

Converting Between Odds and Probabilities

The probability of a success, π , and the odds of success, θ , are two different ways of characterizing the same information: the frequency with which a “success” occurs within a population. So it makes sense that, given information about one of the two measures, we can easily calculate the other!

- a. Start from the definition for the odds of success (below) and rearrange to find a formula for the probability of success, π , that is written in terms of the odds. Your formula should have π on one side of the equals sign and an expression *involving θ alone* on the other side.

$$\theta = \frac{\pi}{1 - \pi}.$$

- b. Using the formula you found in part (a), what is the probability of success, π , if the odds of success are $\theta = 9$?

The Donner Party

Are men better able to withstand and survive harsh conditions than women?

- a. Fill in the empty cells of the contingency table below to calculate (a) the probability of survival and (b) the odds of survival for both men and women on the Donner Party expedition:

	Survived	Died	Total	$\hat{\pi}$	$\hat{\theta}$
Male	24	32	56		
Female	25	10	35		

- b. What is the odds ratio of survival comparing men on the expedition to women on the expedition?

- c. What is the odds ratio of survival comparing women on the expedition to men? How is your answer numerically related to your answer to the previous question?

- d. Use the output below to construct and interpret a **90%** confidence interval for the odds ratio comparing the odds of survival among men to the odds of survival among women.

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qnorm(c(0.9, 0.95, 0.975), 0, 1)
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[1] 1.281552 1.644854 1.959964
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