Longitudinal Research

JULIE MARIE BALDWIN and KRISTEN N. SOBBA

Longitudinal research utilizes repeated measurements of the same variables over two or more observational periods with the purpose of assessing change or stability over time. Compared to repeated cross-sectional studies or trend studies that also collect data over multiple observational periods, longitudinal studies specifically follow the *same* respondents over time. In the field of criminology, longitudinal studies are typically observational, which, relative to experimental studies, means measurements are made without manipulation on the part of the researcher.

Specifically in the areas of crime and punishment, longitudinal research aims to describe and explain change and stability in delinquent and/or criminal behavior and theorized phenomena related to those behaviors over time. For example, criminologists may explore changes in crime rates or measures of social disorganization of a specific area over time, examine the way in which criminal behavior may develop within an individual over time, examine different types of offending trajectories over time, or investigate the effect of incarceration at a young age on the individual's life-course.

Research Design and Methodology

Panel and cohort studies

There are generally two types of longitudinal studies: panel studies and cohort studies. Panel studies are closely related to cross-sectional studies. Like cross-sectional studies, panel studies involve obtaining a sample of a desired population, often through random sampling. However, unlike cross-sectional studies, which only obtain one measurement from the sample, longitudinal panel studies obtain multiple measurements from the *same sample* over, often regular, periods of time.

By comparison, cohort studies obtain multiple measurements from one or more cohorts over time. A cohort is a particular type of population in which all of the members share a common characteristic or experience. For example, all individuals born on a particular day or year form a birth cohort, while people who were incarcerated at a certain facility during a particular period of time would also constitute a cohort.

Retrospective and prospective

Whether it is a panel study or a cohort study, longitudinal research designs may be retrospective or prospective. These design types refer explicitly to the manner in which data is collected, whereas panel or cohort studies refer to the qualities of the sample from which data is being collected. In prospective designs, after a sample is identified, baseline measurements are obtained at the beginning of the study. Subsequent measurements are then made on future occasions. For example, a panel study may begin with a sample of residents from a particular city concerning their criminal involvement. A prospective design would then collect data from these same respondents, for example, every year thereafter for the duration of 5 years. The primary advantage of the prospective method is that respondents are more likely to accurately recall events that happened more recently than if they were asked to recall events that occurred further in the past.

By contrast, a retrospective longitudinal design collects data on events that happened in the past and does not require future follow-up measurement occasions. For example, the sample of a retrospective longitudinal study tends to be older or fit some criterion, such as being previously incarcerated. Then, either the sample is then asked to recall past events (sometimes with the use of a life history calendar), perhaps as far back as childhood, or past records are collected concerning some period of time.

The Encyclopedia of Crime and Punishment, First Edition. Edited by Wesley G. Jennings.

DOI: 10.1002/9781118519639.wbecpx243

Instruments

The self-report methodology forms the basis for much of the longitudinal research conducted in the fields of crime and punishment. In general, surveys contain questions designed to operationalize criminological concepts, often for analytic purposes. One of the first studies to repeatedly administer self-report questionnaires to the same panel of respondents over multiple observations was conducted by Elliott and his colleagues (1985), referred to as the National Youth Survey. In addition to survey questionnaires provided to the individual in question, longitudinal studies may incorporate observations from diverse sources, such as parents, teachers, employers, and social institutions.

Another data collection tool, which is used in conjunction with self-report surveys and is common in retrospective studies, is the life history calendar. The life history calendar is a grid-shaped chart used to visually organize when in time events occurred, often on a month-to-month basis. These life events can include deaths, arrests, periods of employment, victimizations, disabilities, or any other occurrence in which researchers may have an interest. The primary purpose is to aid in the recall ability of respondents (Horney, Osgood, & Marshall, 1995). This tool is said to help the respondent relate the timing of events both mentally and visually, which should help improve the quality of the retrospective data collected (Freedman et al., 1988).

Research questions and modern methods

While cross-sectional studies can generally only make comparisons between Person A at Time 1 and Person B at Time 1, longitudinal studies are generally well suited to make comparisons between Person A at Time 1 and Person A at Time 2. Thus, longitudinal research is able to address questions about within-individual change over time and questions about whether and when events occur. Typical methods to analyze change over time include fixed effects models, individual growth models, and growth mixture models. To address questions regarding whether and when events occur, discrete- and continuous-time survival analysis are common techniques.

There are three advantages to using modern longitudinal methods. First, these methods can identify temporal patterns in the data. This allows one to assess whether an outcome or variable of interest increases, decreases, or is stable over time. It also allows researchers to determine whether the pattern is linear or non-linear and whether there are abrupt changes at interesting points in time. Second, predictors whose values vary over time (time-varying predictors) can be included in the model. Finally, interactions with time can also be included to determine whether a predictor's effect varies with time. Effects may dissipate or increase, and they may change at particular times.

Relationship with Theory

By collecting longitudinal data, researchers were finally capable of testing complex theories of within-individual change and stability over time, a task for which cross-sectional data were poorly suited. These methodological developments ushered in a new wave of theories centered around the study of change, often in the context of human development. For example, Thornberry (1987) developed an interactional theory of criminal behavior by integrating social control and social learning theories that argues criminal behavior is the outcome of interactions between the individual and their environment. Similarly, Sampson and Laub (2003; Laub & Sampson, 1993) continued the data collection effort begun by Sheldon and Eleanor Glueck (1950), ultimately collecting longitudinal data on respondents up to the age of 70. Sampson and Laub interpreted the findings of this exceptional study as support for their theory of age-graded social control.

Most important, the paradigm of developmental and life-course criminology would likely not have developed without the emergence of longitudinal data, as well as the statistical methods necessary for its analysis. Based on this paradigm, prospective longitudinal studies have illuminated numerous correlates of crime across the life-course, while at the same time have furthered the need for increased longitudinal research to appropriately test these theories.

Although longitudinal research has greatly aided in the study of crime and delinquency, some researchers remain unconvinced of its utility, especially compared to cross-sectional

research designs. Michael Gottfredson and Travis Hirschi have claimed that longitudinal studies are not necessary in the study of crime and criminality as part of their hypercritical critique of life-course and criminal career research. They argued that longitudinal research implicitly favors criminal career research, which has thus far failed to prove its value to the study of crime. Additionally, they dismiss the promises of longitudinal research as being able to untangle causal relationships as even frequent measurements are not frequent enough to observe criminal behavior before, during, and after its commission, and even if they were simple observation does not necessarily imply causality will be revealed. Further, they contend that it is difficult to justify the large costs necessary to conduct longitudinal research as proper evaluations of the theoretical adequacy of life-course theories and the relative cost compared to the benefits have not yet been conducted.

By contrast, it follows from their propensity-based theory of low self-control that differences between people in their local-life circumstances remain relatively stable over time, and that these circumstances themselves are the result of low self-control. Therefore, given that differences in propensity toward crime are also relatively stable over time, there are no continually conduct costly measurements. They conclude "As of now, the longitudinal research tradition has no unique findings nor compelling theory about the causes of crime it could use to justify more detailed or more frequent observation" (Gottfredson & Hirschi, 1987, p. 609). They do concede that if criminal propensity were held constant, variation in criminal behavior would be the result of differences in social circumstances; however, the size of the sample necessary to actually hold criminal propensity would be so large that it is more practically collected cross-sectionally than by longitudinal methods.

Practical Issues and Limitations

While some hold the primary advantage of longitudinal designs is that researchers can observe how change occurs over time, there are several costs related to this benefit. Longitudinal studies, especially prospective studies, can be very expensive, requiring substantial amounts of resources (e.g., time, money, labor) due to repeated administration of instruments and observations over long periods of time (e.g., months, years, decades). Compared to prospective studies, retrospective studies typically require less time to complete. Additionally, retrospective studies are better suited to studying rare events, since such events can be included in the sample by design yet are difficult to prospectively predict. However, at the same time, retrospective studies are potentially more vulnerable to selection bias, especially if the criterion for inclusion in the sample is not randomly determined. The obvious disadvantage of retrospective studies, primarily studies that ask respondents to recall events potentially over long periods of time, is that recall accuracy may be unacceptably low, as well as the possibility of different reinterpretation of events at the later date. Further, it may be difficult to determine the temporal ordering of when specific events occurred.

In addition, a number of issues idiosyncratic to longitudinal studies also exist. For example, two of the largest problems facing panel studies are panel fatigue and attrition. Panel fatigue and attrition are closely related concepts referring to the respondent's unwillingness to further participate in the data collection process. In the instance of panel fatigue, respondents become unwilling to complete the data collection process. Regarding panel fatigue, respondents become unlikely to answer screening questions that set off skip patterns in a truthful manner, thus compromising the quality of the data being collected. Attrition refers to the problem of respondents leaving the sample by refusing to participate in subsequent instances of data collection. Attrition is especially concerning when some respondents become more likely to drop out of the sample than other respondents. The differential likelihood of attrition introduces bias into subsequent statistical analyses.

Although the possibility that respondents answer survey questions in an untruthful, yet socially desirable manner is a concern in both cross-sectional and longitudinal research, researchers utilizing longitudinal designs must also be wary of the possibility that the desire to respond in a socially acceptable manner may change over time. Young respondents may have

no issue with admitting wrongdoing, while older respondents may be more cognizant of the possibility that admitting to crimes could be potentially hazardous. These changes create inconsistencies from one wave to the next and may produce misleading results.

Content validity is another concern associated with particular types of longitudinal research. Content validity refers to how accurate an assessment tool is in relation to the topic being studied. In other words, is the assessment asking the appropriate questions or are other extraneous variables influencing the results? In the context of criminology, the need to be sensitive to content validity is most apparent when attempting to measure criminal involvement. It is important to ask questions concerning the types of criminal behavior in which the particular respondent is likely to engage. For example, asking a high school student about recent incidents of cheating, skipping school, and status offenses would be appropriate, while asking an adult about cheating, skipping school, and status offenses would be an example of a survey with poor content validity.

Along the same lines, researchers must be thoughtful about myriad situations in which one is likely to find themselves depending upon their age to measure theoretical constructs appropriately. For example, measuring the social bonds across time can be complex because the institutions and individuals to which one is attached and involved are subject to change over time. Failing to appropriately measure constructs in an age-appropriate manner will likely result in erroneous results. At the same time, researchers must be careful that changes in survey content do not negatively influence construct continuity, resulting in the failure to measure the same theoretical construct over time.

Conclusion

This entry provided a broad and brief introduction of not only the nature of longitudinal research but also the design, methodology, theory, controversy, and issues related to longitudinal research. The employment of longitudinal research and the argument about the utility of longitudinal versus cross-sectional research is anticipated to continue for years to come. This entry includes both cross-references and references of the material presented, as well as a helpful list of future readings for those interested in fully understanding the intricacies of longitudinal research.

SEE ALSO: Age and Crime; Cross-Sectional Research; Integrated Theories of Crime; Life-Course/Developmental Theories.

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