

Current Theses Topics

at the Department of Psychology with Focus on Quantitative Methods

Last updated: 26.08.2026

General information

Topics for final theses are regularly posted on our department website. In addition, you can also work on your own topics in the field of quantitative methods by prior arrangement.

A list of currently available topics can be found on the following pages. If you are interested in one of the topics, please send a short explanation about your interest in the topic and a brief description of yourself via email to the supervisor named in the list. If you would like to work on your own topic, please contact the head of the department (simon.grund@uni-hamburg.de) with a specific topic proposal and a short synopsis (max. 1 page).

For general enquiries, please contact the secretary's office (sekretariat-grund.pb@uni-hamburg.de).

Notes on final theses

The final thesis should show the student's ability to work on and present a problem from an area of psychology according to scientific criteria.

Final theses in the field of "Quantitative Methods" mainly deal with the development and evaluation of statistical methods for psychological research, for example in the context of simulation studies or concrete case studies. Theses in our department are usually written in English. Exceptions are possible by prior agreement.

Topic	Effects of missing data on power and sample size calculations
Type	1-2 Bachelor theses
Supervisor	Prof. Dr. Simon Grund (simon.grund@uni-hamburg.de)
Description	Missing data are a common problem in psychological research that can distort results and reduce statistical power, if it is not adequately handled. However, despite the well-known effects of missing data, they are rarely considered when researchers perform power and sample size computations, resulting in target sample sizes that may be too small. The aim of this thesis (or theses) is to conduct a simulation study to explore the impact of missing data on power and sample size calculations for a common type of statistical analysis in psychological research (e.g., t-tests, regression, ANOVA).
References	Newman, D. A. (2014). Missing data: Five practical guidelines. <i>Organizational Research Methods</i>, 17, 372–411. https://doi.org/10.1177/1094428114548590 Davey, A., & Savla, J. (2009). Estimating statistical power with incomplete data. <i>Organizational Research Methods</i>, 12, 320–346. https://doi.org/10.1177/1094428107300366

Topic	Alternative methods for analyzing within-subjects experimental designs
Type	1 Bachelor thesis
Supervisor	Prof. Dr. Simon Grund (simon.grund@uni-hamburg.de)
Description	The repeated-measures ANOVA (RM-ANOVA) is one of the most common methods for analyzing data from within-subjects experimental designs. However, in recent years, there have been a number of recommendations for alternative methods, which include multilevel models (MLMs) with random effects and linear models with robust variance estimation (RVE) for clustered data. The aim of this thesis is to conduct a series of case studies that apply these methods to existing data from within-subjects designs and compare them with regards to their results and their conceptual and practical advantages and disadvantages.
References	Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. <i>Journal of Memory and Language</i>, 68, 255–278. https://doi.org/10.1016/j.jml.2012.11.001 Lee, Y. R., & Pustejovsky, J. E. (2024). Comparing random effects models, ordinary least squares, or fixed effects with cluster robust standard errors for cross-classified data. <i>Psychological Methods</i>, 29, 1084–1099. https://doi.org/10.1037/met0000538

Topic	Heterogeneity of treatment effects in between- and within-subjects designs
Type	1-2 Bachelor theses
Supervisor	Prof. Dr. Simon Grund (simon.grund@uni-hamburg.de)
Description	In psychological research, treatment effects are often investigated with between- and within-subjects designs, where different treatments are administered to either different individuals or the same individuals at different time points. One aspect that is often overlooked in these designs is the potential heterogeneity of these treatment effects between individuals, for example, when the efficacy of a treatment depends on individual characteristics or groups of individuals differ in other regards that may be relevant for the outcomes being investigated (e.g., differences in means, variances, and covariances over time). The aim of this thesis (or theses) is to conduct a simulation study to investigate some of the effects that heterogeneity can have on the study of treatment effects in between- and within-subjects designs.
References	Bolger, N., Zee, K. S., Rossignac-Milon, M., & Hassin, R. R. (2019). Causal processes in psychology are heterogeneous. <i>Journal of Experimental Psychology: General</i>, 148(4), 601–618. https://doi.org/10.1037/xge0000558 Kam, C. D., & Trussler, M. J. (2017). At the nexus of observational and experimental research: Theory, specification, and analysis of experiments with heterogeneous treatment effects. <i>Political Behavior</i>, 39(4), 789–815. https://doi.org/10.1007/s11109-016-9379-z

Topic	Handling missing data in heterogeneous groups
Type	1 Master thesis
Supervisor	Prof. Dr. Simon Grund (simon.grund@uni-hamburg.de)
Description	Missing data are often handled with either imputation-based methods such as multiple imputation (MI), where the aim is to “fill in” missing values for later analysis, or model-based methods such as Bayesian estimation (BE), which apply an analysis model directly to the incomplete data. Although these methods have been shown to work well in applications where the samples are more or less homogeneous, less is known how they perform when samples consist of heterogeneous groups (e.g., demographic or treatment groups). In this context, using MI can be challenging, because the imputation model used to “fill in” the missing values must take group differences into account, and model-based methods such as BE likewise require that the analysis model is correctly specified. The aim of this thesis is to conduct a simulation study to explore and evaluate different options for handling missing data in heterogeneous groups.
References	Enders, C. K., & Gottschall, A. C. (2011). Multiple imputation strategies for multiple group structural equation models. <i>Structural Equation Modeling: A Multidisciplinary Journal</i>, 18, 35–54. https://doi.org/10.1080/10705511.2011.532695 Enders, C. K. (2025). Missing data: An update on the state of the art. <i>Psychological Methods</i>, 30(2), 322–339. https://doi.org/10.1037/met0000563

Topic	Multiple imputation of ordinal and categorical variables using partial least squares regression
Type	1-2 Master theses
Supervisor	Mark Lustig (mark.lustig@uni-hamburg.de)
Description	Missing data frequently occur in psychological research and can lead to biased results and invalid inferences if not properly treated. Multiple imputation (MI) is a widely used modern approach to handling missing data, but common implementations struggle in applications with many variables, such as questionnaires with multi-item scales. Machine learning methods, such as partial least squares regression (PLS), have been successfully employed to make MI feasible in large datasets. However, previous research has primarily focused on applications with continuous variables. As a result, little is known about how PLS performs with ordinal data (e.g., Likert-type items) or in datasets containing mixed variable types, such as binary and continuous variables. In these thesis projects, students will conduct simulation studies to assess the performance of MI using PLS in scenarios with either ordinal or mixed variable types, with the goal of evaluating its practical applicability in psychological research.
References	Austin, P. C., & van Buuren, S. (2025). Imputation of incomplete ordinal and nominal data by predictive mean matching. <i>Statistical Methods in Medical Research</i>, 34(11), 2163–2182. https://doi.org/10.1177/09622802251362642 Grund, S., Lüdtke, O., & Robitzsch, A. (2024). Multiple imputation of missing data in large studies with many variables: A fully conditional specification approach using partial least squares. <i>Psychological Methods</i>. Advance online publication. https://doi.org/10.1037/met0000694

Topic	Meta-analysis with synthetic data
Type	1-2 Master theses
Supervisor	Prof. Dr. Simon Grund (simon.grund@uni-hamburg.de)
Description	Open data are often considered an important step towards improving the reproducibility of psychological science. Unfortunately, data sharing is still rare, and this is why statistical methods such as synthetic data have been recommended as a way to facilitate data sharing. Using this method, researchers can create simulated copies of the data that can be shared more liberally and still allow other researchers to reproduce the findings of the original study. One open question in this regard is about the utility of synthetic data for analyses such as meta-analysis that go beyond the scope of the original studies. The aim of this thesis is to conduct a case study to investigate the potential utility and challenges of synthetic data for meta-analysis.
References	Grund, S., Lüdtke, O., & Robitzsch, A. (2024). Using synthetic data to improve the reproducibility of statistical results in psychological research. <i>Psychological Methods</i>, 29, 789–806. https://doi.org/10.1037/met0000526 Hagger, M. S., & Hamilton, K. (2021). Effects of socio-structural variables in the theory of planned behavior: A mediation model in multiple samples and behaviors. <i>Psychology & Health</i>, 36(3), 307–333. https://doi.org/10.1080/08870446.2020.1784420

Topic	Testing indirect effects in mediation analyses with incomplete data
Type	1 Master thesis - taken
Supervisor	Prof. Dr. Simon Grund (simon.grund@uni-hamburg.de)
Description	Mediation analyses are often used to investigate indirect effects, which are based on the idea that one variables' effect on a second variable is due, in part, to a third, intermittent variable. In practice, mediation analyses are often complicated by missing data, and many researchers address this problem with multiple imputation (MI) or similar methods. However, best-practice recommendations for estimating and testing indirect effects (e.g., the bootstrap) are difficult to apply in MI, and there are multiple strategies for combining them. The aim of this thesis is to conduct a simulation study to evaluate some of these strategies for testing indirect effects in MI.
References	MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. <i>Multivariate Behavioral Research</i>, 39, 99–128. https://doi.org/10.1207/s15327906mbr3901_4 Newman, D. A. (2014). Missing data: Five practical guidelines. <i>Organizational Research Methods</i>, 17, 372–411. https://doi.org/10.1177/1094428114548590