



Karolinska
Institutet

Methodological challenges when modeling gambling losses

Kristoffer Magnusson

Centre for Psychiatry Research,

Department of Clinical Neuroscience,

Karolinska Institutet

 @krstoffr

<http://rpsychologist.com>

EASG 2018, Malta

Introduction

- Measures of gambling behaviors are common
 - Net losses
 - Days gambled
- Common outcome (cf. Banff consensus statement)
- Generally not close to normally distributed
- In this talk I will cover common “solutions” and compare them to a more plausible two-part (hurdle) model

A review of published RCTs

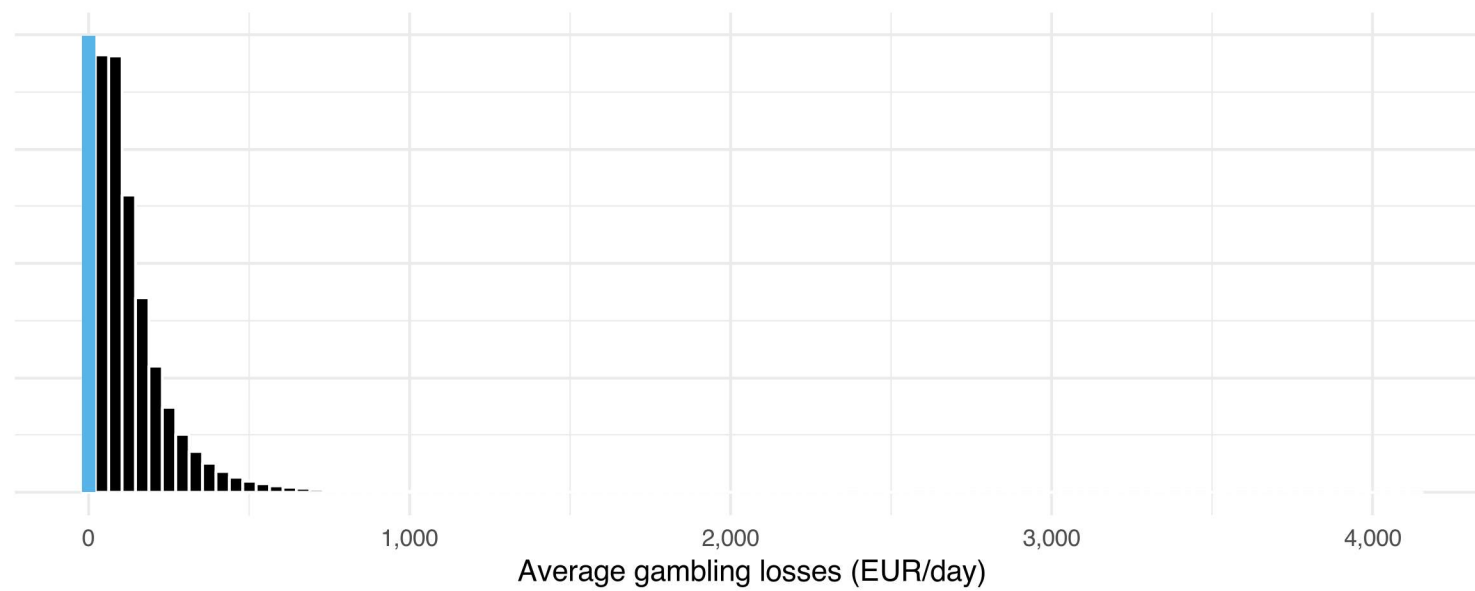
- Outcomes in 45 RCTs reviewed
- **$n = 25$ (56%)** included gambling losses*
 - Most discussed the skewed nature of the data, $n = 18/25$ (72%)

Analytical strategies

- Log-transformation most common, $n = 11/25$ (44%)
 - None mentioned $\log(0) = \text{undefined}$.
- Assumed a normal distribution, $n = 7/25$ (28%)
- Winsorizing, dichotomization, non-parametric, $n = 7/25$ (28%)

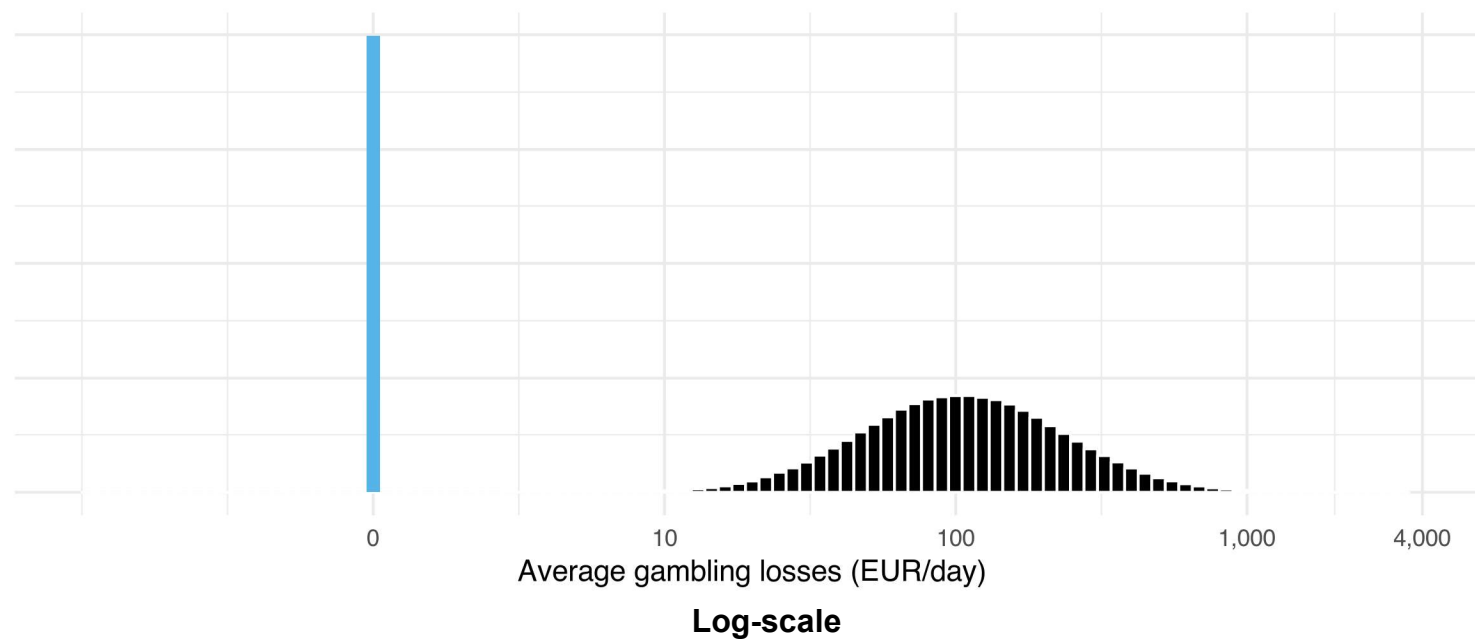
* Or similar outcomes

The problem

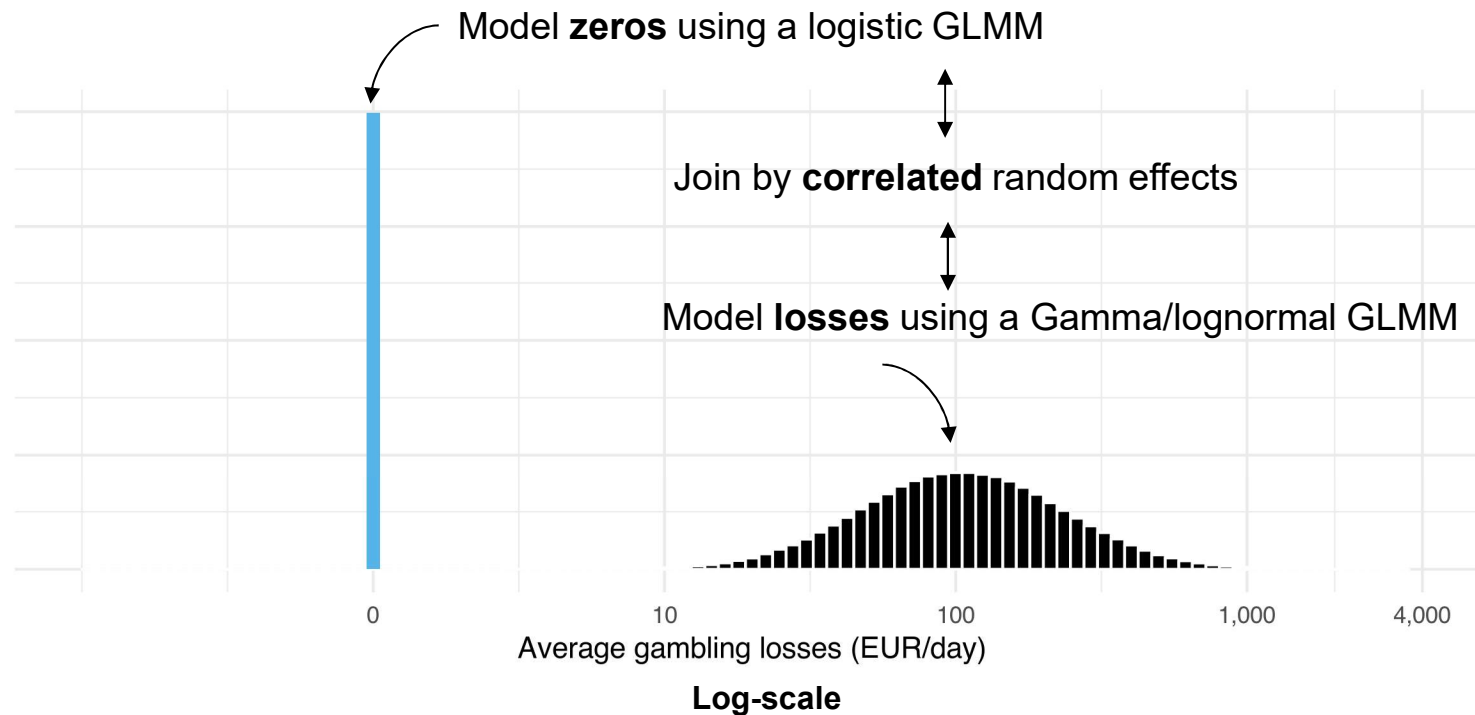


The problem

After log-transformation



Model each part: Two-part models

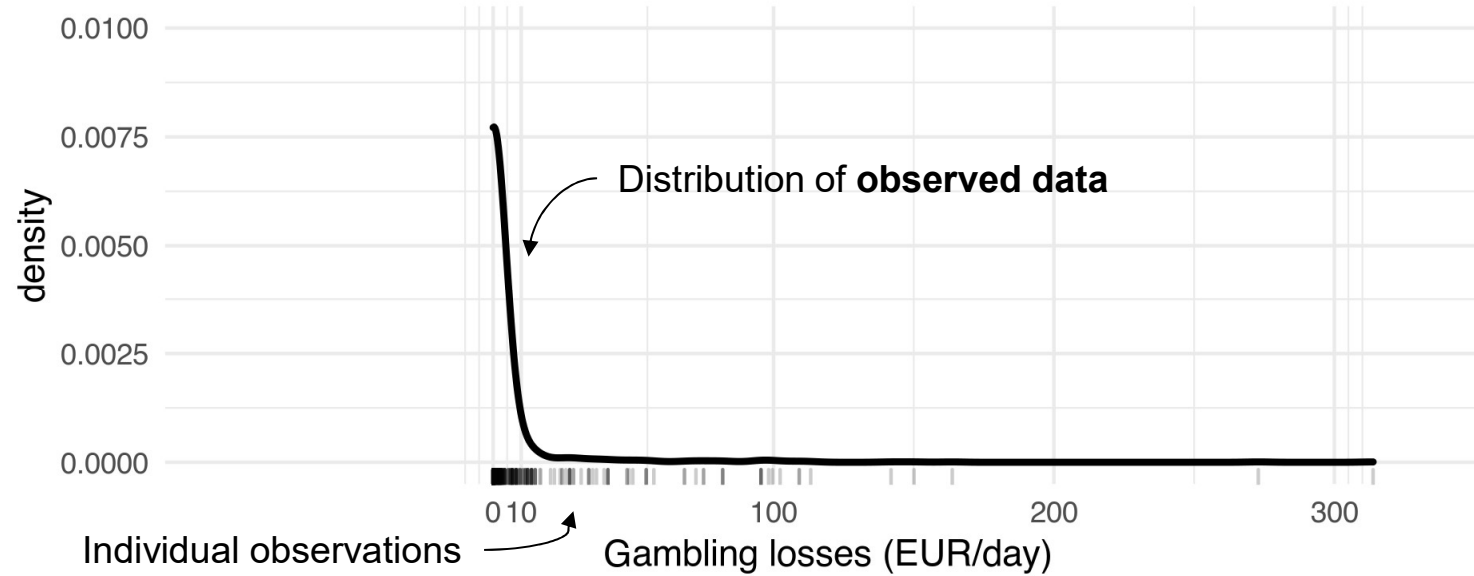


Neelon et al. 2016; Olsen & Schafer 2001; Smith et al. 2015

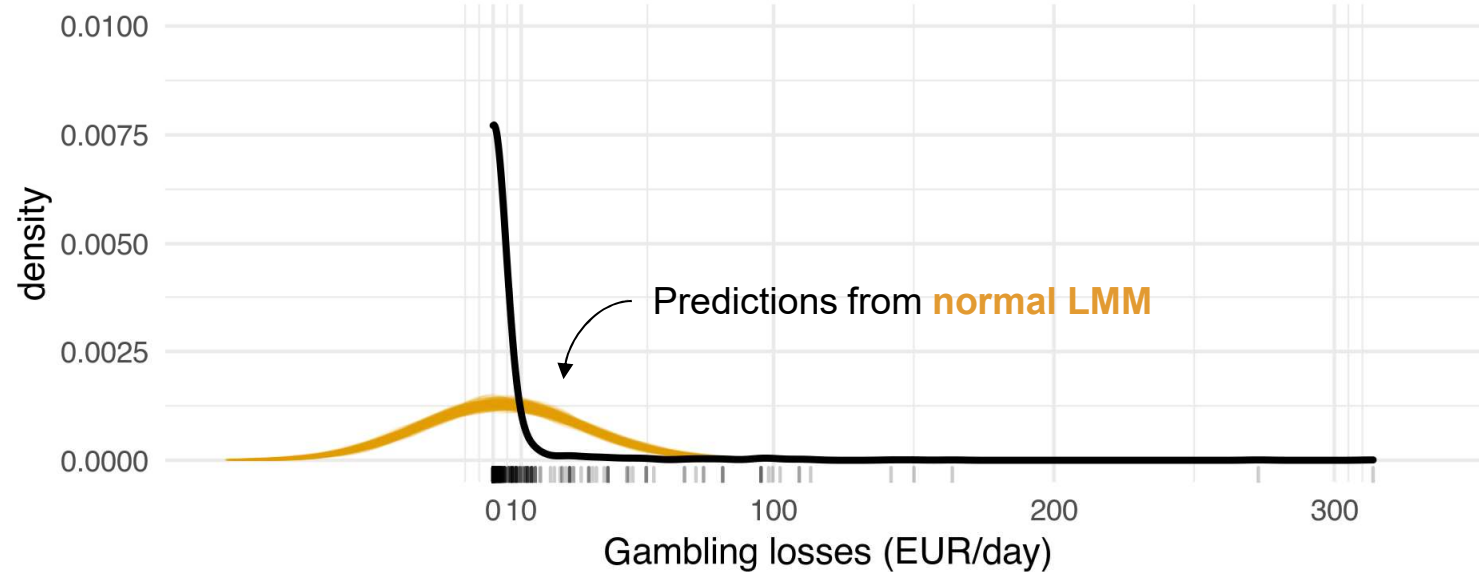
A case study

- Data from an Internet-delivered CBT RCT (Nilsson et al., 2018).
- 130 participants
- TLFB (last 7-days) weekly during treatment
- 11 weeks
- Two treatment groups

Comparing model fit to real data

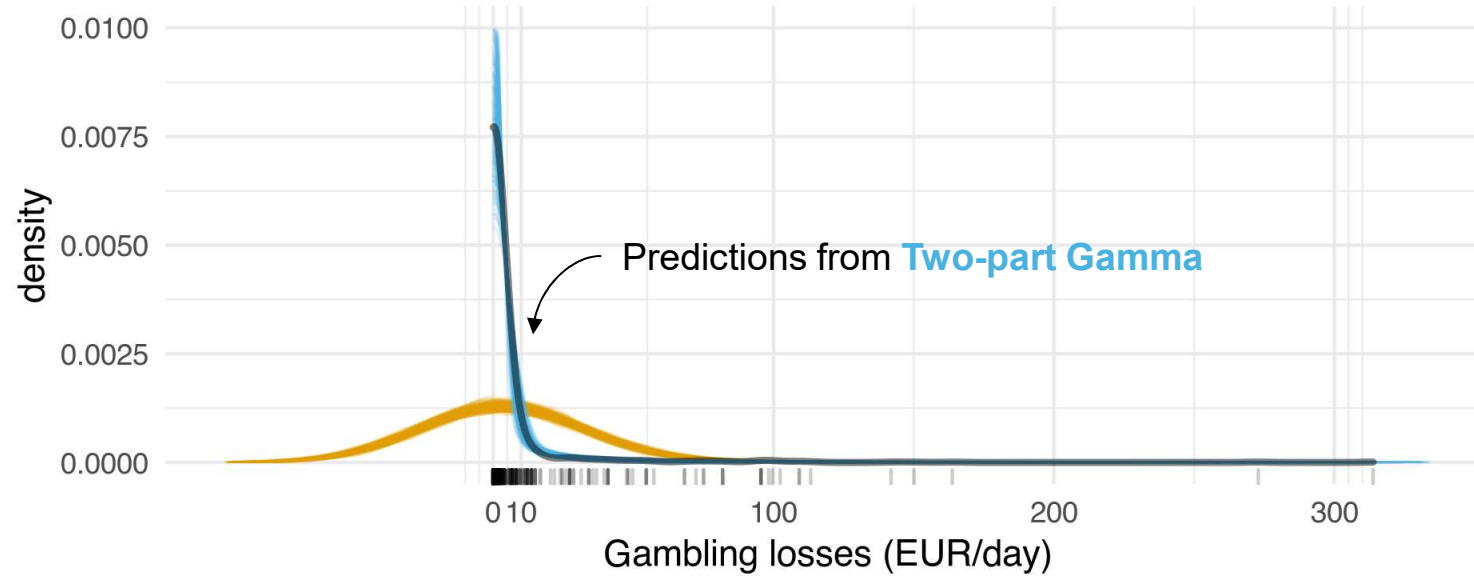


Comparing model fit to real data

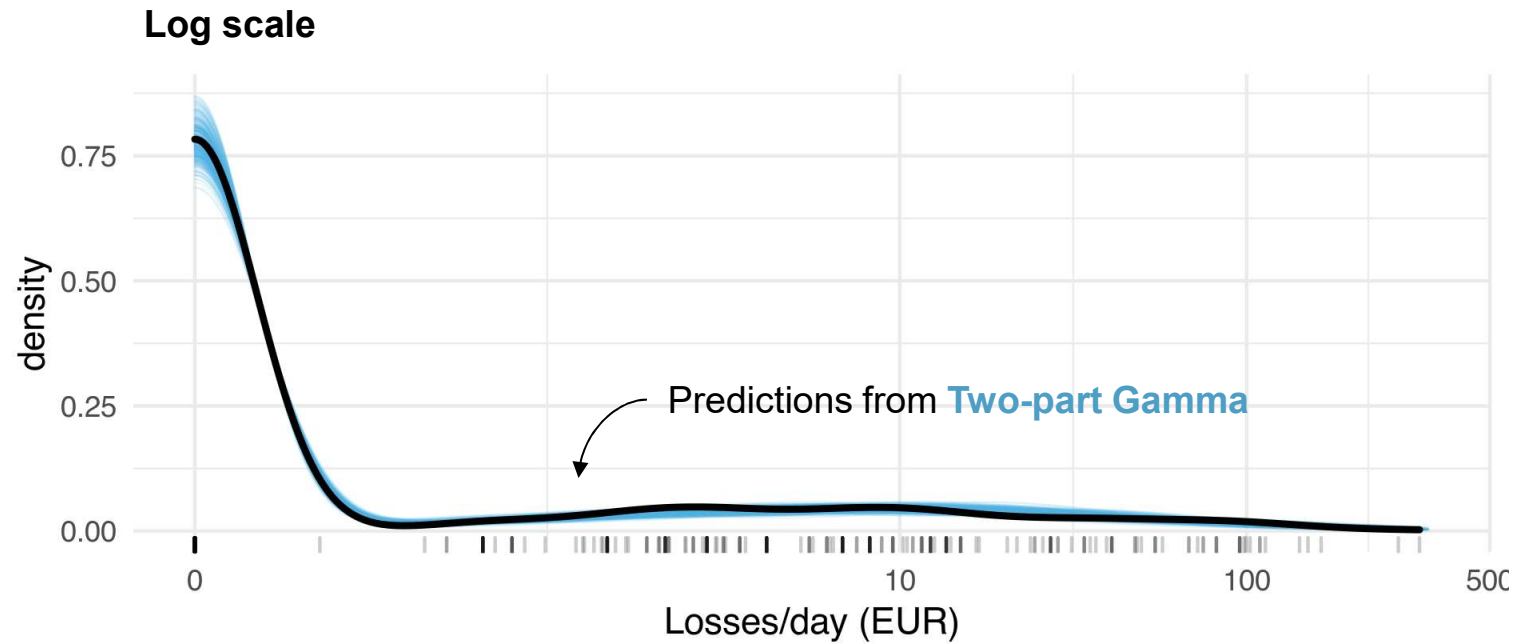


Posterior predictive distribution shown

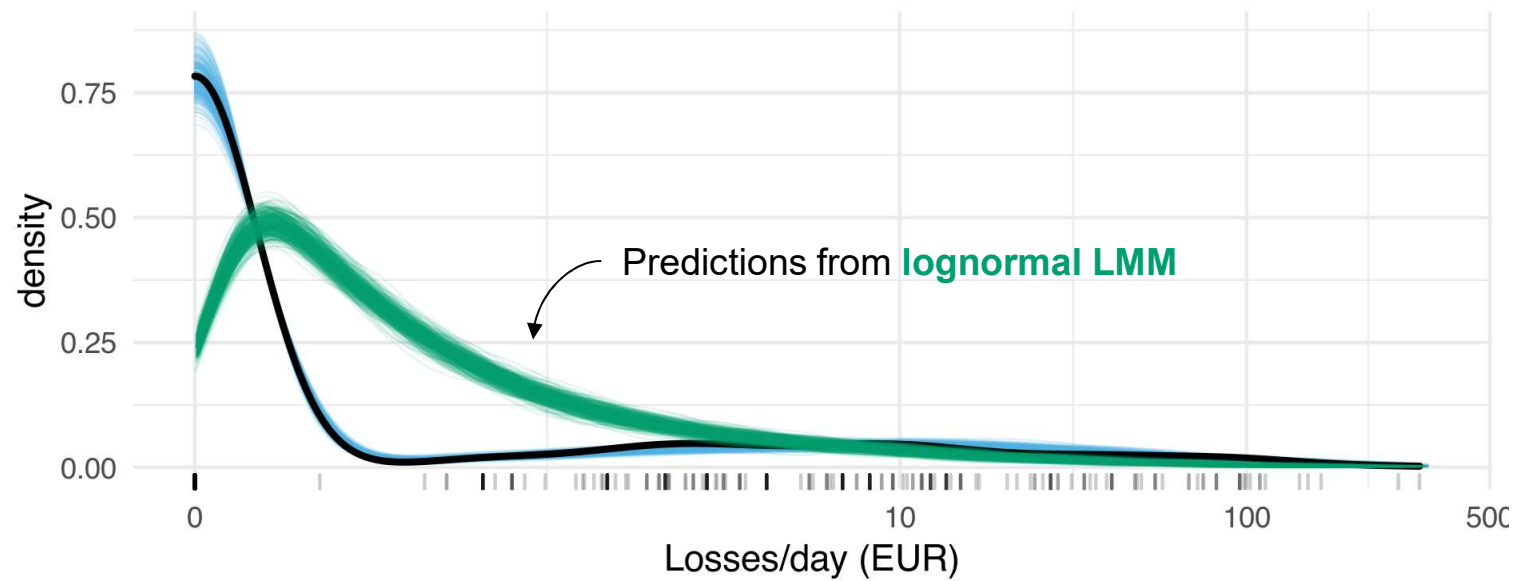
Comparing model fit to real data



Comparing model fit to real data



Comparing model fit to real data



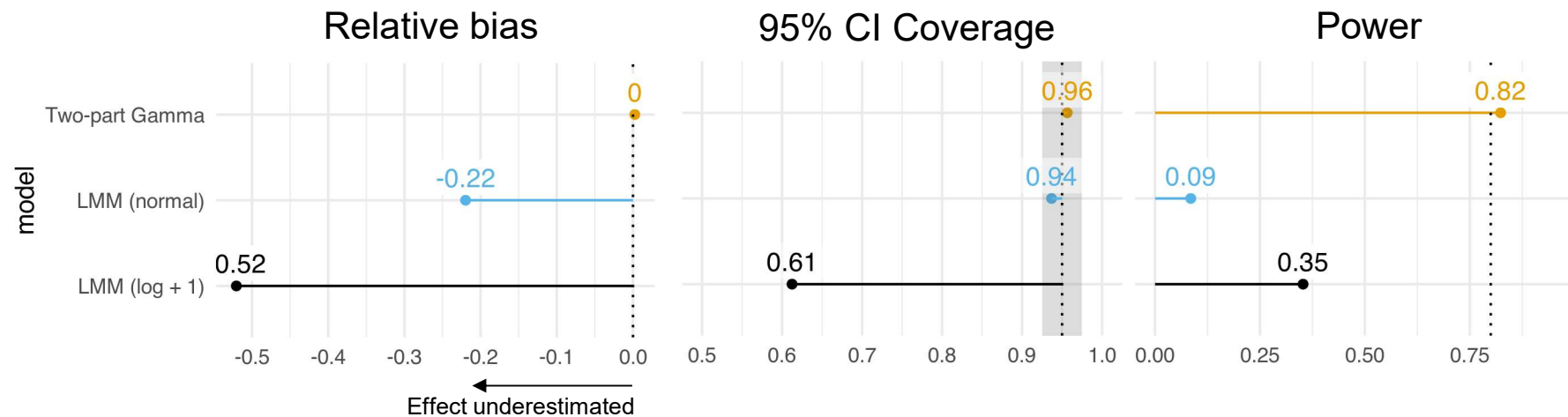
A small simulation study

- We investigated the performance of:
 - The classical linear-mixed effects model (LMM)
 - Lognormal LMM (Log + 1)
 - Two-part Gamma model
- True model was a two-part Gamma model
 - Treatment effects:
 - Overall 66 % decrease in money lost at posttest
 - Odds ratio no losses = 2

The simulations were performed on resources provided by the Swedish National Infrastructure for Computing (SNIC) at HPC2N.

Simulation results: Treatment effect

R = 2000 simulations



“Marginal” **treatment effects** shown, i.e. the overall effect (including both zeros and non-zeros)

Conclusions

- Important to consider if a proposed model could generate the observed data
- Two-part (hurdle) models are flexible enough to handle gambling losses
- Both normal and lognormal LMMs make unrealistic assumptions
 - Both bias, power and the CI's coverage are negatively affected



**Karolinska
Institutet**

Thanks!

Contributors: Anders Nilsson, Clara Hellner, Gerhard Andersson,
Per Carlbring

Kristoffer Magnusson

 @krstoffr

<http://rpsychologist.com>