

Relative risk and odds ratio

Exercise example from the “Seeing Through Statistics” book

12. The Roper Organization (1992) conducted a study as part of a larger survey to ascertain the number of American adults who had experienced phenomena such as seeing a ghost, “feeling as if you left your body,” and seeing a UFO. A representative sample of adults (18 and over) in the continental United States were interviewed in their homes during July, August, and September, 1991. The results when respondents were asked about seeing a ghost are shown in Table 12.10. Find numbers for each of the following:

Table 12.10 **Age and Ghost Sitings**

	Reportedly Has Seen a Ghost		
	Yes	No	Total
Aged 18 to 29	212	1313	1525
Aged 30 or over	465	3912	4377
Total	677	5225	5902

Data Source: The Roper Organization, 1992, p. 35.

The percentage of the younger group who reported seeing a ghost:

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That’s the row corresponding to the younger group: 212 out of 1525 reported yes → $212/1525 = 0.139 \times 100 = 13.9\%$

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The proportion of the older group who reported seeing a ghost:

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That’s the row corresponding to the older group: 465 out of 4377 reported yes → $465/4377 = 0.106$

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a. The **risk** of reportedly seeing a ghost in the younger group:

→ $212/1525 = 0.139$

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What is the *relative risk* of reportedly seeing a ghost for the younger group compared to the older group?

→ Risk for **younger** → Risk for **older**
 $212/1525 = \mathbf{0.139}$ $465/4377 = \mathbf{0.106}$

→ *Relative risk* = Risk younger / Risk older =
 $\mathbf{0.139 \div 0.106 = 1.31}^7$

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What is the relative risk of reportedly seeing a ghost for the younger group compared to the older group?

→ *Relative risk* = Risk younger / Risk older = **0.139 ÷ 0.106 = 1.31**

We would say: *People aged 18 to 29 are 1.31 times as likely to report seeing a ghost as those over 30*

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What is the odds of reportedly seeing a ghost to not seeing one in the younger group?

Odds = 212 to 1313 = 212/1313 = 0.16

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What is the odds ratio of reportedly seeing a ghost to not seeing one in the younger group compared to the older group?

Odds ratio = $(212/1313) \div (465/3912) = 1.36$

Odds of seeing a ghost were 1.36 higher for the younger group.

Summary of Risk, Relative Risk, Odds, and Odds Ratio Computations

Generally, risk and odds are used to compare the responses for a category of interest with the responses for a baseline category. Let's represent the numbers as follows.

	Response 1	Response 2	Total
Category of Interest	A_1	A_2	T_A
Baseline	B_1	B_2	T_B

The only difference between risk and odds is whether Response 2 or Total is used for the comparison. *Risk* compares Response 1 to the Total. *Odds* compares Response 1 to Response 2.

- *Risk* of Response 1 for the Category of Interest = A_1/T_A
- *Odds* of Response 1 to Response 2 for the Category of Interest = A_1/A_2
- *Relative risk* = $\frac{A_1/T_A}{B_1/T_B}$
- *Odds ratio* = $\frac{A_1/A_2}{B_1/B_2}$