Authors: Neil Kaye, Rebecca Hardy and Dara O'Neill

1 Introduction to analysing longitudinal data

All of us are born, we grow/develop through childhood and adolescence, and finally we age and die. Within this life course, we change, we pass a number of milestones and experience events.

Social and biomedical research examines these patterns of change to understand how and why people experience different trajectories and whether or how they can be altered. In order to do so, we need to collect data longitudinally over several time points.

Longitudinal data can take many different forms depending on the design of a study:

Repeated cross-sectional studies collect the same information from *different individuals* at multiple time-points, allowing them to examine aggregate, or societal, changes over time,

Longitudinal studies, such as **Panel studies** collect the same information from the *same individuals* or the *same households* at multiple time-points, which allows them to examine individual changes over time.

Cohort studies are longitudinal studies that follow a group of individuals who experience a specific life event at the same time, typically those who are born in the same year

How you analyse the data will depend on the research question you are trying to answer and the structure of the data you are using.

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For example, you may want to examine whether people who do well at school go on to earn more money in their career.

Or, you may be interested in how long it takes men and women to find their first full-time job.

Alternatively, you may be interested in how physical activity levels change during adolescence and whether earlier-life characteristics – being overweight in childhood, for example – might influence these changes, or whether these changes are related to a future event, for example, the development of heart disease in older age.

Each of these research questions requires different data and is addressed using different analytical techniques.

Sometimes studies collect data on multiple people from within the same households. Other studies might capture detail from multiple students across multiple schools.

We can describe data such as these as being nested and having a multi-level structure. For example, students might be nested into classes, and those classes might be nested into schools, and those schools might be nested into specific suburbs of a city, and so on. Where each member of a lower level fits into the same level above, we say the data has a **hierarchical structure**.

If the same measurements are collected at different time points in the same participants, then we could also think of the data obtained as a hierarchical structure.

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Methods for analysing longitudinal data allow us to make use of the rich data collected and to explore the temporal relationships between measures collected within and across the life course.

To learn more about these analytical 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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