

# CLOSER's new teaching resource: helping students understand and use longitudinal data analysis

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7 February 2019

## Why longitudinal data analysis is important

Woman looks at bar charts on her computer. Longitudinal studies capture detailed information about the ways in which we individually develop throughout our lifecourse and, in combination, how we collectively change as a society over generations. Without appropriate analysis however, such insights will remain hidden in the data. Worse still, invalid use of statistical methods can provide misleading answers, with consequences for our wider scientific understanding and how this translates to policy and practice.

It is perhaps unsurprising therefore that responses to the consultation on the Economic and Social Research Council's Longitudinal Studies Review 2017 underlined the need for more resources to foster improved longitudinal data analysis skills, and highlighted the key role such capacity building can play in overcoming the barriers to policy impact faced by longitudinal studies.

The concepts and methods of longitudinal data analysis can seem daunting to newcomers. Indeed there are characteristics of longitudinal data that may need additional explanation and discussion as we learn how to analyse such data appropriately and effectively. Whereas the data from cross-sectional study designs comprise only one measurement wave per participant, longitudinal data comprise multiple. Using longitudinal data therefore requires us to consider the differences not just between participants, but also those that arise within participants over time. It is this same complexity that makes longitudinal data analysis such a worthwhile endeavour; it allows us to examine the sequencing of events and to potentially explore issues of causality. Helping students develop competence in the analysis of such data is crucial in ensuring that the vast amounts of data collected by longitudinal studies within the UK and beyond are fully and properly exploited in answering important social and biomedical research questions.

## The CLOSER Learning Hub: our new 'Analysis' module

In response to this need, we have developed a new teaching resource at CLOSER to help students and early career researchers learn about key statistical methods for exploring relationships within longitudinal data. This new resource is part of the CLOSER Learning Hub, a free educational tool that provides an introduction to longitudinal studies, their utility and their design. The Learning Hub already comprises modules on longitudinal research principles and data collection methods. The

latest module builds upon this existing content and covers the next key step in the research pathway: data analysis and output interpretation.

This new module uses sample research questions to introduce students to different statistical concepts and methods for analysing longitudinal data. This includes techniques for exploring the relationship that characteristics and experiences from early life can have with outcomes at later ages. In explaining these analytic methods, we draw upon a teaching dataset, developed by CLOSER, based on the National Child Development Study, which has been specifically designed for teaching purposes and comprises a broad array of variables about participants who took part in eight data collection waves across a 50 year period. The analytic methods are each described in a step-by-step fashion, from preparing the data for analysis to interpreting the results and running diagnostics. Every analysis step is accompanied by a short explanation of its purpose and a demonstration of how this step is implemented in Stata (code snippets and screenshots of the relevant Stata output are provided). We will be adding comparable content for SPSS and R users in the near future. We will also be adding new methods, including multilevel modelling and growth curve analysis.

The content was developed and written by Dr Vanessa Moulton (Centre for Longitudinal Studies, UCL) and Dr Dara O'Neill (CLOSER), in collaboration with Prof George Ploubidis (Centre for Longitudinal Studies, UCL) and our former director at CLOSER, Alison Park (now at ESRC).

As it develops and expands, we hope that the CLOSER Learning Hub's new analysis module proves a useful resource to students, early-career researchers and educators alike. By helping build the analytic skill base, such learning opportunities can play an important role in ensuring the research potential offered by longitudinal study data is effectively and fully realised.