Chapter 4

Further Statistical Analysis

The association between physical bullying and the determinant variables was analyzed further in this chapter. We used logistic regression to fit a model. In this analysis the model estimates the probability of an adverse outcome, the odds ratios relating these probabilities with the determinants.

4.1 Logistic regression model

Since the outcome variable is binary, logistic regression is an appropriate method for assessing the effects of the determinants on the outcome. This modeling strategy involved initially including all determinants as factors and subsequently omitting in turn determinants with overall p-values greater than 0.05 (based on the reduction in residual deviance using the chi-squared test). Adjusted odds ratios (OR) and the 95% confidence intervals (CI) of the OR were estimated from the main effects logistic models. The odds ratios are obtainable by exponentiation of the coefficients, so that if the coefficient is b, the corresponding odds ratio is $\exp(b)$. Is the first step, we now fit a model with all variables of interest are shows in Table 4.1.

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Determinants	OR	(95% CI)	p-value
Gender			0.463
Boys			
Girls	0.7	(0.3, 1.6)	
Age group			0.000
12-13 years			
14 + years	7.9	(2.9, 21.4)	
Ethnicity			0.026
Malay or Chinese			
Thai	2.6	(1.1, 6.2)	
Punishment			0.135
Yes			
No	0.5	(0.2, 1.3)	
School type			0.003
Rural			
Urban	4.2	(1.6, 10.7)	
Father's occupation			0.258
Business/Government			
Employee	0.9	(0.3, 2.6)	0.847
Other	0.4	(0.1, 1.3)	0.148
Mother's occupation			0.932
Business/Government			
Employee	0.9	(0.3, 2.7)	0.885
Other	1.1	(0.4, 3.4)	0.833
Marital status of parents			0.3681
Married			
Other	1.6	(0.6, 4.0)	
Parental violence			0.009
Never			
Emotional violence	1.1	(0.4, 2.8)	0.830
Physical violence	4.9	(1.7, 14.3)	0.003

r-sq: 0.2084 df: 231 Deviance: 184.67 p-value: 0.551

Table 4.1: Model of association between determinants and bullying others

Table 4.1 shows the results after fitting a logistic regression model, based on the reported physical bullying other students at school. The model initially fitted contained additive effects for gender, age group, ethnicity, punishment, school type, father's occupation, mother's occupation, marital status of parents and parental

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violence. The r-squared for this model is 20.8%, giving a residual deviance of 184.7 with 231 degrees of freedom (p=0.551).

Table 4.2 gives the results after fitting a multiple logistic regression model to the data with all determinants included, and then reducing the model by eliminating determinants with overall p-values greater than 0.05.

Determinants	OR	(95% CI)	p-value
Age group			0.000
12-13 years			
14 + years	6.8	(2.6, 17.7)	
Ethnicity			0.015
Malay or Chinese			
Thai	2.7	(1.2, 6.0)	
School type			0.001
Rural			
Urban	4.2	(1.8, 10.1)	
Parental violence			0.028
Never			
Emotional violence	0.8	(0.4, 2.0)	
Physical violence	3.4	(1.3, 9.0)	

r-sq: 0.1799 df: 238 Deviance: 191.33 p-value: 0.028

Table 4.2: Reduced model of association between determinants and bullying others

Since we refitted a model containing age group, ethnicity, school type and parental violence, the r-squared for the final model is 17.9%, giving a residual deviance of 191.3 with 238 degrees of freedom. When comparing the values of the deviance from the models reported in Tables 4.1 and 4.2, it was found that the difference between the deviances is 6.7, and the number of parameters omitted is 5, corresponding to the p-value 0.028.

We choose this model because all variables are statistically significant. The final model, reported in Table 4.2 shows that four variables, age group, ethnicity, school

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type and parental violence were all associated with physical bullying in Pattani province, after adjusting for the other determinants.

Students aged 14 years or over were more likely to physically bully others than those aged less than 14 years, by a factor of 6.8 (95% CI: 2.6-17.7). Thai students were 2.7 times (95% CI: 1.2-6.0) more likely to physically bully others than were those of Malay or Chinese ethnicity. In addition, students who came from urban schools were 4.2 times (95% CI: 1.8-10.1) more likely to physically bully others than those from rural schools. Furthermore, students who reported having witnessed physical violence from their parents were 3.4 times (95% CI: 1.3-9.0) more likely to physically bully others than those who never witnessed physical violence, while students who admitted having witnessed emotional violence from their parents were 0.8 times (95% CI: 0.4-2.0) more likely to physically bully others than those who never witnessed emotional violence.

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