Extract

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Meta-analysis of mean and median

Meta-analysis is a statistical technique combining data from several scientific studies addressing a common research question. It is considered to be among the best sources of scientific evidence. In a setting where the outcome of interest is continuous, most studies typically report the sample mean and standard deviation of the outcome. Meta-analytic methods for pooling the mean are well-established in the literature. However, when the distribution of the outcome is skewed, studies often instead report the sample median of the outcome to better represent the center of the data. Although the median is one of the most reported effect measures, there were no available statistical methods to meta-analyze the median for a long time. The problem was that primary studies that report median usually do not report variance, and it is difficult to estimate it because of the dependence on within-study distribution. Consequently, often studies that reported sample median of the outcome were left out of the meta-analysis. Recently several researchers proposed methods to estimate the sample mean and standard deviation from the median, sample size, and several commonly reported measures of spread.

Another advancement was the method developed by McGrath et al. (McGrath et al. 2020) to directly meta-analyze the median. This method estimates the variance of the median based on the estimation of the within-study distribution.

In this thesis, we propose to meta-analyze the mean and median separately. The idea is to include the median-reporting studies in the meta-analysis of the mean using estimation methods and separately meta-analyze studies that report the median in the meta-analysis of the median using a recently developed method. We carried out simulations of meta-analytical approaches and made an analysis and comparison of them.