

What does an odds ratio less than 1 indicate?

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An odds ratio less than 1 indicates that there is a lower likelihood of an event occurring in one group compared to another group. In other words, the group with a lower odds ratio has a lower probability of experiencing the event being studied. This can suggest a potential protective effect or a reduced risk of the event in the group with the lower odds ratio.

Interpret an Odds Ratio Less Than 1

In statistics, an odds ratio tells us the ratio of the odds of an event occurring in a treatment group compared to the odds of an event occurring in a control group.

Odds ratios appear most often in , which is a method we use to fit a regression model that has one or more predictor variables and a binary response variable.

One question students often have regarding odds ratios in logistic regression models is: *How do I interpret an odds ratio less than 1?*

Here's how:

If a predictor variable in a logistic regression model has an odds ratio less than 1, it means that a one unit increase in that variable is associated with a *decrease* in the odds of the response variable occurring.

The following two examples show how to interpret an

odds ratio less than 1 for both a continuous variable and a categorical variable.

Example 1: Interpreting Odds Ratios for Continuous Variables

Suppose we want to understand the relationship between a mother's age and the probability of having a baby with a healthy birthweight.

To explore this, we can perform logistic regression using age as a predictor variable and healthy birthweight (no = 0, yes =1) as a .

Suppose we collect data for 200 mothers and fit a logistic regression model. Here are the results:

Predictor	Odds Ratio	P-value
Age	0.92	0.022

The odds ratio for the predictor variable age is less than 1. This means that each additional increase of one year in age is associated with a decrease in the odds of a mother having a healthy baby.

In particular, we can use the following formula to quantify the change in the odds:

Change in Odds %: $(OR-1) * 100$

For example, the odds ratio (OR) for age is 0.92. Thus, we could calculate:

Change in Odds %: $(0.92 - 1) * 100 = -8\%$

This means that each additional increase of one year in age is associated with an 8% decrease in the odds of a mother having a healthy baby.

Example 2: Interpreting Odds Ratios for Categorical Variables

Suppose we want to understand the relationship between a mother's smoking habits and the probability of having a baby with a healthy birthweight.

To explore this, we can perform logistic regression using smoking as a predictor variable (no = 0, yes = 1) and healthy birthweight (no = 0, yes = 1) as a response variable.

Suppose we collect data for 200 mothers and fit a logistic regression model. Here are the results:

Predictor	Odds Ratio	P-value
Smoking	0.85	0.043

The odds ratio for the predictor variable *smoking* is less than 1. This means that increasing from 0 to 1 for smoking (i.e. going from a non-smoker to a smoker) is associated with a decrease in the odds of a mother having a healthy baby.

Once again, we can use the following formula to quantify the change in the odds:

Change in Odds %: $(OR - 1) * 100$

For example, the odds ratio (OR) for smoking is 0.85. Thus, we could calculate:

Change in Odds %: $(0.85 - 1) * 100 = -15\%$

This means that a mother who smokes experiences a reduction of 15% in the odds of having a healthy baby compared to a mother that does not smoke.