AN EDITOR REPLIES

The provocative letter by Rothman et al. (1) makes a case for displaying estimated relative risks and relative rates on an absolute, rather than a logarithmic, scale. Preference for the logarithmic scale has become so widely enshrined that some journals, including both the *American Journal of Epidemiology* and *Epidemiology*, now require authors to provide justification if they want to use an absolute scale for displays of relative effects. Rothman et al. argue that even when a relative risk has been estimated rather than a risk difference, the absolute scale should be used, because it has more public health relevance than does a logarithmic scale. Should the graphing policy of this journal be revisited?

I found the argument interesting, and I was almost persuaded. Rothman et al. use oversimplified examples, but the public health implications they describe also hold under more complex scenarios that also involve confounders.

However, we should keep in mind that a relative risk associated with a dichotomous exposure, *E*, can also be thought of as a protective effect associated with its complement. Thus, if the relative risk for *E* is 10, then going from non-*E* to *E* confers a 900% increase in risk. However, an equivalent description of the same effect is to say that going from *E* to non-*E* confers a 90% reduction in risk. Public health practitioners could consider the effect on risk for 1,000 persons exposed to a causal *E* who might instead have never been exposed, or the public health implications for 1,000 persons without *E* who might instead have been exposed. The public health impacts are the same. Which version is reported is a matter of coding (and ''spin''). On a relative scale, one gives us 10.0 and the other 0.10, but considerations of public health do not seem to imply a clear preference for one over the other.

Furthermore, for some applications, an absolute scale can be misleading. For example, suppose a number of relative risk estimates are being assessed in a meta-analysis, not for their public health implications but for comparison among them and against some null value. The use of an absolute scale will tend to tilt a null effect toward an overall relative risk that appears to be above 1.0. The eye tries to find a balance point in a visual display, so we are easily misled: 2.0 is much farther from 1.0 than is 0.5.

For many applications, ''removal'' of the exposure under study is not even a meaningful counterfactual. If all men could be made female, many cases of certain diseases would be prevented. Here the designation of men as ''exposed'' would be totally arbitrary.

There are also many graphical presentations where the ''exposure'' is not necessarily causal and the relative risk should not be represented as carrying an ''add/remove'' public health meaning. If the menstrual cycle could be manipulated by medications to be more ''normal,'' would women necessarily become more fertile? If specific single nucleotide polymorphisms could be changed, would disease rates necessarily change accordingly? If small babies could be made heavier at birth, would they necessarily be healthier? These leaps of logic stretch unduly from correlation to causation. Displays based on what might be achieved in imagined interventions could lead the unwary to public health conclusions that descriptive association studies cannot really support.

Rothman et al. (1) are right to value methods motivated by public health relevance. Nevertheless, for most applications, I prefer the symmetry and implicit agnosticism implied by the use of the logarithmic scale. Should the *Journal*'s policy be revised? I think not. Both this journal and *Epidemiology* allow for circumstances in which authors can make a case for presenting graphical displays on an absolute scale. Authors who think that is the correct scale for their findings are welcome to make that case.

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Reference

1. Rothman KJ, Wise LA, Hatch EE. Re: Should graphs of risk or rate ratios be plotted on a log scale? [letter]. *Am J Epidemiol*. 2011;174(3):376–377.

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