

Questions and answers for Chapter 12

1. What are the main differences between multilevel modelling and multiple regression?

The key difference between multilevel modelling and standard linear regression is that multilevel modelling takes the hierarchical structure of a lot of samples in educational research into account, by dividing the variance to be explained across the levels we have samples at. For example, if we have sampled schools and then looked at pupils in schools, multilevel modelling will divide the variance between the school and pupil levels, so we can look at school and pupil level explanations separately. This is both substantially useful and helps solve the problems of attenuation of standard errors in standard regression using hierarchical samples.

2. What are the main differences between structural equation modelling and multiple regression?

There are two main differences between regression and structural equation modelling. The first is that SEM allows us to develop complex path models with direct and indirect effects. This allows us to more accurately model causal mechanisms we are interested in. The second key difference is to do with measurement. In SEM we assume that our actual variables are indicators of underlying constructs (for example, 'I like school' is an indicator of attitudes to school), and we can incorporate that measurement model directly into SEM. This again means that we are more accurately modelling the

phenomena we want to explain.

3. What are the main differences between multilevel modelling and structural equation modelling?

Traditionally SEM doesn't allow us to model the hierarchical structure of a lot of our data in the way multilevel modelling can. On the other hand, multilevel modelling doesn't allow us to incorporate complex path structures like SEM can. However, work is underway on the development of multilevel SEM, which allows us to do both. Currently it is still largely limited to models with no more than two levels (for example, school and pupil, but not as yet school, classroom and pupil).

4. Can you think of a hypothesis or model you could test using structural equation modelling?

There are of course many possibilities here. One example in our dataset might be a model where we hypothesise that parental education affects self-concept, which in turn affects achievement. Achievement itself also affects self-concept. This type of complex model with indirect and reciprocal effects can be modelled in SEM.

5. Can you think of a study for which you would use multilevel modelling?

In our dataset we have sampled schools, and then surveyed pupils in those schools. A two

level multilevel model with school as level 2 and pupil as level 1 would therefore be appropriate. If we wanted to predict self-concept for example, we could include both pupil level variables like achievement and school level variables like type of school in the model.

6. Why do you think it might be useful to combine multilevel modelling and structural equation modelling?

Combining the two would allow us to have the advantages of being able to model both the hierarchical structure of the data and the complex relationships between variables. This would lead to more accurate and reliable models.