

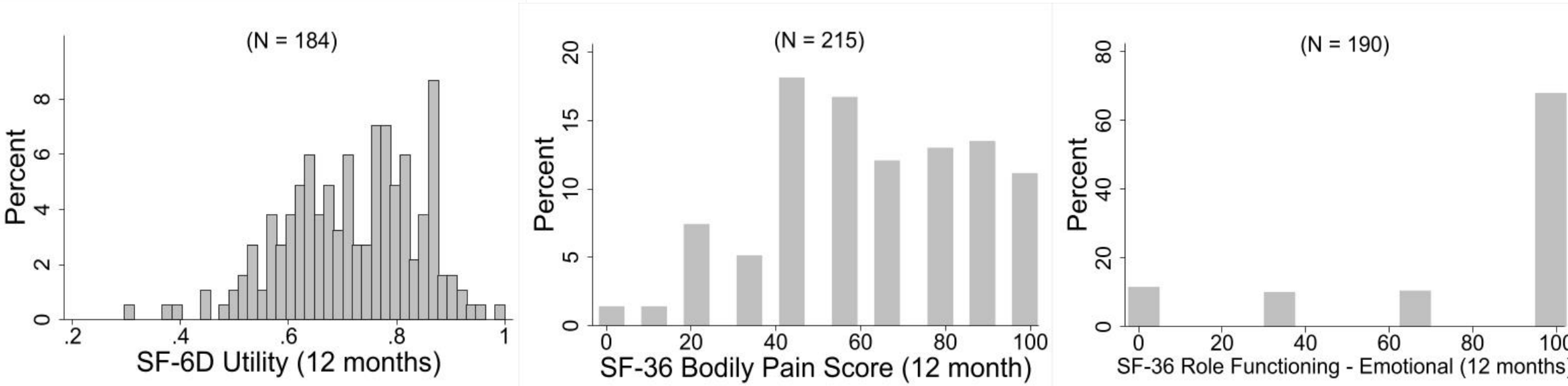
Abstract 15: A comprehensive review of statistical methods for analysing patient-reported outcome measures (PROMs) as primary outcomes in randomised controlled trials (RCTs) published by the United Kingdom Health Technology Assessment (HTA) Journal (1997-2020).

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Background:

- PROMs are used as key outcomes in RCTs. It enables health researchers to measure, analyse and compare clinical outcomes from the patient perspective and provide clinical effectiveness outcomes to support decision making.
- However, it can be complex to analyse PROM data as one PROM can generate multiple outcomes and PROM data are usually skewed, bounded and discrete.
- Conventional statistical methods (e.g. linear regression) may not be suitable for the analysis of PROMs as some model assumptions (e.g. Normality) are likely to be violated.



- An inappropriate statistical analysis of PROMs can result in unreliable estimands of clinical effectiveness and accordingly fail to provide accurate and robust results for decision-making.
- This study aims to identify how frequently PROMs are used as primary and/or secondary outcomes and to summarise what statistical methods are used for the analysis of PROMs in RCTs.

Methods:

- Reports of RCTs published in the UK HTA Journal between 1 January 1997 and 31 December 2020 that defined and reported a PROM as clinical endpoints or outcomes for the trial were systematically identified and reviewed. Information relating to PROM use was extracted, including the frequency of using PROMs, the PROM characteristics, and the statistical methods for analysing PROMs when using PROMs as primary outcomes.

Conclusions:

- The majority of trials used PROMs as primary and/or secondary outcomes.
- In recent years, there is an increasing trend of using complex models (e.g. with mixed effects) for the analysis of PROMs.
- Conventional methods such as linear regression are widely used, despite the likely violation of their assumptions.
- Statistical methods developed to address these violations when analysing PROMs, such as beta-binomial regression, are not routinely used in practice.
- There was a lack of explicit reporting of PROMs in some HTA trials.

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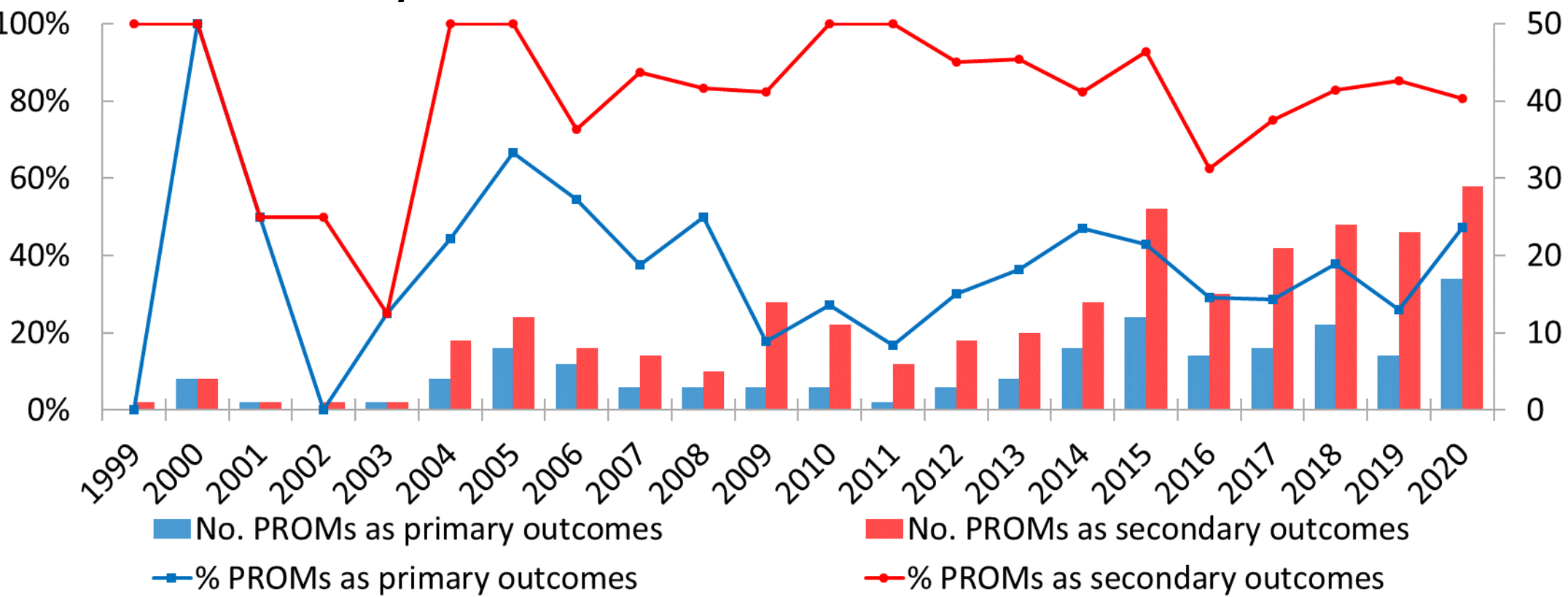
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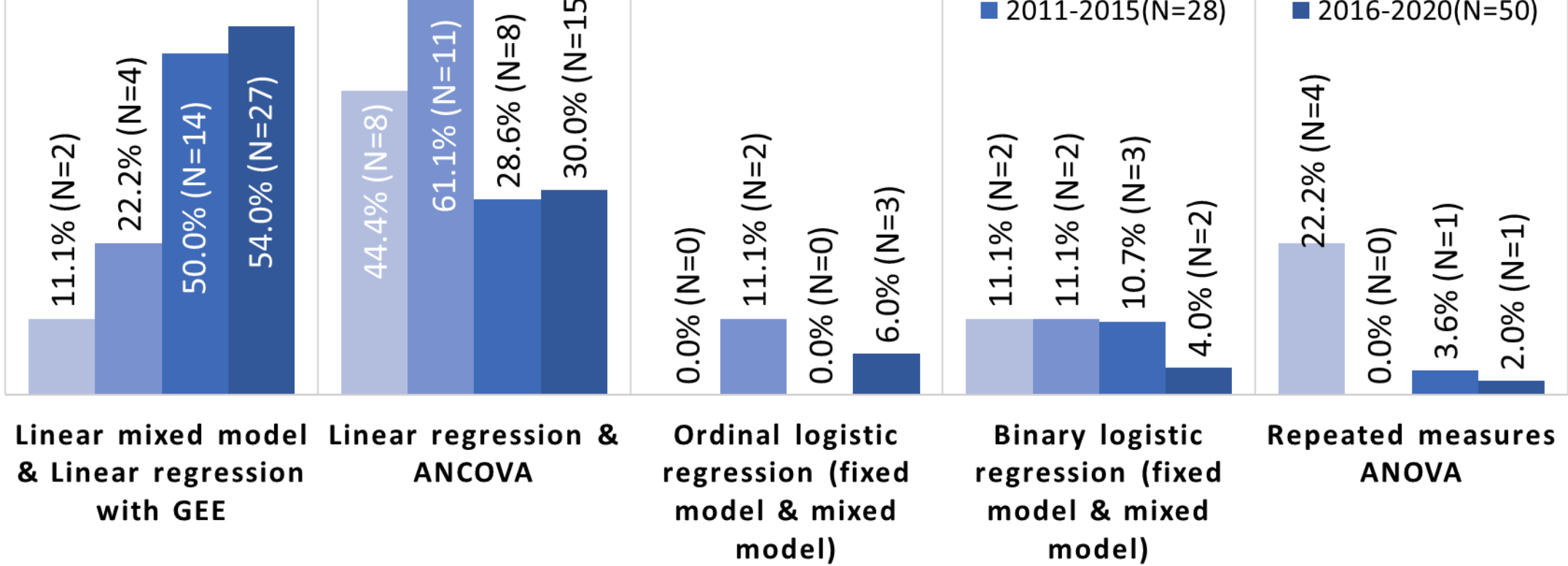
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Results:

- In the 303 published RCTs, 114 trials (37.6%) used PROMs as primary outcomes and 251 trials (82.8%) used PROMs as secondary outcomes.



- In the 114 RCTs where the PROM was the primary outcome, the most used PROM was Short-Form 36 (8/114), the most popular methods were linear mixed model (45/114), linear regression (29/114) and analysis of covariance (ANCOVA) (13/114); and logistic regression was applied for binary and ordinal outcomes in 14/114 trials.



Future Directions for Research:

- Future research will evaluate different statistical methods for the analysis of PROMs considering a set of established criteria, and make recommendations on using statistical methods for the analysis of PROMs in RCT settings.