

Nuts and Bolts

Logistic Regression

Inés M. Anchondo, DrPH, RD, LD, CSP, MPH



Logistic regression (LG) is an approach to prediction, part of the statistical models called generalized linear models. It is a method for determining the relationship between the dependent variable and the independent variables. The dependent variable in LG is usually* dichotomous or categorical, which is a variable that has the value of 'yes' and 'no' or 1 or 0 (presence or absence), as it is customary to code this variable. Logistic regression is similar to ordinary linear regression methods such as: ANOVA, simple linear regression, ANCOVA, etc.

LG predicts the probability that Y is equal to 1 (rather than 0) given certain values of X. Assuming that X and Y have a positive linear association then, LG predicts the probability that Y = 1 will increase as the values of X increase.

In logistic regression results are given in terms of *odds ratio* (OR), a coefficient. If the OR is greater than 1 then the event is more likely to happen, than not. If the OR is less than 1 then the event is less likely to happen, than not.¹ Being that 1 is the null value for OR any value near

1 (say, 0.9 or 1.1) may indicate a weak association (assuming p-value is 0.05 or less and no confounding or bias exists).

For example, in the article 'Rapid Postnatal Weight Gain and Visceral Adiposity in Adulthood: The Fels Longitudinal Study'² results included in Table 3.

The OR for infants who experienced rapid infant weight gain was 2.27, which means that the probability that Y equals 1 is twice as likely (2.27 times to be exact) as the value of X is increased by one unit. The OR for infants in the 'gradual' weight gain was 1.35 (adjusted for three variables). In this case, Y represents increase (yes or no) in weight of 0.67 standard deviation score (SDS). The X is the amount of visceral

and abdominal fat accumulation. In addition, these models were 'minimally' adjusted for three variables and 'fully' adjusted for twelve variables. This refers to the other variables that were taken into consideration in the results. The interpretation of these results is that infants who experienced rapid weight gain had a higher OR than infants with 'gradual' weight gain.

*LG can also be used with ordinal data, variables with two or more categories such it is done in surveys.

References

1. Crichton N. INFORMATION POINT: Odd ratio. *Journal of Clinical Nursing*. 2001;10(2):268-269.
2. Demerath EW, Reed D, Choh AC, et al. Rapid Postnatal Weight Gain and Visceral Adiposity in Adulthood: The Fels Longitudinal Study. *Obesity*. 2009;17(11):2060-2066.

Table 3

Rapid infant weight gain and the risk of overweight and obesity in adulthood, N = 233

	Overweight (BMI >25kg/m ²)		Obesity (BMI >30kg/m ²)	
	OR ^a (minimally adjusted)	OR ^b (fully adjusted)	OR ^a (minimally adjusted)	OR ^b (fully adjusted)
Rapid infant weight gain (change in SDS greater than +0.67)	2.27 (1.04, 4.94)	5.54 (1.88, 16.31)	2.41 (1.09, 5.37)	4.08 (1.44, 11.6)
Gradual infant weight gain (change in SDS -0.67 to +0.67)	1.35 (0.70, 2.58)	2.37 (1.04, 5.42)	0.82 (0.39, 1.76)	1.07 (0.45, 2.58)
Slow infant weight gain (change in SDS less than -0.67)	(ref)	(ref)	(ref)	(ref)

OR, odds ratio; MRI, magnetic resonance imaging; SDS, standard deviation score.

^aAdjusted for sex, gestational age at birth, and age at MRI. ^bAdjusted for the above, and birth weight SDS, stature, birth year, birth order, breastfeeding (ever/never), education (university degree yes/no), sport activity (high/low), and current cigarette smoking status (yes/no).

Solae, LLC is a world leader in developing soy-based ingredients for nutritious, great-tasting products. Solae provides solutions that deliver a unique combination of functional, nutritional, economical and sustainable benefits to our customers (primarily food and beverage manufacturers). Headquartered in St. Louis, Missouri, USA, the company was formed through a joint venture between DuPont (NYSE: DD) and Bunge (NYSE: BG) in 2003. Solae is a recipient of 2011 Ethisphere's Ethics Inside Certification and was recognized as one of 100 "World's Most Ethical Companies" in 2011.

For more information, visit www.Solae.com, or follow the company on Twitter at www.Twitter.com/SolaeLLC, Facebook at www.Facebook.com/SolaeLLC, and LinkedIn at www.linkedin.com/company/Solae-LLC.

