Dear students,

open the data „preexam.sav“ and complete following tasks. Good luck!:)

1. Run the logistic regression model (analyse-logistic-binary logistic) explaining work satisfaction (SAT=dependent variable) with gender (SEX=independent variable, women as a reference group)
2. What is the average **sample** difference in odds of being satisfied among men compared to women? (2 p.)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables in the Equation** | | | | | | | | | |
|  | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
| Lower | Upper |
| Step 1a | Sex of Respondent(1) | ,098 | ,024 | 16,507 | 1 | ,000 | 1,103 | 1,052 | 1,156 |
| Constant | -,260 | ,017 | 229,455 | 1 | ,000 | ,771 |  |  |
| a. Variable(s) entered on step 1: Sex of Respondent. | | | | | | | | | |

*A: Sample difference in odds of being satisfied among men compared to women is 1,103. Men have 1,103 times higher odds of being satisfied compared to females. Men have about 10 percent higher odds of being satisfied compared to females.*

1. What is the average **population** difference in odds of being satisfied among men compared to women? (2 p.)

|  |  |
| --- | --- |
| 95% C.I.for EXP(B) | |
| Lower | Upper |
| 1,052 | 1,156 |

*A: Population difference in odds of being satisfied among men compared to women is from 1,052 to 1,156 with 95 percent probability. With 95 percent probability, in population, men have from 1,052 to 1,156 times higher odds of being satisfied compared to females. With 95 percent probability, men have from about 5 to 15 percent higher odds of being satisfied compared to females.*

c) How good is this model (including SEX) compared to empty model (excluding SEX) based on LL comparison? (2 p.)

*Solution:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Omnibus Tests of Model Coefficients** | | | | |
|  | | Chi-square | df | Sig. |
| Step 1 | Step | 16,513 | 1 | ,000 |
| Block | 16,513 | 1 | ,000 |
| Model | 16,513 | 1 | ,000 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Model Summary** | | | |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 38510,444a | ,001 | ,001 |
| a. Estimation terminated at iteration number 3 because parameter estimates changed by less than ,001. | | | |

LL1: 38510,444a

Diff.: 16,513

LL0: 38510,444a + 16,513 = 38526,96

*A: Model with SEX as the only independent variable is 16,513 better compared to empty model.*

1. Add the education variable (EDUC) as the second independent variable to the model („no education“ category as a reference group).
2. What is the average **sample** difference in odds of being satisfied among people with highest education compared to people with no education? (2 p.)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables in the Equation** | | | | | | | | | |
|  | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
| Lower | Upper |
| Step 1a | Sex of Respondent(1) | ,109 | ,024 | 19,996 | 1 | ,000 | 1,115 | 1,063 | 1,170 |
| Highest completed education level: Categories for international comparison |  |  | 141,202 | 6 | ,000 |  |  |  |
| Highest completed education level: Categories for international comparison(1) | ,374 | ,094 | 15,903 | 1 | ,000 | 1,454 | 1,209 | 1,747 |
| Highest completed education level: Categories for international comparison(2) | ,174 | ,077 | 5,117 | 1 | ,024 | 1,190 | 1,023 | 1,383 |
| Highest completed education level: Categories for international comparison(3) | -,080 | ,076 | 1,110 | 1 | ,292 | ,923 | ,796 | 1,071 |
| Highest completed education level: Categories for international comparison(4) | ,234 | ,078 | 9,007 | 1 | ,003 | 1,264 | 1,085 | 1,473 |
| Highest completed education level: Categories for international comparison(5) | ,210 | ,076 | 7,578 | 1 | ,006 | 1,233 | 1,062 | 1,431 |
| Highest completed education level: Categories for international comparison(6) | ,309 | ,079 | 15,413 | 1 | ,000 | 1,363 | 1,168 | 1,590 |
| Constant | -,415 | ,073 | 32,402 | 1 | ,000 | ,661 |  |  |
| a. Variable(s) entered on step 1: Highest completed education level: Categories for international comparison. | | | | | | | | | |

A: *The average* ***sample*** *difference in odds of being satisfied among people with highest education compared to people with no education is 1,363. In particular, people with highest education have 1,363 times higher odds of being satisfied compared to no educated people. In other words, people with highest education have about 36 percent higher odds of being satisfied compared to no educated people.*

1. How good is this model (including SEX and EDUC) compared to previous model (with SEX only) based on LL comparison? (2 p.)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Omnibus Tests of Model Coefficients** | | | | |
|  | | Chi-square | df | Sig. |
| Step 1 | Step | 142,413 | 6 | ,000 |
| Block | 142,413 | 6 | ,000 |
| Model | 159,115 | 7 | ,000 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Model Summary** | | | |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 38000,160a | ,006 | ,008 |
| a. Estimation terminated at iteration number 3 because parameter estimates changed by less than ,001. | | | |

LL2 (sex+educ) = 38000

LL1 (sex) = 38000 + 142,413 = 38142,413

Diff: 142,413

*A: Model with SEX and EDUC is 142,413 better compared to model with SEX only.*