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NOTE

Correction of results

'A multilevel analysis of neighbourhood contextual effects on serious juvenile offending: The role of subcultural values and social disorganization' (*European Journal of Criminology 1*, 201–36)

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Innovation can sometimes be a thorny road, entailing not only progress and rewards but also hazards and failures. Multilevel analysis is without doubt a methodological innovation that in recent years has become very popular in criminological research, at least in North America, whereas it has rarely been used by European criminologists. Consequently, there is still a dearth of experience in the application of multilevel modelling in criminological research. Against this background, I want to apologize to all readers of the *European Journal of Criminology* for partly flawed statistical results presented in my article in Volume 1; I now present a corrected multilevel model, which leads to some changes to the interpretation of results.

The problem concerns the type of centring of independent variables (predictors) at level 1 of the multilevel regression models reported in Table 8 (pp. 224–5). Centring decisions are a crucial step in building multilevel models and depend on the theoretical perspective and the kinds of question one intends to answer. In the extended edition of their textbook on hierarchical linear models (a synonym for multilevel analysis), Raudenbush and Bryk (2002: 134–49) provide a very useful discussion of this important topic. Level-1 predictors may be entered into multilevel models in three different ways: uncentred, group-mean centred, or grand-mean centred. Among other aspects, the nature and interpretation of estimates of the random part of the intercept (u_{oj}) and its group-level predictors ($\gamma_0 z_j$) change substantially depending whether level-1 predictors are entered

either grand-mean centred (or uncentred) or group-mean centred. When trying to identify possible contextual (group-level) effects – such as neighbourhood effects on juvenile offending in this study – it would be wrong to use group-mean centring because this prevents the estimates of the group means from being adjusted for the individual composition of the groups. If the hypothesis to be tested assumes that the concentration of social disadvantage within neighbourhoods has an additional effect on offending *over and above* the individual-level effect of social disadvantage, it is obviously necessary to disentangle individual- and context-level effects of social disadvantage on offending by controlling for the social composition of neighbourhoods. This is achieved by including uncentred or grand-mean centred level-1 measures of social disadvantage. In the multilevel models I presented in the article, this is correctly done in steps 1 and 2 (Table 7, p. 222; see also the 'conditional model' reported in Table 4). As a result of controlling for individual-level composition, the random effect at level 2 (u_{oj}) was reduced from 0.00234 in the 'empty model' (not reported) to 0.00103 in model 1, which controls for sociodemographic composition, and to 0.00053 in model 2, which additionally controls for two attitude scales.

However, in models 3 and 4 reported in Table 8 the level-1 predictors were wrongly group-mean centred. As a result, the estimates of the coefficients of the neighbourhood-level predictors for the intercept ('fixed effects – level 2' in Table 8) are inflated and represent not the 'true' contextual effect but an aggregate effect not adjusted for individual composition. Correcting this mistake by switching from group-mean centring to grand-mean centring results in lower estimates of coefficients. Table 1 reports the corrected versions of model 3 and model 4. Apart from changing to group-mean centring, dummy variables for regional effects are excluded from these models because they are non-significant and, judged by both the deviance statistic and the non-convergence of estimates, do nothing to improve the model. Also, the slope γ_{80} ('violence tolerance') was re-specified as fixed because the estimation of random slopes and level-2 coefficients explaining variation of slopes between groups is not impeded by group-mean centring, and including a random part (u_{8j}) of the slope led to the non-convergence of estimates (see below).

The results presented in model 3 of Table 1 show that, compared with group-mean centring in the old model, the coefficient for '% welfare recipients under 18' is reduced by more than half from 0.039 to 0.017. Looking at the proportional reduction in error variance, this predictor now explains roughly 60 percent of the neighbourhood-level variance that is left after controlling for individual-level predictors (Table 8, model 2). Looking at model 4, of the two survey-based measures of neighbourhood-level

Table 1 Corrected linear multilevel regression models explaining serious offending (school survey, $N = 2520$ respondents in $N = 58$ neighbourhoods)

	Model 3			*Model 4*		
	Unstand. coefficient	*t-value*	*Significance*	*Unstand. coefficient*	*t-value*	*Significance*
Fixed effects – level 1						
Sex: female (γ_{10})	–0.040	5.4	***	–0.040	5.4	***
Age (γ_{20})	0.005	1.3	n.s.	0.005	1.3	n.s.
Immigrant background (γ_{30})	0.020	1.4	n.s.	0.020	1.4	n.s.
Parents: separated (γ_{40})	0.052	5.0	***	0.052	5.0	***
Parental socioeconomic status (γ_{50})	–0.010	–2.2	*	–0.010	–2.2	*
Unemployed/welfare recipient (γ_{60})	0.032	1.9	+	0.032	1.9	+
School bonding (γ_{70})	–0.047	–4.7	***	–0.047	–4.7	***
Violence tolerance (sq.) (γ_{80})	0.046	12.1	***	0.046	12.1	***
Intercept (γ_{00})	0.174	14.3	***	0.174	14.3	***
Fixed effects – level 2						
Predictors for intercept (γ_{00})						
% welfare recipients under 18[a] (γ_{01})	0.017	3.8	***	–	–	
Mean violence tolerance (γ_{02})	–	–		0.002	0.1	n.s.
Intergenerational closure[b] (γ_{03})	–	–		–0.100	–3.4	**
	Var.comp.	*Sign.*	R^2	*Var.comp.*	*Sign.*	R^2
Random effect – level 1 (r_{ij})	0.03854		27.1%[c]	0.03870		26.8%[c]
Random effects – level 2						
Intercept (u_{oj})	0.00021	n.s.	59.6%[d]	0.00002	n.s.	96.2%[d]

Notes: Linear regression models, log. incidences of self-reported serious offending previous year; level–1 and level–2 predictors are grand mean centred.

[a] Official data.

[b] Postal neighbourhood survey, empirical Bayes estimates controlling for individual-level sociodemographic composition.

[c] Proportional reduction in error variance compared with 'empty model' without level-1 predictors (not reported, $r_{ij} = 0.05286$).

[d] Proportional reduction in error variance compared with 'conditional model' with level–1 predictors ($u_{oj} = 0.00052$; see model 2 of Table 7).

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.10$.

social processes, only 'intergenerational closure' survives the switch from group-mean to grand-mean centring, its coefficient being reduced by only about 15 percent from –0.115 to –0.100; 'mean violence tolerance', the strongest coefficient in the old model, is now rendered completely insignificant. This means that, once the individuals' violent attitudes are controlled for, there is no additional contextual effect of a high concentration of individuals with violent attitudes on serious offending. This contradicts earlier claims about a subcultural explanation of neighbourhood effects on juvenile offending. On the other hand, the contextual significance of 'intergenerational closure' is underlined by the finding that its contribution to the reduction of neighbourhood-level variance is larger (71.2 percent) than that of officially measured '% welfare recipients under 18' (59.6 percent). This indicates that this scale, which comes from an independent neighbourhood survey, actually taps a relevant collective-level social process that is closely linked to juvenile misbehaviour.

As mentioned above, when focusing on neighbourhood-level variation in the *slopes* (whose existence indicates so-called cross-level interaction effects), group-mean centring is not deemed inappropriate, and may sometimes lead to more stable estimates (Raudenbush and Bryk 2002: 149). Thus, 'intergenerational closure' remains a significant neighbourhood-level predictor for the slope variance of 'violence tolerance', as reported in the article. From the still limited experience with this new technique, it seems that there is no single 'optimal' solution within multilevel modelling that is suitable for all theoretical perspectives. The spread of multilevel modelling in criminological research will I hope contribute to a clearer understanding of its advantages as well as its limitations.

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Reference

Raudenbush, S. and Bryk, A. (2002). *Hierarchical linear models: Applications and data analysis methods*, 2nd edn. Thousand Oaks, CA: Sage.

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