

***Statistical Analysis with Incomplete Data  
in the Context of the Ecological Model***

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The presence of multiple processes behind missing data within longitudinal (and cross-sectional) studies, such as participant attrition or differential mortality, pose serious problems for obtaining inferences to a population of aging individuals. Whereas some forms of nonparticipation can still permit inference to a single population, in cases such as mortality, inference is made more difficult as individuals leave the population of interest, such that inferences must be defined as conditional on the probability of surviving and/or remaining in the study. In order to continue to make appropriate population inferences in these situations, it is important to consider what additional variables may be related to selection and attrition, and to include such contextual variables and any group-level interactions with the variables within the missingness model. The ecological model is useful in this regard by providing a framework in which to consider the impact of many static and dynamic contextual factors on attrition and selection processes. In addition to nonignorable missingness methods and current state-of-the-art approaches that rely on statistical assumptions of *missing at random* (where the probability of missing information is related to covariates and previously measured outcomes), we will present recently developed statistical methods through which the impact of contextual variables on selection and attrition processes can be properly incorporated, using an example in which estimates of aging-related changes are derived conditionally on the mortality and attrition-related processes that change the nature of the aging population of inference. Finally, we will consider what further steps might be important in achieving appropriate population inferences despite incomplete data.