

Logistic Regression Interaction Figures

Comparison of Interactions for Log-odds vs. Risk

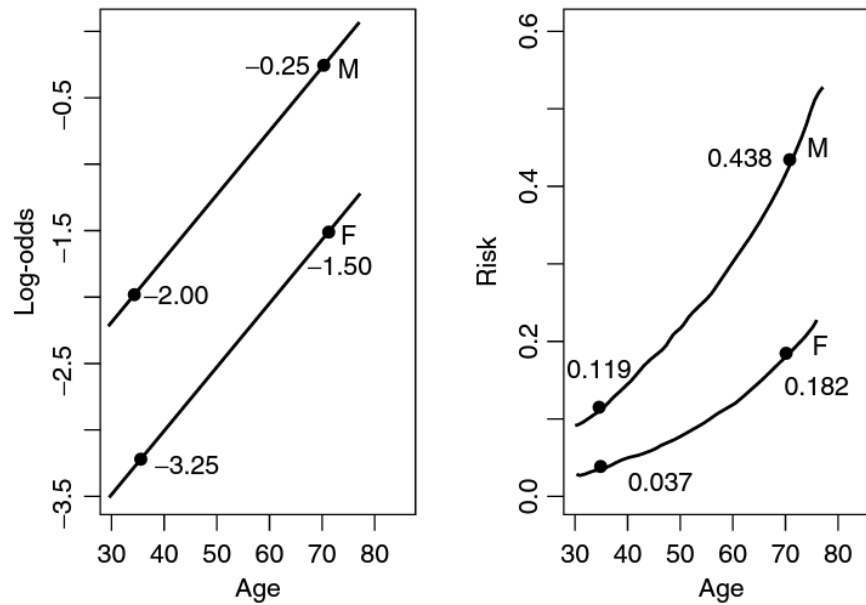


Figure 10.12 Demonstration that parallel lines on the log-odds scale (left) will lead to non-parallel lines when transformed to the risk scale (right). There is no effect modification (interaction) on the odds ratio scale (left) but there is effect modification on the risk difference scale (right).

From Hosmer, Lemeshow, & Sutdivant (2013) p. 449

Comparison of Multiplicative and Additive Interaction

Below is a comparison of the two approaches, multiplicative using odds-based standard logistic regression, and additive, using binomial linear link regression, to test the interaction between initial myopathy and father's myopathy in predicting child's myopathy at a later age using both the usual logit link interaction test with standard logistic regression and the binomial linear link test.

Table 10.28 Fit of the Logit Link Model Containing DDMY, SPHEQ.5 and Their Interaction

Variable	Coeff.	Std. Err.	<i>z</i>	<i>p</i>	95% CI	
DADMY	0.831	0.4731	1.76	0.079	−0.096,	1.758
SPHEQ.50	2.266	0.4685	4.84	0.000	1.348,	3.185
DADMYxSPHEQ.50	0.085	0.5811	0.15	0.883	−1.054,	1.224
Constant	−3.470	0.3838	−9.04	0.000	−4.222,	−2.718

From Hosmer, Lemeshow, & Sutdivant (2013) p. 454

Table 10.27 Fit of the Linear Link Model Containing DDMY, SPHEQ.50 and Their Interaction

Variable	Coeff.	Std. Err.	<i>z</i>	<i>p</i>	95% CI	
DADMY	0.036	0.0206	1.78	0.076	−0.004,	0.077
SPHEQ.50	0.201	0.0490	4.09	<0.001	0.105,	0.297
DADMYxSPHEQ.50	0.161	0.0721	2.24	0.025	0.020,	0.303
Constant	0.030	0.0112	2.69	0.007	0.008,	0.052

From Hosmer, Lemeshow, & Sutdivant (2013) p. 453

Simple Effects with Multiple Dummy Variable Example

The lower order terms for the education variable below for three models switching the referent group for the dummy variables, give the education simple effects for each of the three groups.

TABLE 5 Logistic Coefficients for Qualitative and Quantitative Predictors: Two-Way Intera

<i>Predictor</i>	<i>Logistic Coefficient</i>	<i>Exponent of Coefficient</i>	<i>95% Lower Limit</i>	<i>95% Upper Limit</i>	<i>p Value</i>
a. Whites as Reference Group on Moderator Variable					
D_{black}	-0.8564	0.4247	0.1705	1.0575	0.066
D_{Hispanic}	-1.2082	0.2987	0.1082	0.8248	0.020
Education	0.4556	1.5772	1.3003	1.9129	<0.001
$D_{\text{black}} * \text{education}$	-0.1995	0.8191	0.6522	1.0288	0.086
$D_{\text{Hispanic}} * \text{education}$	0.4584	1.5815	1.0216	2.4482	0.040
Intercept	1.6682	5.3026	2.4598	11.4309	
b. Hispanics as Reference Group on Moderator Variable					
D_{black}	0.3518	1.4216	0.6217	3.2506	0.404
D_{white}	1.2082	3.3475	1.2124	9.2426	0.020
Education	0.9140	2.4942	1.6853	3.6916	<0.001
$D_{\text{black}} * \text{education}$	-0.6579	0.5180	0.3436	0.7808	0.002
$D_{\text{white}} * \text{education}$	-0.4584	0.6323	0.4085	0.9789	0.040
Intercept	0.4600	1.5841	0.8151	3.0785	
c. Blacks as Reference Group on Moderator Variable					
D_{Hispanic}	-0.3518	0.7034	0.3076	1.6085	0.404
D_{white}	0.8564	2.3548	0.9456	5.8638	0.066
Education	0.2561	1.2919	1.1443	1.4585	<0.001
$D_{\text{Hispanic}} * \text{education}$	0.6579	1.9307	1.2808	2.9103	0.002
$D_{\text{white}} * \text{education}$	0.1995	1.2208	0.9720	1.5333	0.086
Intercept	0.8118	2.2520	1.3764	3.7104	

From Jaccard (2001), p. 32-33

References

Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression*. New York: Wiley.
Jaccard, J. (2001). *Interaction effects in logistic regression* (Vol. 135). Thousand Oaks, CA: Sage.