

**Interdisziplinäres Zentrum für empirische Lehrer*innen- und
Unterrichtsforschung (IZeF)**
in collaboration with
The Graduate School of the Faculty of Human Sciences

Workshop: How to deal with missing data

Lecturer: JProf. Fani Lauermann, Ph.D
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<https://sites.google.com/site/fanilauermann/home>.

Date: 21st of July 2017, 10 am to 4 pm

Venue: Seminar room of the Graduate School
“City-Passage Lindenthal” 2nd floor, Dürener Str. 89, 50931 Cologne

Registration: Members of the Graduate School are asked to register **until July 7th** using:
Graduiertenschule-HF@uni-koeln.de or 0221/57080210.

Registration via the IZeF should be done with Sarah Strauß **until July 7th**
using: sarah.strauss@uni-koeln.de or 0221/470-6901.

Missing values in data collections can occur for many different reasons, and even well-designed and properly conducted studies will not always be able to avoid the issue of missing values. Certain items in a questionnaire may be overlooked, skipped or answered incorrectly, measurements might not be performed or recorded exactly, and participants in longitudinal studies may drop out of the research program before they have completed all waves of data collection.

Missing data — especially if missingness occurs due to some systematic (i.e., non-random) and unobservable cause — poses a serious risk that the sample might lose its representative function and can lead to distorted results. Consequently, incorrect conclusions could be drawn from the data.

This one-day workshop will offer an overview of how to evaluate and understand missing data and will give practical advice on different approaches to handling missing data.

The workshop will include two parts (morning and afternoon sessions):

- In the first part of the workshop (“morning session”), we will discuss ways to evaluate and understand missing data, we will illustrate how missing data can affect such statistical estimates as means, variances, correlations, and regression coefficients (which provide the foundation for various more advanced statistical analyses), and we will go over the basics of how missing data are typically handled in educational research (including the advantages and disadvantages of common methods). All

demonstrations and exercises will be carried out using Excel or with the SPSS software using data samples provided by the instructor.

- The second part of the workshop (“afternoon session”) will be designed to meet the needs of more advanced users and will focus on so called “model-based” methods for handling missing data (multiple imputation and full information maximum likelihood estimation). These missing data methods are used in the context of specific analyses/statistical models (e.g., confirmatory factor analysis, path analysis, structural equations modeling, item response theory). SPSS is very limited in the use of these methods (e.g., multiple imputation). Therefore, we will rely not only on SPSS, but also on more advanced software such as MPlus to illustrate how these methods can work in the context of specific analyses, and when to apply them.
- At the end of the workshop, participants will be given the opportunity to reproduce particular tasks using their own data sets.

The workshop will focus on the following topics:

- Principles of data preparation and different mechanisms of missing data (MCAR, MAR, MNAR)
- The treatment of missing data and discussion of different methods, i.e. list- and pairwise deletion, single imputation, multiple imputation, maximum-likelihood estimation
- The identification of potential distortions in statistical estimates

Previous knowledge of structural equation modeling and of the software MPlus is not required for participation, and will be relevant only for the second part of the workshop (afternoon session). Familiarity with regression analysis and with the SPSS software is expected.

The presentations for this workshop will be held in English, but all questions and discussions can be asked/carried out either in English, or in German.

Participants are asked to bring a laptop with them which has SPSS already installed.

References:

Allison, Paul D. 2001. Missing Data. Sage University Papers Series on Quantitative Applications in the Social Sciences. Thousand Oaks: Sage.

Enders, Craig. 2010. Applied Missing Data Analysis. Guilford Press: New York.

Little, Roderick J., Donald Rubin. 2002. Statistical Analysis with Missing Data. John Wiley & Sons, Inc: Hoboken.

Schafer, Joseph L., John W. Graham. 2002. Missing Data: Our View of the State of the Art. Psychological Methods.