Can sensory-nutrient satiety effects be maintained?

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Introduction
When an individual consumes a food they will have both implicit and explicit expectations about the effect it will have on their appetite. We suggest that these cognitions will be integrated with oral, gastric and post-gastric signals to determine the actual experience of satiety. If so, development of more satiating food products will require manipulation of consumer expectations alongside nutrient delivery. Identifying how these factors integrate should thereby allow design rules to be developed that allow optimal delivery of satiety for consumers.

Previous findings
Previously the Sussex Team have established that the sensory characteristics of beverages (thickness and creaminess) influence expectations and actual experiences of satiety: compensation for calories in the beverages improved as they became thicker and creamier and more predictive of satiety.

Aims of present study
This study tested whether expectations and actual experiences of satiety dependent on the sensory quality and nutrient content of a beverage are maintained after repeated consumption.

Design
A mixed design compared the satiating effects of four beverages differing in energy content and sensory characteristics (energy and sensory between subject factors), on the day when they were first consumed and after they had been experienced on multiple occasions (time as within subject factor).

Methods
Participants (n=48; all male) consumed a fixed portion of one version of the fruit yoghurt beverage on day 1 (pre-exposure), days 2-5 (exposure), day 6 (post-exposure) and day 7 (1 month follow up). Expectations of satiety and actual satiety responses were measured on test days 1, 6 and 7. Expectations were assessed using Brunstrom’s (2008) method of constant stimuli. Measures of actual satiety were intake of a test meal 90 minutes following consumption of the beverage and VAS ratings of appetite.

The four beverages under test combined two levels of energy (high energy: HE, 274kcal; low energy: LE, 77 kcal) and two levels of satiety-relevant sensory quality (low sensory: LS; high sensory (thicker and creamier): HS).

Results: test meal intake
Consistent with previous findings test meal intake on 1 (pre exposure) was dependent on both the energy content and sensory quality of the beverage [F(1, 41)=13.7, p<0.001]; participants consumed less of the test meal following the LE versions of the beverage regardless of the sensory characteristics.

Test meal intake on day 6 (post exposure) was dependent only on the energy content of the beverages [F(1, 45)=13.7, p<0.001]; participants consumed less of the test meal following the HE versions of the beverage regardless of the sensory characteristics.

Results: satiety
Overall the high sensory beverages were expected to be significantly more satiating than the low sensory beverages, these were expected to deliver 72 kals more than the low sensory versions. The energy content of the beverage had no bearing on the extent to which they was expected to be satiating. Expectations did not change after repeated experience of the beverages.

Results: hunger ratings
Energy by day [F(2, 82)=4.0, p<0.02]. No main effect or interactions with sensory. Participants were more hungry before lunch consuming the LE versions of the beverages compared to the HE versions, but this was only after repeated exposure.

Expected satiety task
Take ONE mouthful of the drink in front of you. Imagine you have consumed the whole bottle for breakfast. Now imagine how hungry you would feel before lunch. Select the amount of breakfast cereal you would need to match the effect of the yoghurt drink on your hunger*

Comparisons made with seven breakfast cereals

Test day 1
Expected satiety
Test meal

Exposure days 2-5
Day 6

Expected satiety
Test meal

Day 7

Expected satiety
Test meal

Day 8

Key findings
➢ When a beverage was first experienced its actual satiating power was dependent on both its sensory characteristics and its energy content
➢ After repeated experience of this beverage its energy content most influenced satiety
➢ Repeated consumption of a low energy beverage resulted in subsequent overeating but only if it’s sensory characteristics confer low expectations of satiety.
➢ Expectations of satiety were dependent on the beverage’s sensory characteristics, and these were not changed by repeated consumption.

Relevance to industry
The satiety experienced by beverage consumers will change after repeat purchases, and this will be most evident in consumers of low energy drinks with ambiguous sensory characteristics, though expectations about the product are likely to remain stable.

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