

Primer on Absolute vs. Relative Differences

When presenting data comparing two or more groups, researchers (and reporters) naturally focus on differences. Compared with others, one group may (pick one): cost more, have longer hospital stays, or have higher complication rates. These relations may be expressed as either absolute or relative differences. An absolute difference is a subtraction; a relative difference is a ratio. Because this choice may influence how big a difference “feels,” readers need to be alert to the distinction.

When the units are counts, such as dollars, the distinction between absolute and relative differences is obvious: group 1 costs \$30,000 more; group 1 had 40% higher costs. But when the units are percentages (frequently used to describe rates, probabilities, and proportions), it can be difficult to determine whether a stated difference is absolute or relative.

Consider the risk for blindness in a patient with diabetes over a 5-year period. If the risk for blindness is 2 in 100 (2%) in a group of patients treated conventionally and 1 in 100 (1%) in patients treated intensively, the absolute difference is derived by simply subtracting the two risks:

$$2\% - 1\% = 1\%$$

Expressed as an absolute difference, intensive therapy reduces the 5-year risk for blindness by 1%.

The relative difference is the ratio of the two risks. (NB: Relative risk, relative rate, rate ratios, and odds ratios are all examples of relative differences.) Given the data above, the relative difference is:

$$\frac{1\%}{2\%} = 50\%$$

Expressed as a relative difference, intensive therapy reduces the risk for blindness by half.

Both expressions have their place. Without any qualification, both statements (“reduced the risk by 1%” and “reduced the risk by 50%”) could be construed as representing either an absolute or relative difference. But most important, note the difference in “feel.” A statement of “reduced the risk by 1%” does feel like a smaller effect than “reduced the risk by 50%.”

The most frequent problem readers will face is the reporting of an isolated relative difference. Research abstracts, medical review articles, and general circulation newspapers and magazines are filled with statements like “60% decrease in costs,” “twice as many days in the hospital,” or “20% decrease in mortality.” These statements provide no information about the starting point. For example, the statement, “The risk for disease X was cut in half” gives no information about where you started. As shown in the Table below, there is a wide range of risks that can be cut in half.

Consequently, when you're

RISK FOR DISEASE		ABSOLUTE DIFFERENCE [A - B]	RELATIVE DIFFERENCE [B/A]
GROUP A	GROUP B		
20% (2/10)	10% (1/10)	10%	50%
2% (2/100)	1% (1/100)	1%	50%
0.2% (2/1000)	0.1% (1/1000)	0.1%	50%

presented with a relative difference (“60% more”) and you really want to get a complete picture of what’s going on, make sure you ask the question, “From what?” If the goal is clarity, the actual data (the dollars, the hospital days, and the mortality rates) for each group is tough to beat.