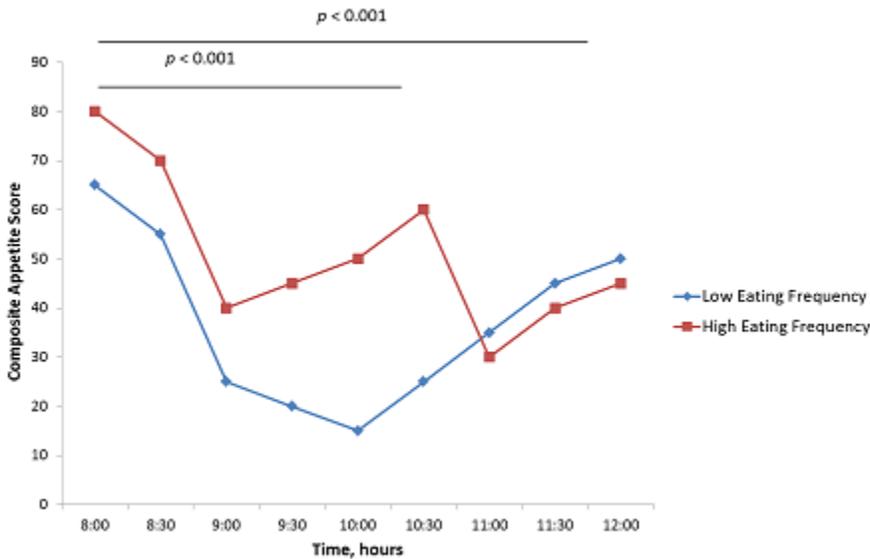


# Stick to three square meals a day to curb appetite

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N Zubair



Composite appetite score in high and low eating frequency conditions by healthy adults. Values are means, n = 12. Significant differences over the entire testing period and from baseline through 10:30 are shown.

More than one third of adults in the United States are obese. Obesity strongly contributes to the risk of chronic diseases such as heart disease, stroke, type-2 diabetes, and cancer. Reducing rates of obesity can prevent a large portion of morbidity and mortality from these diseases.

Obesity is caused by excess energy intake. One strategy to reduce this excess energy intake involves regulating appetite. Eating several small, frequent meals throughout the day has been suggested to better regulate appetite. Increased eating frequency (EF) is proposed to influence appetite via its effects on several physiologic and cognitive pathways. Few studies have investigated, using repeated measures of self-reported appetite, whether EF alone modifies appetite and subsequent food/caloric intake. To investigate this question, Drs. Martine Perrigue, Marian Neuhaus, and colleagues (Public Health Sciences Division) examined the relation between EF and self-reported appetite in the absence of alterations to caloric or macronutrient (protein, fat, carbohydrate) content to the diet. The results from this study were recently published in the *Journal of Nutrition*.

The investigators conducted a randomized crossover intervention trial in 12 participants enrolled in the Meals and Grazing Study. Each individual completed two isocaloric (same caloric energy) 3-week intervention phases in random order: 1) low EF or three eating occasions per day and 2) high EF or eight eating occasions per day. Participants consumed their own food throughout the study with the use of an individually tailored meal plan for either low EF or high EF. Researchers gave participants a 2-week washout period between intervention phases, where they were instructed to consume their habitual diet. Participants were also given detailed instructions on keeping a food record.

At the end of the each study phase, participants completed a four-hour (8:00am-12:00pm) appetite testing session. During the appetite testing session at Fred Hutch, participants were provided either a single large portion of food at 8:00am (low EF) or two smaller portions of food at 8:00am and 10:30am. Standardized ratings of hunger, desire to eat, satiety, thirst, and nausea were assessed every 30 minutes. A composite appetite score was calculated as the mean of hunger, desire to eat, and the inverse of fullness.

The investigators found no difference in the energy content or macronutrient composition of the diets assigned to participants during the low EF and high EF intervention phases. Using linear regression analysis, they found that the appetite score was significantly higher in the high EF group for the total appetite testing period and for the time period between baseline through 10:30am ( $p$  value < 0.001). In conclusion, the popular recommendations to graze, nibble, or snack throughout the day to decrease appetite may not apply.

This work paved the way for new research ideas, as Dr. Neuhausner elaborates, “ this study provided supporting data for an R01 we recently got funded by the NIH. This grant will look at EF and its influence on appetite on a larger scale. We are collecting information on postprandial glucose and insulin. For those with higher EFs, it seems like these glucose and insulin values remain stable, but high. Constant high levels of glucose and insulin could pose as risk factors for diseases such as cancer.” Furthermore this newly funded grant incorporates tech savvy methods, Dr. Neuhausner notes, “ participants no longer have to fill out food diary questionnaires online, but can now use a mobile app, and this makes compliance much better.”

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[Perrigue MM, Drewnowski A, Wang C-Y, Neuhausner ML](#). 2016. Higher Eating Frequency Does Not Decrease Appetite in Healthy Adults. *The Journal of Nutrition*. 146(1):59-64.