**Automatically detecting issues with randomised controlled trials**

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Word count: ?

# Abstract

*Objectives*:

*Design*: Observational study.

*Setting*: Published RCTs.

*Participants*:

*Main outcome measures*:

*Results*:

*Conclusion*:

*Key words*: randomised controlled trials;

# Introduction

# Methods

The observed differences () in groups were modelled using a t-distribution.

where is the study index and is the row index. The degrees of freedom (df) for study is the total sample size minus ().

The pooled inverse-variance was modelled as

where is the observed pooled variance. The study-level random variable was used to model an additional precision for study using a spike-and-slab approach

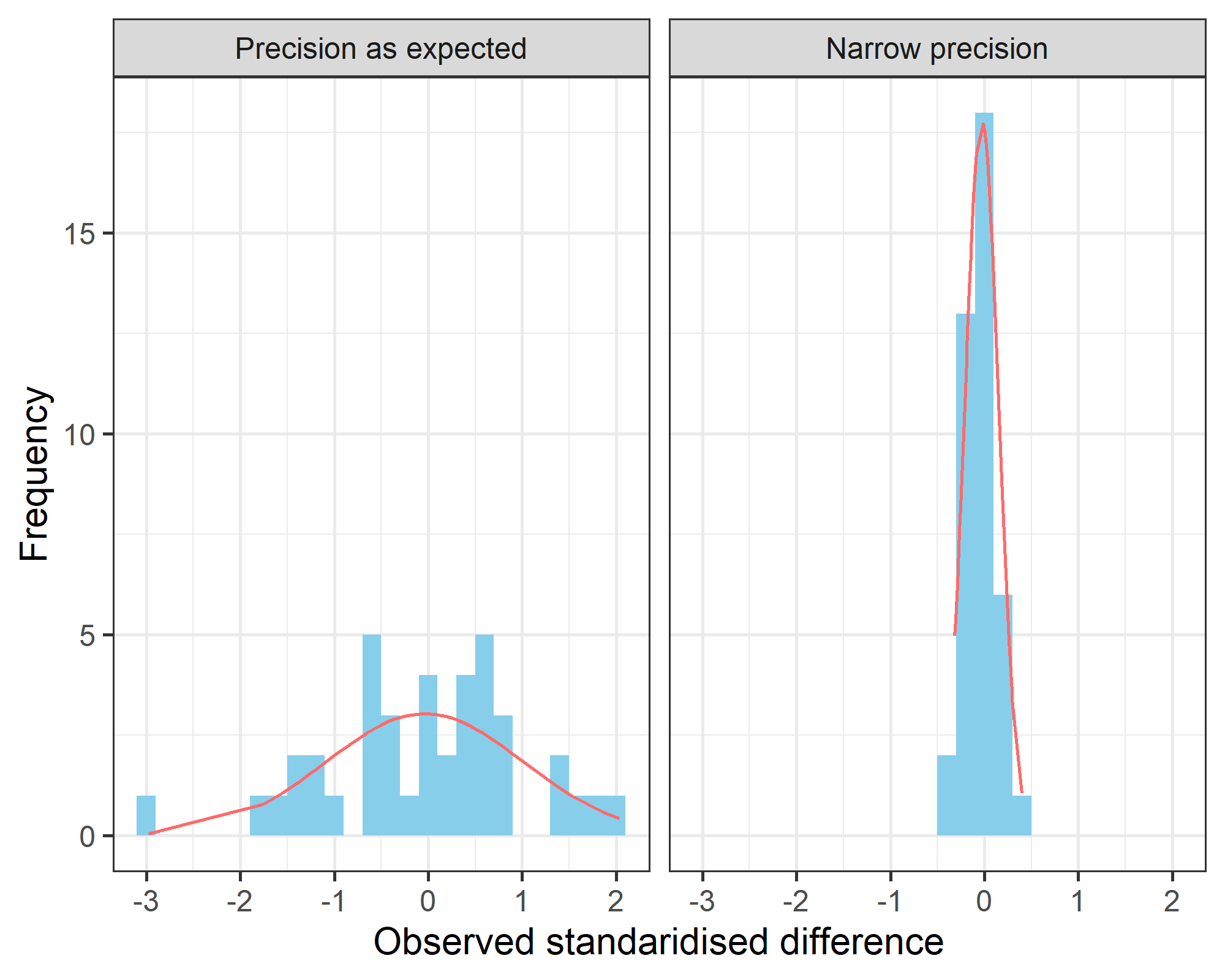
So the additional precision is zero with probability () which is the “spike” that models studies where the differences between randomised groups are as expected. The switch for each study is modelled using a Bernoulli distribution. The probability is the expected proportion of papers with an issue. This can be specified as a constant or given its own hyper-parameter. The additional precision (“slab”) was modelled using a truncated normal distribution where the estimate must be positive. This is because we were interested in studies with a higher than expected precision.

The mean was also modelled using a spike-and-slab approach.

So here the spike is at zero for studies where the mean difference is as expected for randomised controlled trials. The slab here includes a wide range of positive and negative values.

### Graphical description of the model

Here we give a graphical description of the model.



In the example, both studies have a mean difference of zero, but the observed differences from one study are much narrower and closer to zero. Our approach models the precision (inverse-variance) and aims to detect when studies have an unexpectedly narrow precision.

# Conclusion

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## Competing interests

The authors have declared that no competing interests exist.

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## Authors’ contributions

## Data sharing

# References

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