Logistic Regression – Age, Motorcycles & ED

Dependent Variable: Presence/Absence of Erectile Dysfunction
Independent Variables: Age (20-29,…,50-59), Motorcycle Riding (Yes/No)

agegrp * ed * mtrcycl Crosstabulation

mtrcycl				ed 0	ed 1	Total
0	agegrp	1	Count	77	35	112
			% within agegrp	68.8%	31.2%	100.0%
		2	Count	205	101	306
			% within agegrp	67.0%	33.0%	100.0%
		3	Count	131	77	208
			% within agegrp	63.0%	37.0%	100.0%
		4	Count	73	53	126
			% within agegrp	57.9%	42.1%	100.0%
	Total		Count	486	266	752
			% within agegrp	64.6%	35.4%	100.0%
1	agegrp	1	Count	25	35	60
			% within agegrp	41.7%	58.3%	100.0%
		2	Count	32	55	87
			% within agegrp	36.8%	63.2%	100.0%
		3	Count	14	44	58
			% within agegrp	24.1%	75.9%	100.0%
		4	Count	2	27	29
			% within agegrp	6.9%	93.1%	100.0%
	Total		Count	73	161	234
			% within agegrp	31.2%	68.8%	100.0%

Overall X=266+161=427 "Successes" and n=752+234=986 subjects $\hat{\pi} = \frac{X}{n} = \frac{427}{986} = .4331$

$$\text{Model 0: } \pi = \frac{e^{\alpha}}{1+e^{\alpha}} \qquad \text{Model1: } \pi(\text{Age}) = \frac{e^{\alpha+\beta_A A}}{1+e^{\alpha+\beta_A A}}$$

$$\text{Model2: } \pi(\text{Age, MR}) = \frac{e^{\alpha+\beta_A A+\beta_M M}}{1+e^{\alpha+\beta_A A+\beta_M M}}$$

$$\text{Model3: } \pi(\text{Age, MR}) = \frac{e^{\alpha+\beta_A A+\beta_M M+\beta_{AM} AM}}{1+e^{\alpha+\beta_A A+\beta_M M+\beta_{AM} AM}}$$

Model 0:

```
Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept) -0.26937    0.06427  -4.191 2.78e-05 ***


    Null deviance: 101.62  on 7  degrees of freedom
Residual deviance: 101.62  on 7  degrees of freedom
```

Model 1:

```
Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -0.915497   0.274247  -3.338 0.000843 ***
age          0.016486   0.006785   2.430 0.015114 *

    Null deviance: 101.618  on 7  degrees of freedom
Residual deviance:  95.684  on 6  degrees of freedom
```

LR Test for Age Effect. H_0: $\beta_{Age}=0$ H_A: $\beta_{Age}\neq 0$ TS: _____ RR: _____

Wald Test for Age Effect. H_0: $\beta_{Age}=0$ H_A: $\beta_{Age}\neq 0$ TS: _____ RR: _____

Model 2:

```
Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -1.602726   0.299229  -5.356  8.5e-08 ***
age          0.025036   0.007186   3.484 0.000494 ***
mr           1.468761   0.163629   8.976  < 2e-16 ***

    Null deviance: 101.6176  on 7  degrees of freedom
Residual deviance:   7.8012  on 5  degrees of freedom
```

LR Test for MR Effect. H_0: $\beta_{MR}=0$ H_A: $\beta_{MR}\neq 0$ TS: _____ RR: _____

Wald Test for MR Effect. H_0: $\beta_{MR}=0$ H_A: $\beta_{MR}\neq 0$ TS: _____ RR: _____

(These Control for Age)

Model 3:

```
Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -1.257466   0.334854  -3.755 0.000173 ***
age          0.016436   0.008141   2.019 0.043509 *
mr           0.013092   0.676970   0.019 0.984570
age:mr       0.039497   0.018047   2.189 0.028628 *

    Null deviance: 101.6176  on 7  degrees of freedom
Residual deviance:   2.7998  on 4  degrees of freedom
```

LR Test for Age*MR Interaction H_0: $\beta_{AM}=0$ H_A: $\beta_{AM}\neq 0$ TS: _____ RR: _____

Wald Test for Age*MR Interaction. H_0:$\beta_{AM}=0$ H_A: $\beta_{AM}\neq 0$ TS: _____ RR: _____

Tests of whether all Betas = 0 (F-type tests for Linear Models)

	Model	logLik	Null Dev	Res Dev	Deviance	DF	X2(.05)	P-value	R2-Nag
Null	0	-69.9091	101.6176	101.6176	0.0000	0	NA	NA	0.0000
	1	-66.9426	101.6176	95.6844	5.9332	1	3.8415	0.0149	0.5237
	2	-23.0009	101.6176	7.8012	93.8164	2	5.9915	0.0000	1.0000
	3	-20.5003	101.6176	2.7998	98.8178	3	7.8147	0.0000	1.0000
Saturated	4	-19.1003	101.6176	0.0000	101.6176	7	14.0671	0.0000	1.0000

Predicted Probabilities by Model

	Model	Cell Props	Model0	Model1	Model2	Model3	Model4
1	1	0.3125	0.4331	0.3768	0.2735	0.3002	0.3125
2	2	0.3301	0.4331	0.4162	0.3260	0.3358	0.3301
3	3	0.3702	0.4331	0.4567	0.3832	0.3734	0.3702
4	4	0.4206	0.4331	0.4978	0.4438	0.4125	0.4206
5	5	0.5833	0.4331	0.3768	0.6206	0.5384	0.5833
6	6	0.6322	0.4331	0.4162	0.6775	0.6711	0.6322
7	7	0.7586	0.4331	0.4567	0.7296	0.7812	0.7586
8	8	0.9310	0.4331	0.4978	0.7761	0.8620	0.9310