

Eggs Versus Waffles: Can Breakfast Choice Modify Obesity Risk?

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Source: Baum JI, Gray M, Binns A. Breakfasts higher in protein increase postprandial energy expenditure, increase fat oxidation, and reduce hunger in overweight children from 8 to 12 years of age. [J Nutr. 2015;145\(1\):2229-2235](#); doi:10.3945/jn.115.214551. [See AAP Grand Rounds commentary by Dr. Shelley Springer](#) (subscription required).

PICO Question: Among school-aged children, does a protein-based breakfast increase postprandial energy metabolism and substrate oxidation, decrease hunger, and reduce food intake at lunch as compared to a carbohydrate-based breakfast?

Question type: Intervention

Study design: Randomized crossover

If you read the study title, you have the short version of what the authors want us to take away from this report, involving 29 8 - 12 year old children, 16 of whom were obese based on body mass index but all otherwise normal and healthy. In a randomized crossover design, the children received either a protein-based breakfast (1 egg, 2 egg whites, butter, orange juice, 2 slices of white bread) or a carbohydrate-based breakfast (waffle, butter, maple syrup, orange juice). This was followed by a 4-hour period of observation and measurements, and then a buffet lunch where food choices and quantity were recorded. Then, all the kids came back for another round, at least a week later, where they ate whatever breakfast they didn't have the first time around, which is the crossover part of the design. Researchers attempted to standardize the amount of physical activity the day before and during the 4-hour experimental periods, but of course it's very difficult to account for the myriad of variables that could impact hunger and eating behaviors.

The participants weren't blinded to the study assignment; they could see what they were eating. It wasn't clear to me whether the investigators were blinded to the assignments, and lack of investigator blinding could have had an impact if study personnel were involved in collecting some of the more subjective data, such as palatability of meals and how satiated the kids were after the meals.

[Assuming a bit of butter added, this is pretty much the carb breakfast these kids enjoyed. From Legoktm, via Wikimedia.](#) The crossover study design is useful for studying interventions for chronic conditions that don't change much over time, such as attention deficit disorder or asthma, though for the latter condition one needs to worry about seasonal changes. It's a method where each child can serve as his or her own control, and it can help in reducing the number of patients necessary to find significant results. However, I can't see that the authors used this design for these purposes. First of all, they don't report individual child outcomes. I was expecting to see some analysis of how each child changed (or didn't) with the type of meal, but I couldn't find it. Second, the authors did not include any rationale for the sample size they chose. This is primarily a problem for outcomes where they did not find any statistically significant differences, because too few study subjects might lead to missing true differences between groups.

I also had a slight grin when I saw how the authors chose to "spin" their conclusions. Note that they chose to highlight somewhat positive statements in their title. Don't get me wrong, the study results definitely support those statements. Postprandial energy expenditure and fat oxidation are pretty objective measures, but



those measurements are really biomarkers (or surrogate outcomes) for what are more important outcomes, such as whether the children eat less for lunch because they had a protein-based breakfast. If you look closely at the results, the authors show a better area under the curve (i.e. looking over the entire 4-hour period between breakfast and lunch) for perceived hunger, fullness, and desire to eat for the protein group. However, at the 4-hour measurement, just before lunch, it doesn't appear that the groups had different scores. Furthermore, there were no differences in energy intake at lunch based on the breakfast assignment. The authors' spin could cause the casual reader to miss these important findings.

True confessions here, I'm finalizing this commentary a day after I had a breakfast of blueberry pancakes smothered in maple syrup, and I'm probably still feeling guilty about that meal. I didn't particularly keep track of my intake the rest of the day, but let the jury note that I had a glass of wine and pizza for dinner. I'm sure that tweaked my BMI in the wrong direction.

Per the authors' discussion, a fairly large body of information suggests that protein-based meals, especially if combined with low glycemic index carbohydrates, are helpful in increasing satiety and decreasing hunger and maybe caloric intake, but it's going to take a lot of work to conduct a scientific study that strongly supports that view, because of the large number of variables that are difficult to control.

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