Cumulative meta-analysis

Introduction

Study (and, by extension, intervention) duration is important for the chronic management and prevention of obesity. Yet, all study duration thresholds for original studies and for meta-analysis inclusion are arbitrary. Our choice of 72 hours is arbitrarily short, but extends beyond just differences in eating (e.g., differences in weight from the actual digestive contents of eating versus skipping). Another meta-analysis arbitrarily chose 4 weeks as the cutoff, and a comment by a reviewer of the second version of our manuscript suggests 12+ weeks would be more reasonable. To address differences in study duration threshold for inclusion, we conducted a cumulative meta-analysis, adding studies from the longest to the shortest duration.

Methods

Using the effect sizes calculated in the primary analysis, studies were included in the cumulative meta-analysis one at a time, starting with the longest duration (16 weeks) to the shortest (6 days). Within duration, individual studies or strata were added arbitrarily as organized in the data set. Each effect estimate was assumed to be independent, though we recognize there may be some greater similarity within studies that stratified by baseline habits (e.g., the Eater vs Skipper strata of Dhurhandar et al. may be more similar than participants across strata in other studies by virtue of being a part of the same study, even though each strata-by-assignment group included independent samples). Estimates were calculated using the 'cumul' function of the 'metafor' package. See code for more details. Body weight and BMI had enough effect sizes included in the primary analysis to meaningfully synthesize results cumulatively across study durations. No multiple comparisons corrections were conducted.

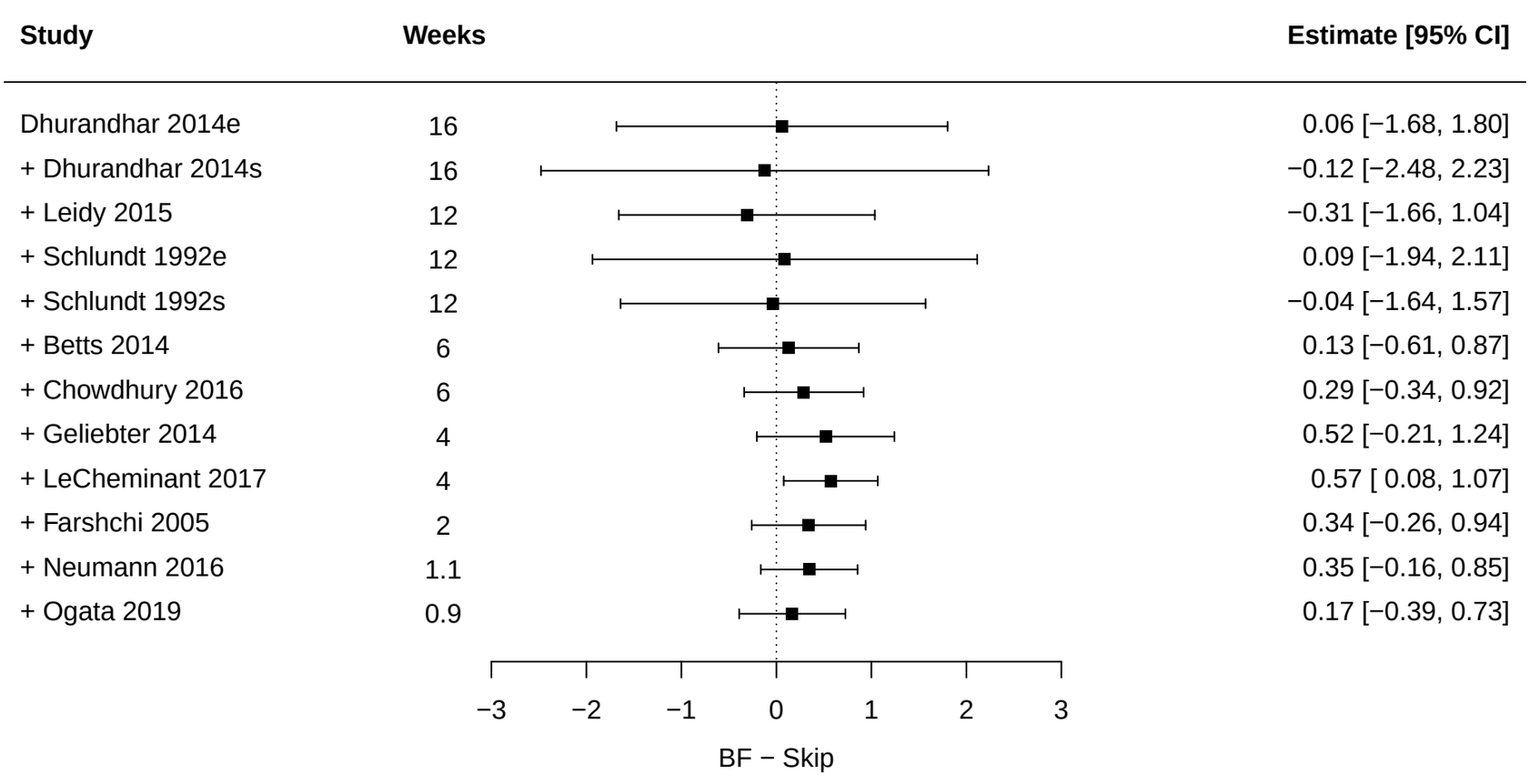
Supplemental Forest Plots for Cumulative Meta-Analysis

The cumulative meta-analyses were conducted using the same effect estimates generated for the main analysis. The upper panel depicts body weight, and the lower panel depicts BMI. Each row represents the effect estimate from pool that row with each row above it. Within duration, studies were included in an arbitrary order, and thus interpretation should focus on the lowest row within duration. For instance, interpretation of 4 weeks should be done using the row labeled LeCheminant 2017 because that row synthesizes both 4 week studies with all longer durations above it.

Results and Discussion

As studies were added throughout the cumulative analysis, the point estimates hovered near and crossed the null, with no obvious pattern of a trend in the relationship between eating and skipping breakfast across durations. For both body weight and BMI, the difference between eating and skipping breakfast was only statistically significant in favor of skipping when studies of 4 weeks or longer were included (see the row labeled with LeCheminant 2017 in both panels), but not when shorter durations were added or when studies only longer than 4 weeks were included. Given that the process of cumulative meta-analysis results in multiple testing, interpretation of any statistically significant results should be made with caution.

Body Weight (kg)



BMI