Sequential Studies

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Sequential studies combine aspects of longitudinal and cross-sectional studies in order to overcome some of inherent problems in both designs. Longitudinal studies can provide rich information about phenomena change, but have two major disadvantages: (a) they can require substantial resources, and (b) they can confound effects of age, cohort (i.e., influences due to shared historical experiences), and time-of-data-collection effects (i.e., events that co-occur with the data collection occasions). Cross-sectional studies require fewer resources, but only provide limited information about developmental change.

There are three major types of sequential studies: cross-sequential, cohort-sequential, and time-sequential. They are summarized in Table 1.

*Cross-sequential* designs start with a cross-sectional design and then follow all the participants over a period of time. They allow for studying longer periods of development in shorter time periods. An example is shown in Figure 1(a) for a study designed to assess development during school-age years (5–18 years). A typical longitudinal study would require at least 13 years, but the cross-sequential design in Figure 1(a) reduces it to 4 years. A drawback of this design is that it is not able to provide information on specific age effects unless time-of-measurement effects are negligible. In Figure 1(a), the true rate of growth between 16–18 years might differ across cohorts because older cohorts (i.e., Generation X) provide estimates that occurred before influential time-of-measurement effects, whereas younger cohorts (i.e., Millennials) provide estimates after the time-of-measurement effects. For example, if the
phenomenon of interest is knowledge acquisition, mass Internet availability could make the rate of change between 16–18 years of age in older cohorts different from that in younger cohorts.

*Cohort-sequential designs* involve simultaneously conducting several short-term longitudinal studies covering the same age range. It starts with a single cohort, and then an additional cohort is added each year. Each cohort stays in the study until they reach the maximum age. These designs are useful for investigating the effects of age on the target phenomena as well as consistently of age effects across cohorts. An example is given in Figure 1(b) for study designed to assess development between 11–14 years of age. It could be used to estimate the rate of growth between 11- and 14-year-olds as well as see if that rate differs between older and younger generations. A drawback for this design is that it assumes there are no time-of-measurement effects. So, if something happens in the middle of the study, its effect on the target phenomena will differ for older and younger cohorts. For example, in Figure 1(b) the effect of mass Internet availability would only show up for older ages of the Generation X cohorts but for both younger and older ages of the Millennial cohorts.

In *time-sequential designs* the age range of participants is kept the same for each wave of data collection. Thus, at each wave data are collected for only a portion of the cohorts. This design is useful for examining if age group differences change over time. An example is given in Figure 1(c) for a study examining if the difference between 11- and 15-year-olds is the same for Generation X and Millennial generations. The drawback of the design is that it does not capture cohort effects. Thus, mass Internet availability could confound any generational differences.

**Further Reading**


Table 1. Summary of Features for Three Types of Sequential Study Designs.

<table>
<thead>
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<th>Design</th>
<th>Minimum Requirements</th>
<th>Effects</th>
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<td>Wave, Cohort</td>
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<td>Time</td>
<td>Ages: 2, Cohorts: 4, Waves: 2</td>
<td>Age, Wave</td>
<td>Cohort</td>
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Figure 1. Examples of cross-sequential (a), cohort-sequential (b), and time-sequential studies (c).