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Title: Appetite effects of breakfast – restrained to the morning?

Author: Javier T. Gonzalez, BSc., MRes., PhD.

Email: J.T.Gonzalez@Bath.ac.uk

Author list for indexing: Gonzalez

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Address for correspondence:

Department for Health,
University of Bath,
Bath,
BA2 7AY,
UK.

Tel: 0(+44)1225 38 5518

Recommendations to regularly consume breakfast in order to control or lose body weight are prevalent in guidelines from charities [1] and public health authorities [2, 3]. Yet, when the evidence base is scrutinized, the vast majority of research is observational in nature [4]. Whilst observational studies are useful for establishing a potential link between a behavior and an outcome, randomized controlled trials are essential in order to make definitive causal statements. More recent studies using free-living designs over periods of weeks and months [5-8], combined with evidence from more tightly-controlled laboratory studies conducted within a single day [9-11] are beginning to address the causality of breakfast consumption, body weight regulation and health, whilst providing mechanistic insight into any causal effects.

When attempting to control or lose body weight, exercise can be a powerful tool to improve body composition. Exercise also potently improves metabolic health, even when the energy deficit that exercise usually creates is removed [12]. As exercise drastically alters the metabolic responses to breakfast consumption [9, 13], it is important to study the effects of breakfast consumption/omission in the context of exercise.

In this edition of *Nutrition*, Clayton *et al.* [14] add to this growing body of literature by examining the subjective appetite, metabolic and hormonal responses to breakfast consumption compared to extended overnight fasting, with the particularly novel component being an exercise bout performed in the afternoon (as opposed to the morning), between a standardized lunch and dinner. This design not only allows the findings to be generalized to those who perform exercise towards the end of the day, but also provides information as to whether breakfast consumption results in any carry-over effects on exercise metabolism, even after lunch has been consumed [15]. Subjects reported feeling less hungry after breakfast consumption (compared to extended fasting), up until the standardized lunch was consumed. However, no significant differences were found in hunger (nor in any other subjective

appetite ratings) for the rest of the day, suggesting that any effects of breakfast consumption on subjective appetite ratings are transient in nature and do not carry-over after a standard lunch is consumed. Similarly, the metabolic and hormonal responses were not significantly different following lunch, although a higher frequency of sampling may be needed to detect some metabolic responses [9, 13].

By fixing energy intake at lunch and dinner, information about within-day compensation cannot be determined, however, it can be argued that when individuals are attempting to control or lose body weight, then *ad libitum* feeding is not necessarily the default situation, and energy intake is in many cases, prescribed to some extent. This study provides information about appetite responses under prescribed feeding and exercise, a crucial component to study given the benefits of exercise for body composition and health.

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