# Chapter 20: Categorical outcomes: logistic regression

## Labcoat Leni's Real Research

### Mandatory suicide?

#### Problem

Lacourse, E., et al. (2001). *Journal of Youth and Adolescence*, *30*, 321–332.

My favourite kind of music is heavy metal. One thing that is mildly irritating about liking heavy music is that everyone assumes that you're a miserable or aggressive bastard. When not listening (and often while listening to) heavy metal, I research clinical psychology in youths. Therefore, I was literally beside myself with excitement when a few years back I stumbled on a paper that combined these two interests. Lacourse, Claes, and Villeneuve (2001) carried out a study to see whether a love of heavy metal could predict suicide risk. Fabulous stuff!

Eric Lacourse and his colleagues used questionnaires to measure several variables: suicide risk (yes or no), marital status of parents (together or divorced/separated), the extent to which the person's mother and father were neglectful, self-estrangement/powerlessness (adolescents who have negative self-perceptions, are bored with life, etc.), social isolation (feelings of a lack of support), normlessness (beliefs that socially disapproved behaviours can be used to achieve certain goals), meaninglessness (doubting that school is relevant to gain employment) and drug use. In addition, the authors measured liking of heavy metal; they included the sub-genres of classic (Black Sabbath, Iron Maiden), thrash metal (Slayer, Metallica), death/black metal (Obituary, Burzum) and gothic (Marilyn Manson). As well as liking, they measured behavioural manifestations of worshipping these bands (e.g., hanging posters, hanging out with other metal fans) and what the authors termed 'vicarious music listening' (whether music was used when angry or to bring out aggressive moods). They used logistic regression to predict suicide risk from these variables for males and females separately.

The data for the female sample are in the file **Lacourse et al. (2001) Females.sav**. Labcoat Leni wants you to carry out a logistic regression predicting **Suicide_Risk** from all of the other predictors (forced entry). (To make your results easier to compare to the published results, enter the predictors in the same order as Table 3 in the paper: **Age**, **Marital_Status**, **Mother_Negligence**, **Father_Negligence**, **Self_Estrangement**, **Isolation**, **Normlessness**,

**Meaninglessness**, **Drug_Use**, **Metal**, **Worshipping**, **Vicarious**.) Create a table of the results. Does listening to heavy metal predict girls' suicide? If not, what does?

## Solution

The main analysis is fairly simple to specify because we're just forcing all predictors in at the same time. Therefore, the completed main dialog box should look like Figure 1. (Note that I have ordered the predictors as suggested by Labcoat Leni, and that you won't see all of them in the dialog box because the list is too long!)

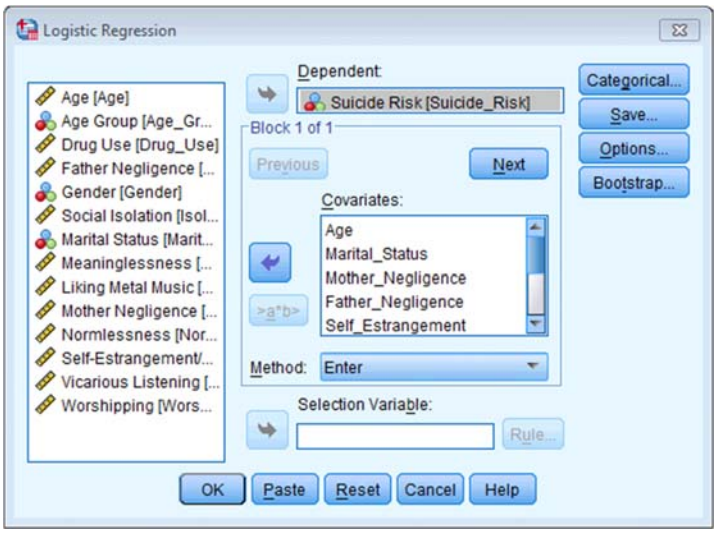


**Figure 1**

We also need to specify our categorical variables. We have only 1 Marital_Status (Figure 2).

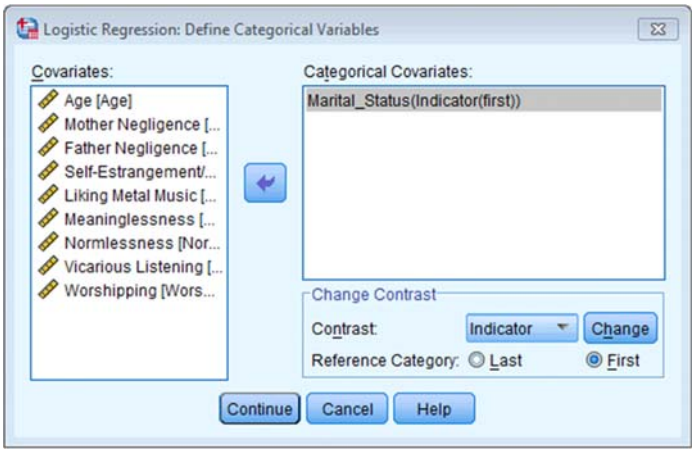


**Figure 2**

I have chosen an indicator contrast with the first category (Together) as the reference category. It actually doesn't matter whether you select first or last because there are only two categories. However, it will affect the sign of the beta coefficient. I have chosen the first category as the reference category purely because it gives us a positive beta as in Lacourse

et al.'s table. If you chose 'last' (the default) the resulting coefficient will be the same magnitude but a negative value instead.

You can select whatever other options you see fit based on the chapter (the CI for Exp(*B*) will need to be selected to get the same output as below). The main output is as follows:

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95.0% C.I.for EXP(B) Lower | Upper |
|---|---|---|---|---|---|---|---|---|---|
| Step 1[a] | Age | .693 | .323 | 4.589 | 1 | .032 | 1.999 | 1.061 | 3.769 |
| | Marital_Status(1) | .183 | .677 | .073 | 1 | .786 | 1.201 | .319 | 4.531 |
| | Mother_Negligence | -.020 | .053 | .136 | 1 | .713 | .981 | .883 | 1.088 |
| | Father_Negligence | .085 | .048 | 3.127 | 1 | .077 | 1.088 | .991 | 1.195 |
| | Self_Estrangement | .155 | .065 | 5.727 | 1 | .017 | 1.168 | 1.028 | 1.326 |
| | Isolation | -.006 | .076 | .006 | 1 | .939 | .994 | .856 | 1.154 |
| | Normlessness | .191 | .109 | 3.089 | 1 | .079 | 1.211 | .978 | 1.499 |
| | Meaninglessness | -.067 | .061 | 1.191 | 1 | .275 | .936 | .830 | 1.054 |
| | Drug_Use | .317 | .103 | 9.446 | 1 | .002 | 1.373 | 1.122 | 1.680 |
| | Metal | .136 | .092 | 2.184 | 1 | .139 | 1.145 | .957 | 1.371 |
| | Worshipping | .159 | .129 | 1.506 | 1 | .220 | 1.172 | .910 | 1.511 |
| | Vicarious | -.342 | .196 | 3.033 | 1 | .082 | .710 | .484 | 1.044 |
| | Constant | -19.012 | 6.209 | 9.376 | 1 | .002 | .000 | | |

a. Variable(s) entered on step 1: Age, Marital_Status, Mother_Negligence, Father_Negligence, Self_Estrangement, Isolation, Normlessness, Meaninglessness, Drug_Use, Metal, Worshipping, Vicarious.

**Output 1**

We can present these results in the following table:

| | *B* | *SE* | 95% CI for odds ratio | | |
|---|---|---|---|---|---|
| | | | Lower | Odds Ratio | Upper |
| Constant | 6.21 | 6.21 | | | |
| Age | 0.69* | 0.32 | 1.06 | 2.00 | 3.77 |
| Marital status | 0.18 | 0.68 | 0.32 | 1.20 | 4.53 |
| Mother negligence | −0.02 | 0.05 | 0.88 | 0.98 | 1.09 |
| Father negligence | 0.09* | 0.05 | 0.99 | 1.09 | 1.20 |
| Self-estrangement/ powerlessness | 0.15* | 0.06 | 1.03 | 1.17 | 1.33 |
| Social isolation | −0.01 | 0.08 | 0.86 | 0.99 | 1.15 |
| Normlessness | 0.19* | 0.11 | 0.98 | 1.21 | 1.50 |
| Meaninglessness | −0.07 | 0.06 | 0.83 | 0.94 | 1.05 |
| Drug use | 0.32** | 0.10 | 1.12 | 1.37 | 1.68 |

| | | | | | |
|---|---|---|---|---|---|
| Metal | 0.14 | 0.09 | 0.96 | 1.15 | 1.37 |
| Worshipping | 0.16* | 0.13 | 0.91 | 1.17 | 1.51 |
| Vicarious listening | −0.34 | 0.20 | 0.48 | 0.71 | 1.04 |

*$p$ < .05, **$p$ < .01; one-tailed

I've reported one-tailed significances (because Lacourse et al. do and it makes it easier to compare our results to Table 3 in their paper). We can conclude that listening to heavy metal did not significantly predict suicide risk in women (of course not; anyone I've ever met who likes metal does not conform to the stereotype). However, in case you're interested, listening to country music apparently does (Stack & Gundlach, 1992). The factors that did predict suicide risk were age (risk increased with age), father negligence (although this was significant only one-tailed, it showed that as negligence increased so did suicide risk), self-estrangement (basically low self-esteem predicted suicide risk, as you might expect), normlessness (again, only one-tailed), drug use (the more drugs used, the more likely a person was to be in the at-risk category), and worshipping (the more the person showed signs of worshipping bands, the more likely they were to be in the at-risk group).

The most significant predictor was drug use. So, this shows you that, for girls, listening to metal was not a risk factor for suicide, but drug use was. To find out what happens for boys, you'll just have to read the article! This is scientific proof that metal isn't bad for your health, so download some Deathspell Omega and enjoy!

## Reference

Stack, S., & Gundlach, J. (1992). The effect of country music on suicide. *Social Forces*, 71(1), 211–218.

**Case Summaries[a]**

| | Case Number | Analog of Cook's influence statistics | Leverage value | Normalized residual | DFBETA for constant | DFBETA for Intervention(1) |
|---|---|---|---|---|---|---|
| 1 | 58 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 2 | 59 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 3 | 60 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 4 | 61 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 5 | 62 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 6 | 63 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 7 | 64 | .04576 | .01754 | -1.60078 | .00000 | -.06362 |
| 8 | 65 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 9 | 66 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 10 | 67 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 11 | 68 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 12 | 69 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 13 | 70 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 14 | 71 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 15 | 72 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 16 | 73 | .04576 | .01754 | -1.60078 | .00000 | -.06362 |
| 17 | 74 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 18 | 75 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 19 | 76 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 20 | 77 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 21 | 78 | .04576 | .01754 | -1.60078 | .00000 | -.06362 |
| 22 | 79 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 23 | 80 | .04576 | .01754 | -1.60078 | .00000 | -.06362 |
| 24 | 81 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 25 | 82 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 26 | 83 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 27 | 84 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 28 | 85 | .04576 | .01754 | -1.60078 | .00000 | -.06362 |
| 29 | 86 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 30 | 87 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 31 | 88 | .04576 | .01754 | -1.60078 | .00000 | -.06362 |
| 32 | 89 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 33 | 90 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 34 | 91 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 35 | 92 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 36 | 93 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 37 | 94 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 38 | 95 | .04576 | .01754 | -1.60078 | .00000 | -.06362 |
| 39 | 96 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 40 | 97 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 41 | 98 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 42 | 99 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 43 | 100 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 44 | 101 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 45 | 102 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 46 | 103 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 47 | 104 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 48 | 105 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 49 | 106 | .02424 | .01786 | 1.15470 | .04242 | -.04242 |
| 50 | 107 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 51 | 108 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 52 | 109 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 53 | 110 | .00697 | .01754 | .62470 | .00000 | .02483 |
| 54 | 111 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 55 | 112 | .01364 | .01786 | -.86603 | -.03182 | .03182 |
| 56 | 113 | .00697 | .01754 | .62470 | .00000 | .02483 |
| Total N | | 56 | 56 | 56 | 56 | 56 |

a. VAR00001 = 1

**Output 2**