3 Multi-level & growth curve modelling

When study participants come from the same households or the same schools, they might have more things in common than they do with people from other households or other schools. This is an important thing to consider when it comes to data analysis.

When we run standard forms of regression analyses, we are assuming that all participants in the data are independent from each other. However, if they are not we could use multi-level modelling specifically to account for this.

Multi-level models account for variability at both the individual and group level, providing a more accurate and informative picture.

Multi-level models can also account for other characteristics of our participants that may play a role in the associations we are testing, at an individual or group level.

Let's say a group of schools were asked to assess how much physical activity their students did every week in the run up to exams. In terms of levels in a hierarchy, at the top, we have the schools. The students are clustered within each school, and then for each student, we have another level in the hierarchy, their weekly assessments of physical activity.

Now just considering physical activity within individuals in just one of these schools, we could plot these repeated measures as lines on a graph; but to get an overall picture of how trajectories change over time we need to explore how we can model a line of best fit to the data to estimate the average pattern of change.

To analyse trajectories of longitudinal change, we can use a method called growth curve modelling, which can be analysed as a form of multilevel model.

This can be undertaken with varying levels of complexity. We can model change over time as a simple linear trend. Each individual has its own starting point and slope. We can then summarise these by fitting an overall average line.

With enough repeated measures of physical activity for each individual, more complex patterns of change over time can be modelled.

Growth curve analysis allows us to understand the way participants change over time and then to explore what other circumstances influence these patterns of longitudinal change.

To learn more about these analysis methods and how they can be performed in different software packages, check out our guidance and suggestions for further reading on the CLOSER website and Learning Hub.

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