Example: Two-group regression analysis of an intervention study

Following is an example of multiple-group analysis using the intervention study of aggressive-disruptive behavior with an interaction between the covariates tx and agg1. The single-group model is

$$agg5_i = \beta_0 + \beta_1\ tx_i + \beta_2\ agg1_i + \beta_3\ tx_i\ agg1_i + \epsilon_i \tag{1.51}$$

$$= \beta_0 + \beta_2\ agg1_i + (\beta_1 + \beta_3\ agg1_i)\ tx_i + \epsilon_i. \tag{1.52}$$

The two-group approach to interaction modeling considers control and intervention groups where in each group agg5 is regressed on agg1. For individual i in group g (g =control, intervention),

$$agg5_{ig} = \gamma_{0g} + \gamma_{1g}\ agg1_{ig} + \delta_{ig}. \tag{1.53}$$

The regression lines for the two groups may be visualized as shown earlier in Figure 1.11. The two-group model parameters can be directly related to the parameters of the regression model with an interaction. The interaction between tx and agg1 corresponds to the γ_1 slope of the (1.53) regression varying across groups. The difference in γ_1 slopes is equal to the β_3 parameter in (1.51). This follows from (1.42) and (1.43). The γ_0 intercept in the regression also varies across groups. If the residual variances are held equal across groups, the number of parameters and the loglikelihood are the same for the model of (1.51) and (1.52) and the model of (1.53). The model of (1.53) is a reparameterization of the model of (1.51) and (1.52). The need to relax the equality constraint of the residual variances can be studied using a chi-square difference test with one degree of freedom corresponding to the single equality restriction in the two-group analysis. In this application, there is no evidence of a need for group-varying residual variances.

The intervention effect can be expressed as the difference in agg5 means for the two groups as a function of the moderator variable agg1. Using the notation in (1.53), the agg5 mean difference between the intervention and control groups conditioned on a certain value of the moderator agg1 is

$$E(agg5_1 - agg5_0 \mid agg1) = \gamma_{01} + \gamma_{11}\ agg1 - (\gamma_{00} + \gamma_{10}\ agg1), \tag{1.54}$$

where the first two terms on the right-hand side of the equality give the agg5 mean for the intervention group and the last two terms give the agg5 mean for the control group.

The input for the two-group analysis is shown in Table 1.11. The GROUPING option is used to identify the variable in the data set that contains information on group membership and to assign labels to the values