognized or not, that distorts the findings of a study. In research studies, bias can influence the observations, results, and conclusions of the study and make them less accurate or believable.

Causation

Two variables are causally related if changes in the value of one cause the other to change. Two variables can be associated without having any causal relation, and even if two variables have a causal relation, their correlation can be small or zero.

Correlation

A measure of linear association between two (ordered) lists. Two variables can be strongly correlated without having any causal relationship, and two variables can have a causal relationship and yet be uncorrelated.

Confounding Variable

An unforeseen, and unaccounted-for variable that jeopardizes reliability and validity of an experiment's outcome. (e.g., age, gender, smoking, income).

Relative Risk

A comparison of the risk of a particular event for different groups of people. Relative risk (RR) is usually used to estimate exposure to something that could affect health.

Reliability

The extent to which a measure, procedure or instrument yields the same result on repeated trials.

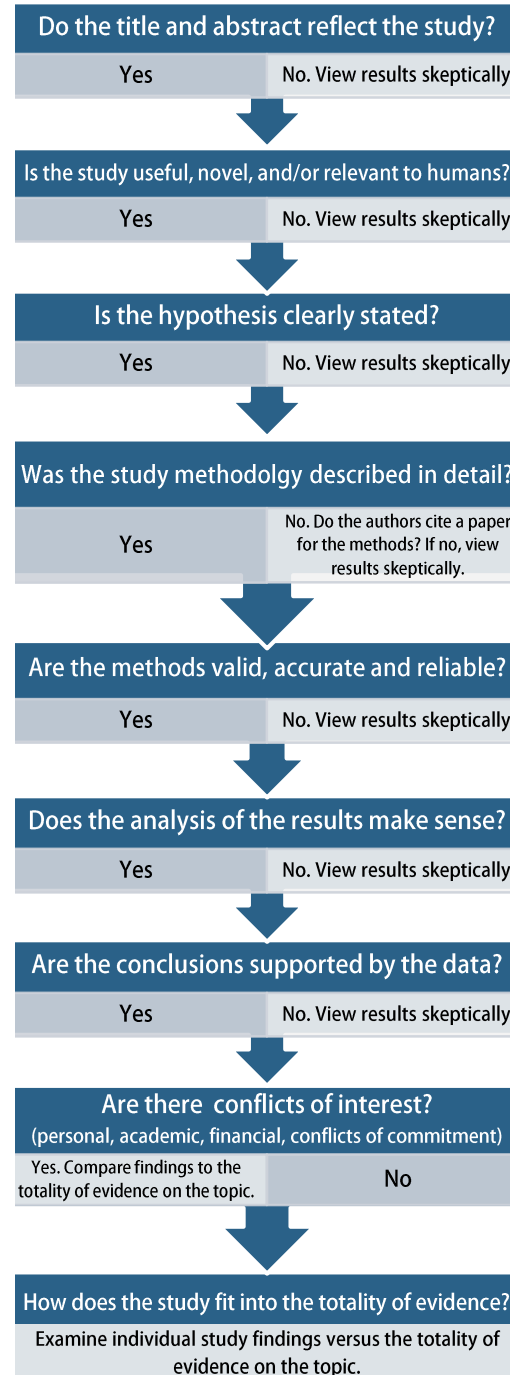
Statistical Significance

Calculation of the probability that an observed effect in a research study is occurring because of chance, typically expressed as a P-value (e.g., $p < 0.05$).

Validity

The degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure. A method can be reliable, consistently measuring the same thing, but not valid.

Quick Study Evaluation Checklist



Study Design Cheat Sheet

Type	Design	Definition
Observational	Cohort	Cohort studies follow a group of people who share common characteristics and assess whether exposure to a certain risk factor leads to certain outcome.
	Case-control	Case-control studies follow specific groups of people, cases vs. controls for a certain outcome, who differ only by exposure to a risk factor.
	Cross-sectional	Cross-sectional studies examine associations at a single point in time to assess prevalence of exposure to a risk factor or disease outcome.
	Ecological	Ecological or Epidemiological studies assess the rate of a disease outcome in relation to population-level factors.
Experimental	Preventative trial	Preventative trials use healthy individuals to assess illness prevention via an intervention.
	Clinical trial	Clinical trials use a particular type of person or group of people and follow a pre-defined intervention plan.
	Diagnostic trial	Diagnostic trials screen a particular type of person or group of people and follow a pre-defined intervention plan.