

The Effect of Repeated Exposure to Herb and Spice Seasoning in Low Salt Tomato Soup on Consumer Liking

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Conflict of interest regarding this presentation:

McCormick Science Institute

**I wish to declare a potential conflict of interest, and
that I have received direct industry support in
relation to all or part of the results presented here.**

Background



- In most countries the targets for reduction in salt intake are not met by the majority of the population
- In western populations, approximately 75% of dietary salt is derived from processed food
- Decreasing salt in processed food is challenging for the food industry → adverse effect on product sensory profile and hence consumer acceptability
- Herbs & spices with savoury aromas ('salt congruent') could enhance salty taste

Hypothesis:

Herbs and spices will enhance liking
of lower salt version of a standard soup

Aims



1. To establish whether incorporation of H&S into low salt tomato soup would give an immediate improvement in the hedonic liking
2. To repeatedly expose subjects to the tomato soup over 3 d and assess changes in acceptability, familiarity and consumed volume over exposure time.
3. To assess the effect of adding H&S to low salt soup on perception of salty taste

Study Plan -1



- **Soup**
 - Tomato Soup (instant soup powder)
 - For taste tests - 30ml soup in cup
 - For repeat exposure tests - 400ml soup
- **Preliminary study:** Determine low salt level to use in main study
 - 100 subjects compared standard salt soup (0.5% w/w salt) with reduced salt variants (30, 40, 50% reduction)
 - Standard salt soup had highest overall liking
 - 50% reduced salt soup was significantly less liked → used in main study

Subjects

160 consumer recruited (148 completed study)

- age 35-60
- balance of low & high socio-econ groups
- balance of male / female
- 24 h urine samples taken to assess salt intake: balance low/high salt intake across exposure groups
- Each completed FFQ (EPIC) as measure of salt intake

Exclusion criteria

- H&S rejecters
- vegetarians
- Medical conditions/drugs affecting taste/smell/appetite

Subjects were given no information on aim of study

Study plan : Liking of H&S Mods

150 subjects scored liking of low salt soup flavoured with 3 different blends of H&S → soup to use in main study

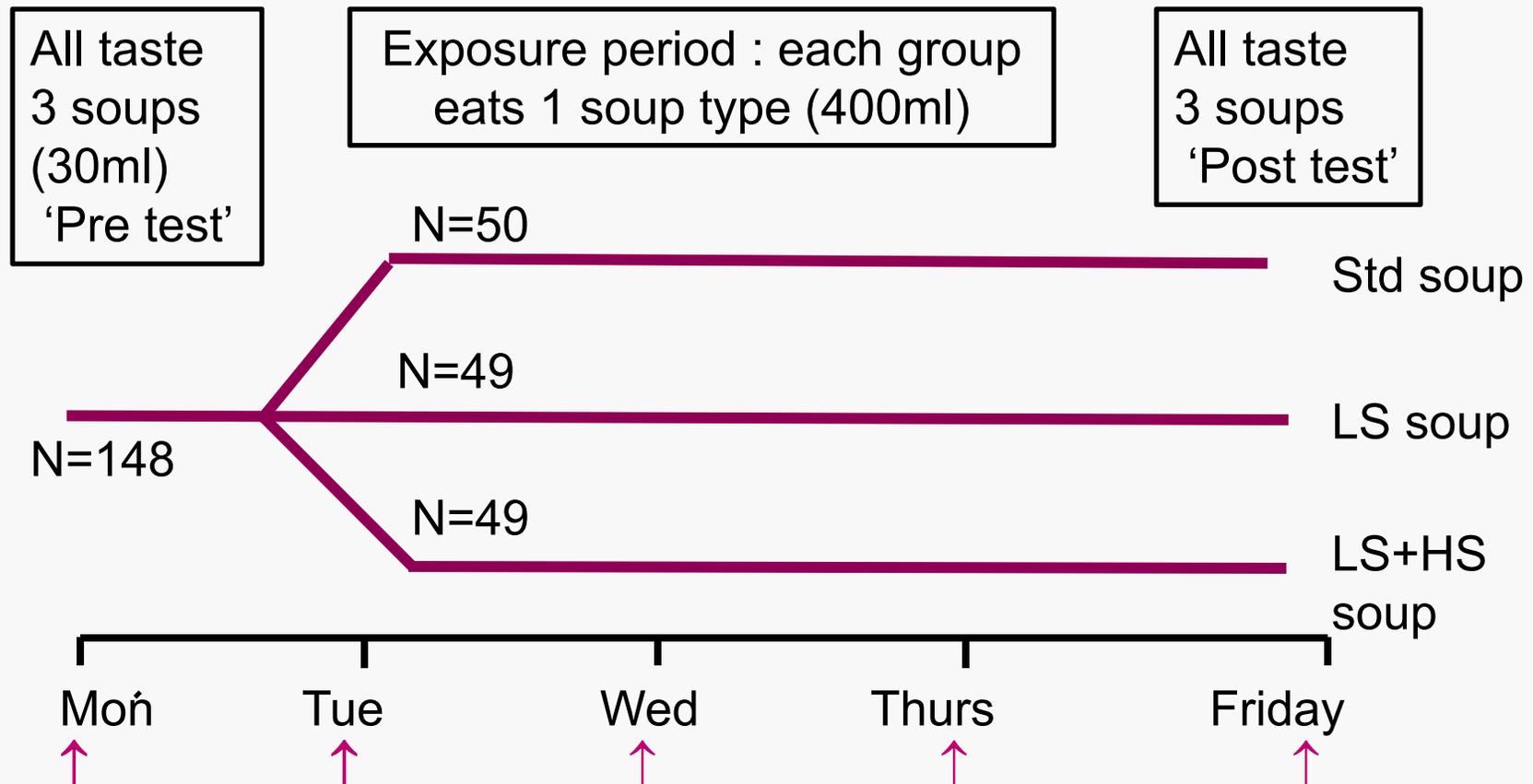
H & S modification	Overall liking
Oregano, Bay, Celery, Garlic and Black Pepper	57
Basil, Black pepper, Celery, Garlic	55
Cumin, Coriander, Celery seed, Garlic	54

No significant difference in any variant, but Oregano variant chosen on basis of cluster analysis

For main study

Std soup	= 0.57% salt
Low salt (LS)	= 0.26% (53% reduction)
LS +HS	= 0.26%

Study design



Liking assessed with VAS scales (dislike extremely to like extremely)
The exposure groups were balanced for gender, age, H&S consumption, daily salt intake and their liking cluster

H&S did not give immediate increase in liking (pre-exposure)



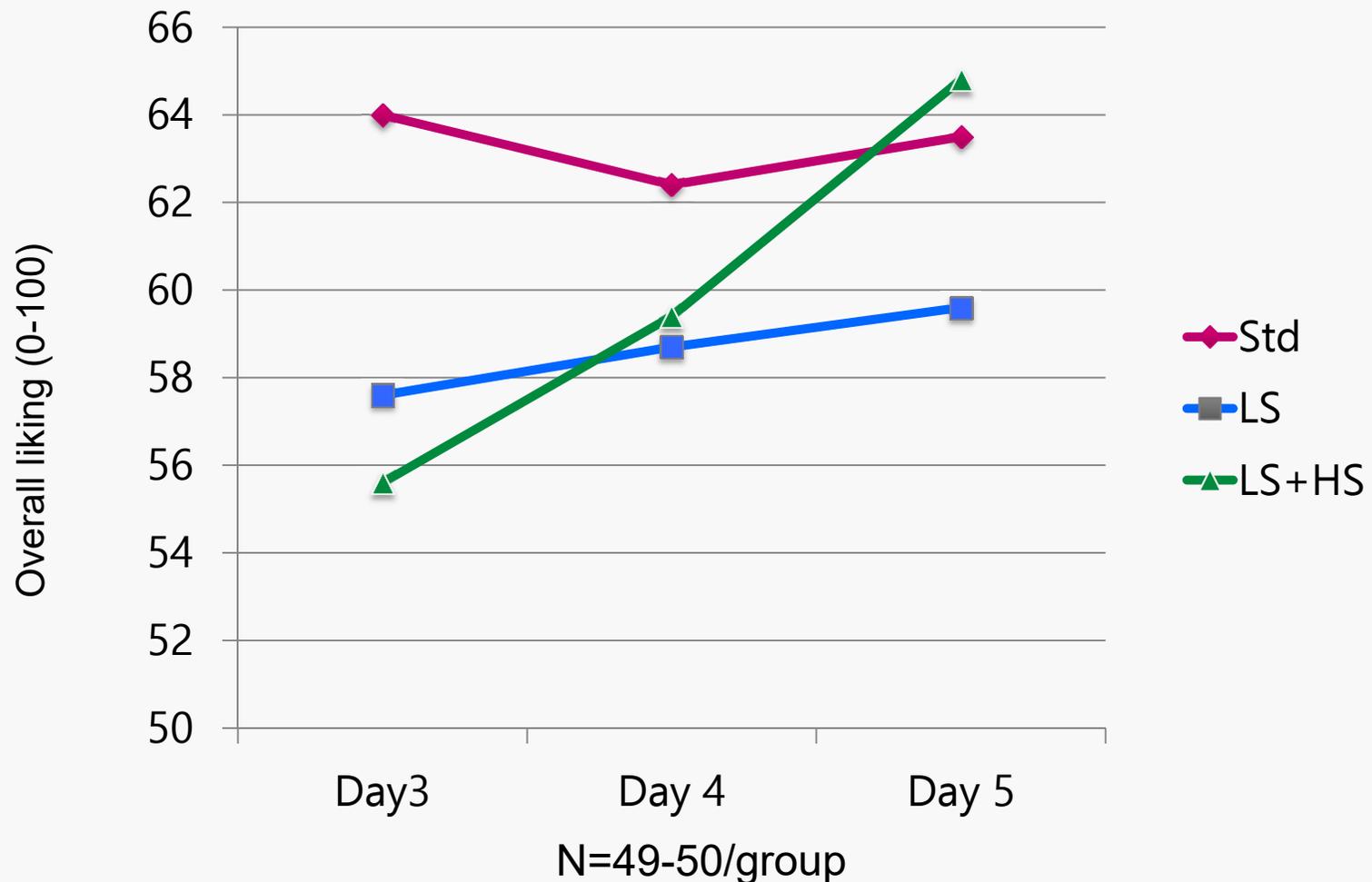
	Std	LS	LS+HS
Overall liking*	64.7 ^a ±1.9	52.5 ^b ±1.9	55.4 ^b ±1.9
Liking flavour*	63.6 ^a ±2.0	50.6 ^b ±2.0	53.6 ^b ±2.2
Flavour intensity≠	2.7 ^a ±0.1	2.3 ^b ±0.1	2.9 ^c ±0.1

Balanced monadic presentation of 30ml samples of each soup. Results are mean ± SEM (n=145). Different letter show sig diff

* VAS scale (0-100)

≠ Just about right (JAR) scale (value of 3 is ideal)

Overall liking of HS soup increased during exposure phase

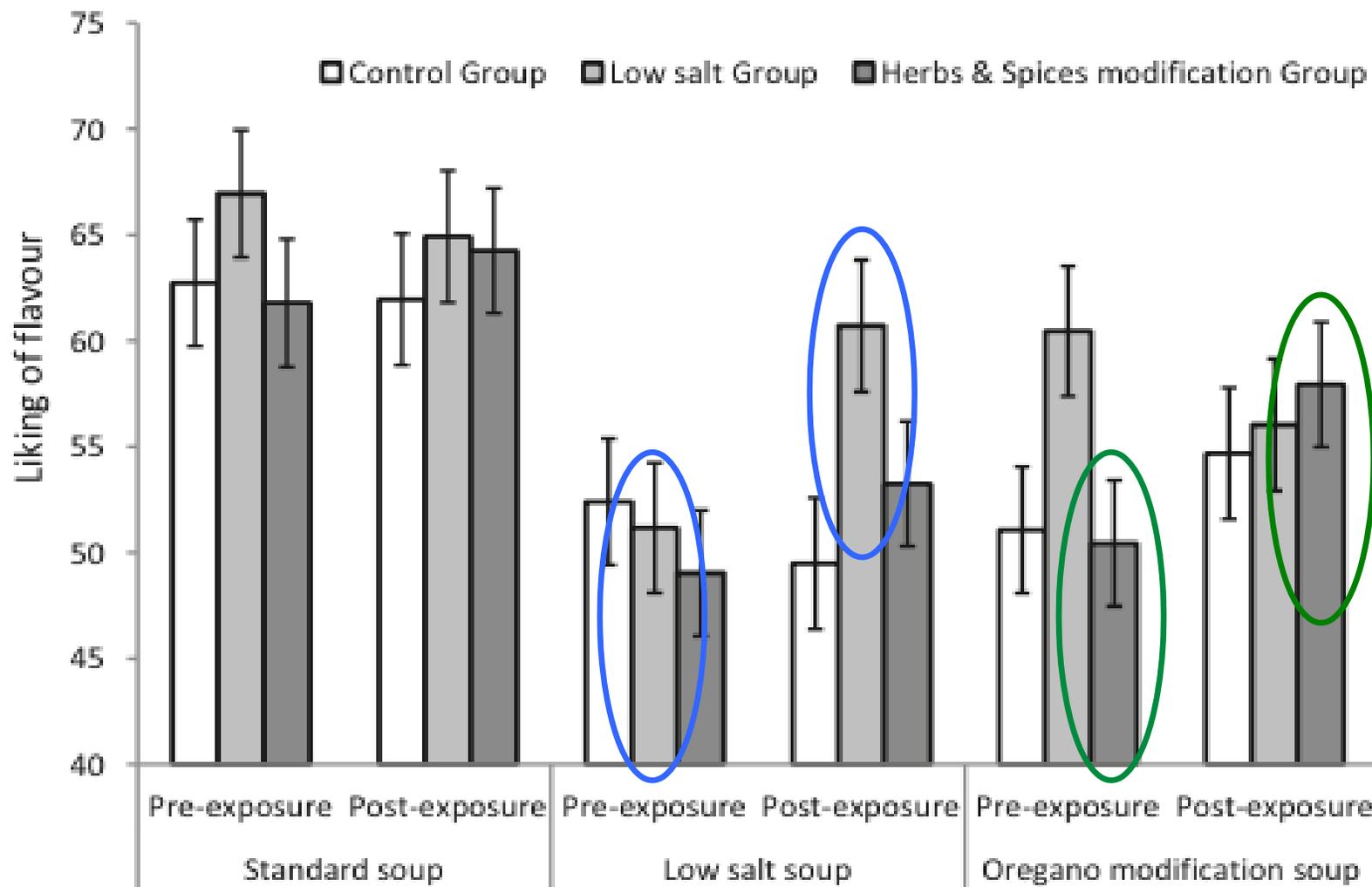


Effect of exposure to H & S soup on liking

Repeated exposure to the H&S soup led to significant linear increase in liking of

- Overall liking (+9.0 p=0.02)
- Flavour (+9.8 p=0.02),
- Texture (+10.1 p=0.01)
- Familiarity (+11.9 p=0.002)

Pre & post exposure – liking of flavour



Effect of H&S on salt perception

1. 'Post exposure' – soup assessed by all subjects (n=145) for salty taste intensity by VAS

Std soup	38.5 ^{ab} ±1.8
LS soup	33.7 ^b ±1.5
LS+HS soup	40.3 ^a ±1.7

2. Two-alternative forced choice directional comparisons in 92 subjects:

- Low salt soup sig less salty than std soup (P<0.0001)
- No sig diff in saltiness between std soup & H&S soup (P=0.23)

The H&S used in the study enhanced the perception of salty taste

Summary



- Reducing salt in tomato soup by ~50% reduced consumer acceptability
- Inclusion of H&S did not cause an immediate increase in liking
- Liking of low salt soup without H&S did not increase over repeated exposure.
- Repeated exposure to the H&S low salt soup enhanced significantly the overall liking and liking of flavour, texture and aftertaste

Conclusions



- The H&S used in the study (oregano, bay, celery, garlic, black pepper) enhanced the perception of salty taste and compensated for a 53% reduction in added salt
- Probably due to enhancement of salty taste perception by the savoury volatile aroma compounds.
- The findings suggest that the use of H&S is a useful approach to reduce salt content in foods
- Herbs and spices should be chosen carefully to complement the food as large contrasts in flavour can polarise consumer liking.

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