First the "addiction" data are loaded and attached.

```r
> library(catdata)
> data(addiction)
> attach(addiction)
```

For the Multinomial Model with hierarchically structured response we use simple Logit Models. For the first model, which models the effect of categories 0 and 1 versus 2, a new response "ill01" is created. In addition the variable "age2" for the squared effect of age is created.

```r
> ill01 <- ill
> ill01[ill==0] <- 1
> ill01[ill==2] <- 0
> age2 <- age^2
```

Now the model for categories 0 and 1 versus 2 is fitted.

```r
> m01vs2 <- glm(ill01 ~ as.factor(gender) + as.factor(university) + age + age2,
+ family=binomial())
> summary(m01vs2)
```

Call:
```r
glm(formula = ill01 ~ as.factor(gender) + as.factor(university) +
age + age2, family = binomial())
```

Deviance Residuals:
```
    Min     1Q  Median     3Q    Max
-1.9573  0.5416  0.6492  0.7702  1.0774
```

Coefficients:
```
                               Estimate Std. Error z value
(Intercept)                   2.1788569  0.5145020  4.235
as.factor(gender)1 -0.0171594  0.1828231 -0.094
as.factor(university)1  0.0894869  0.2067492  0.433
age                    -0.0342091  0.0255108 -1.341
age2                    0.0001307  0.0002881  0.454
```

Pr(>|z|)
For the next model the data set has to be reduced, only observations with response categories 0 or 1 are needed. Then the variable "age2" is built.

```r
> detach(addiction)
> addiction2 <- addiction[addiction$ill!=2,]
> attach(addiction2)
> age2 <- age^2
```

Finally the model for categories 0 versus 1 is fitted.

```r
> m0vs1 <- glm(ill ~ as.factor(gender) + as.factor(university) + age + age2,
+ family=binomial())
> summary(m0vs1)
```

Call:  
```r
glm(formula = ill ~ as.factor(gender) + as.factor(university) +
age + age2, family = binomial())
```

Deviance Residuals:  
```
                      Min       1Q     Median       3Q      Max
-2.3539  -0.94270   0.53160   0.89180   1.9496
```

Coefficients:  
```
                 Estimate Std. Error t value  Pr(>|z|)
(Intercept)         -3.546802   0.544339 -6.5164 7.23e-11 ***
as.factor(gender)1  0.543323   0.205468  2.6440  0.00819 **
as.factor(university)1  1.465550   0.260079  5.6351 1.75e-08 ***
age                0.171989   0.028391  6.0584 1.38e-09 ***
age2              -0.001734   0.000334 -5.1911 3.00e-07 ***
```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 756.98 on 681 degrees of freedom
Residual deviance: 736.74 on 677 degrees of freedom
(30 observations deleted due to missingness)
AIC: 746.74

Number of Fisher Scoring iterations: 4
age2 2.10e-07 ***

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 689.93 on 515 degrees of freedom  
Residual deviance: 583.94 on 511 degrees of freedom  
(27 observations deleted due to missingness)  
AIC: 593.94

Number of Fisher Scoring iterations: 4