



IDOSUSCON: IDentifying and understanding Obstacles to SUStainable food CONsumption with meat substitutes as a case study

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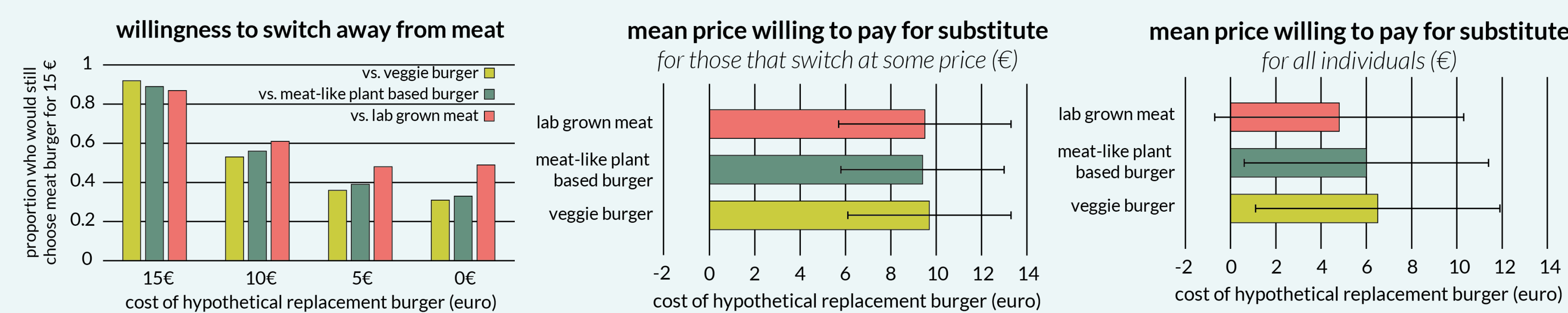
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IDOSUSCON: IDentifying and understanding Obstacles to Sustainable food CONsumption with meat substitutes as a case study

Elizabeth S. Collier^{1,2*}, Jun Niimi¹, Fredrik Carlsson³, Kathryn L. Harris¹, Anne Normann¹, Lisa-Maria Oberrauter¹, Cecilia Norman¹, Victoria Sörensen¹, Mitesh Kataria³, Elina Lampi³, Mihaela Mihnea⁴, Dominique Valentin⁵ & Penny Bergman¹

Background: The food industry is a major contributor to greenhouse gas emissions: excessive meat consumption is associated with negative health outcomes and a disproportionately high environmental impact. To achieve more **sustainable food consumption**, consumers must **reduce their meat consumption** in favour of plant-based alternatives. In recent years, the steady increase of meat consumption in Sweden has subsided but given the 50 years of unprecedented increase in meat consumption prior, this is not enough. The main objective of IDOSUSCON was to obtain knowledge on how to **increase the consumption of meat-free alternatives**, with meat substitutes as a case study. Meat substitutes represent one of several plant-based alternatives available to consumers, and the European market for these products has grown dramatically in recent years. However, their role and effectiveness in facilitating meat reduction is not yet fully understood. Using a **transdisciplinary approach** covering psychology, behavioural economics, and sensory & consumer science we present a more **holistic understanding** of the obstacles faced by consumers when confronted with reducing their meat consumption and replacing meat with products such as meat substitutes.

cognition and decision making

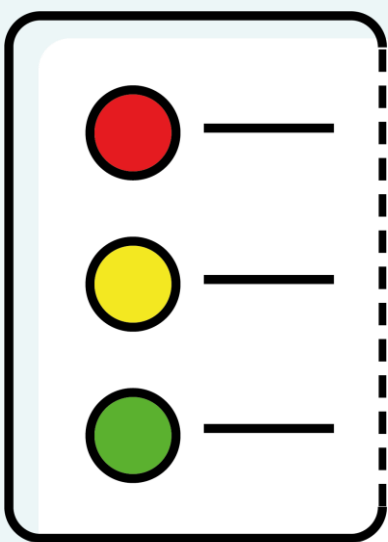


how much does it take?

Using a stated preference survey, the main barriers to and drivers of switching to the following meat substitutes were identified and quantified: a **plant-based veggie burger**, a **meat-like burger**, and a **lab burger**. Roughly a third of those who prefer meat would consider switching to a meat substitute if the price were **two-thirds or less of the price of the meat option**. However, almost half of the respondents would not choose a lab meat burger **even if it was free**. Environmental & health consciousness and being **familiar** with the substitute product were correlated with willingness to substitute.

the importance of label design

Varying information for environmental impact, health, antibiotic use, and animal welfare was presented using three different label types. For a traffic-light label type, the categories were shown as **red** (bad), **yellow** (middling) or **green** (good). **Red indicators** had the **strongest avoidance effect** when signaling high environmental impact and use of antibiotics, whilst **green indicators** were most effective to indicate **positive health information**. People responded that they were **willing to pay up to 50% extra** for products labelled as healthy, compared to the lowest health rating, around **64% extra** for products labelled as avoiding overuse of antibiotics and as good for animal welfare, but only **20% extra** for **positive climate-related labels**.



	alternative A (not labeled)	alternative B (labeled)	alternative C (labeled)
use of antibiotics	unknown	no restriction ● ○ ○	some restrictions ○ ○ ○
animal care	unknown	poor ● ○ ○	very good ○ ○ ●
climate impact	unknown	large: <4kg ● ○ ○	medium: 3-4 kg ○ ○ ○
healthiness	unknown	healthy ○ ○ ●	unhealthy ● ○ ○
price	25 SEK	30 SEK	55 SEK



Carlsson et al. (2021)

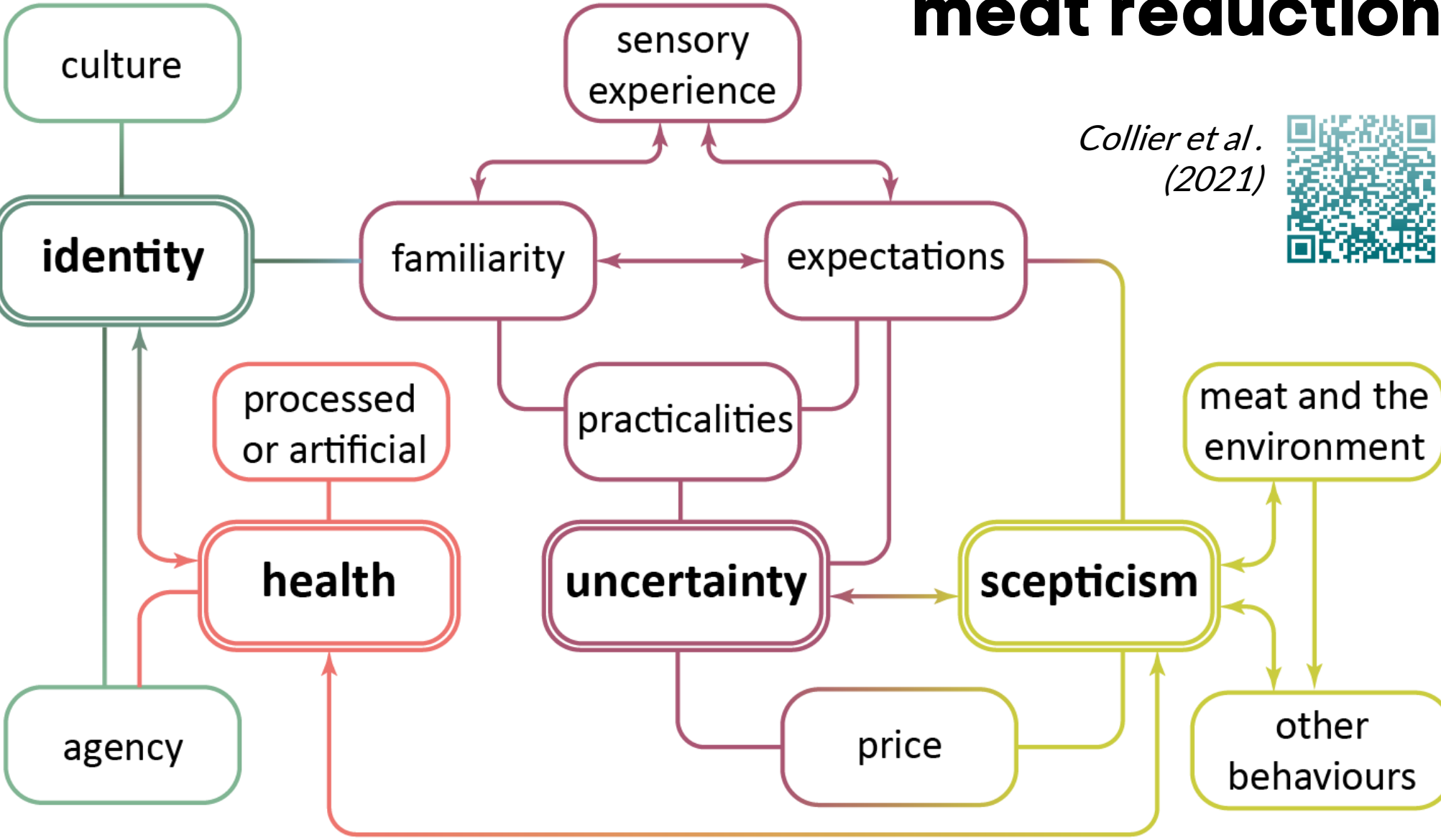


Carlsson et al. (2022a)



Carlsson et al. (2022b)

mapping drivers of and barriers to meat reduction



Uncertainty generated from lacking familiarity with a substitute product in seemed to generate **scepticism** towards that product due to not knowing how it might taste or how it had been produced. The connection between **scepticism** and **health** represents doubt that meat substitutes represent a good, healthy alternative to meat, a concern that was sometimes driven by their perception as unnatural or artificial. The participants were generally **health-conscious**, which affected their choices. However, there was disagreement on the role of meat in a healthy diet (health was both a driver of and barrier to reduction). There was a sense that food choices are related to **identity** and control over food choices was generally highly valued. Other behaviours such as limiting travel were sometimes perceived as just as impactful as reducing meat consumption.

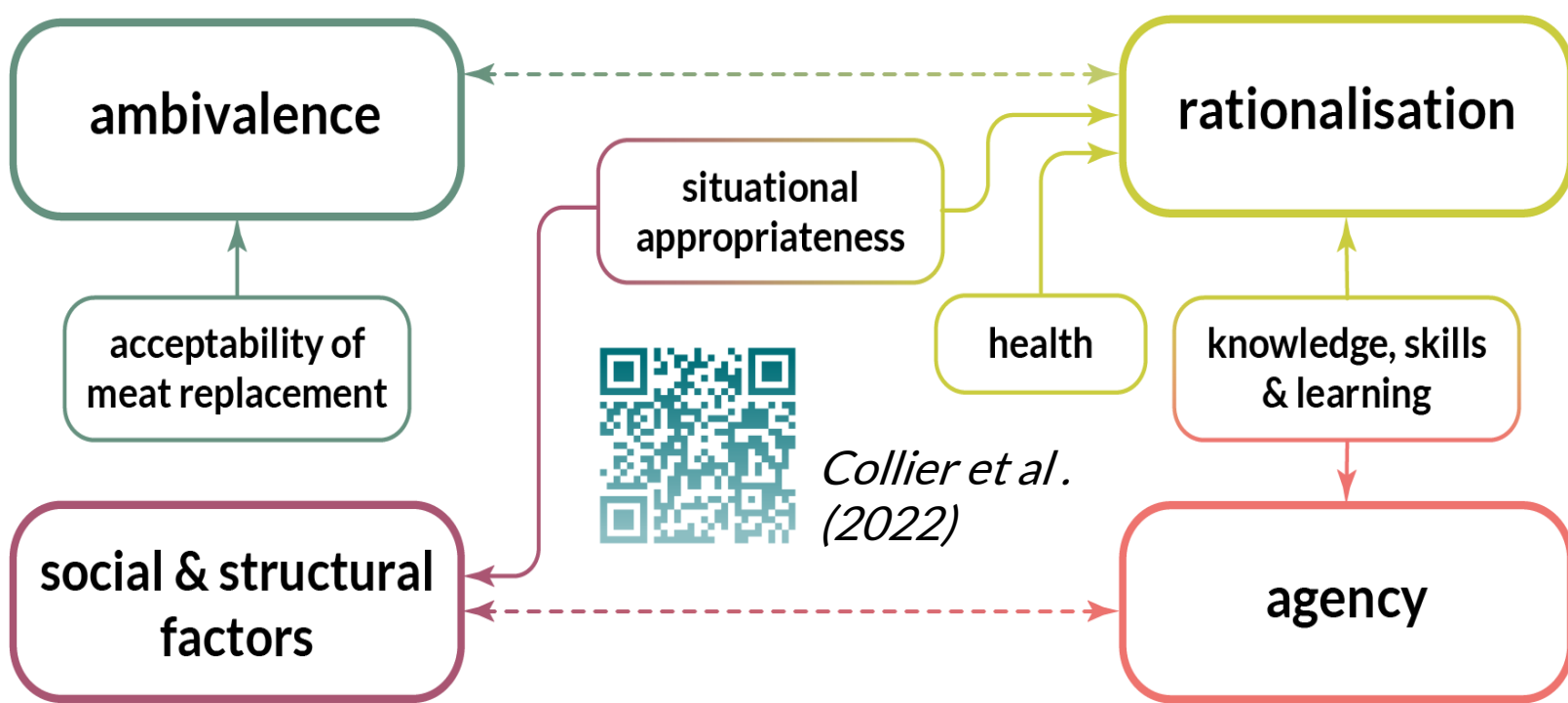
Participants (N = 33) engaged in focus group discussions around purchasing, preparing, and consuming meat and meat substitutes at a central location. The participants were pre-screened and grouped by applying a stage-of-change model which targeted their meat consumption behaviour. Four main themes, as well as several sub-themes, were identified through thematic analysis on the transcribed data: **uncertainty**, **scepticism**, **health**, and **identity**. The themes were strongly interlinked.

affective and psychological aspects

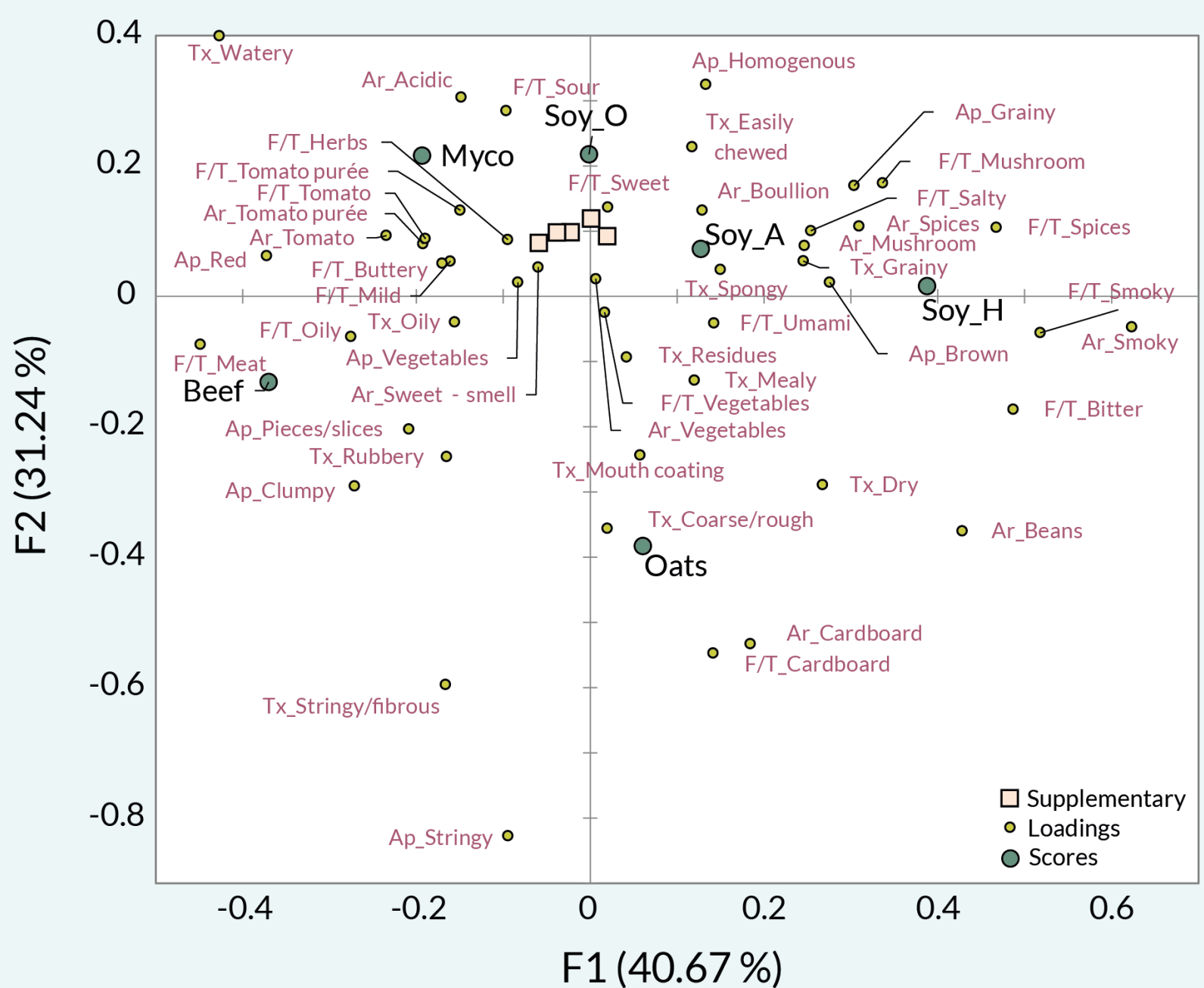
understanding why intention is insufficient – the psychology and practicality of meat substitution



Participants (N = 39) who were **interested in reducing their meat consumption** collected ingredients and were guided through meal preparation online. The meals included two novel meat substitute products. After tasting both the prepared dishes, focus group discussions on the preparation process, barriers and drivers for reducing meat consumption, and sustainability more broadly were held. Thematic analysis of the transcribed discussions revealed four main themes: **ambivalence**, **rationalisation**, **social & structural factors**, and **agency**. Small changes that go against the societal grain but that can help impart a sense of agency matter, and could even contribute to **normalizing** meat-free meals. Further, knowledge, skills and **confidence** in preparing meals without meat could help support longer-term change. Intention alone is not sufficient to overcome the meat paradox. Instead, **practical** and **social aspects** affecting behavioural control should also be accounted for.



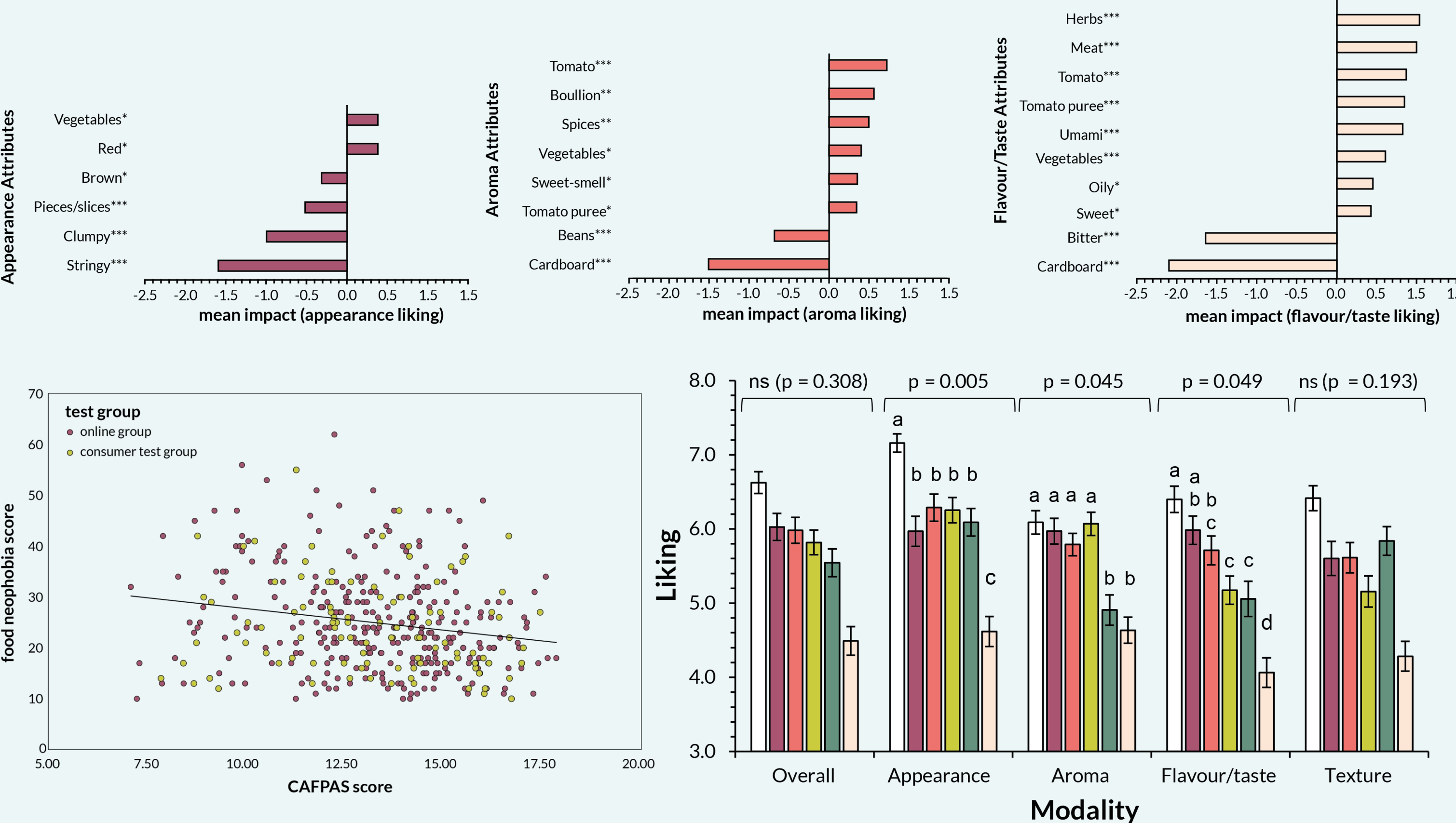
sensory factors



Significant differences in hedonic scores for appearance, aroma, and flavour/taste were detected. Bolognese prepared with some meat substitutes (in particular Soy_O) was **liked more** than that prepared with beef, and **drivers of liking** were quantified. The oat-based meat substitute was the least liked product. For the combined dataset, it was seen that cooking ability and food neophobia scores were significantly **inversely related**.

sensory appreciation of meat substitutes in a meal context

Consumers (N = 101) of varying cooking ability and food neophobia (measured using questionnaires) evaluated six mince products (one beef, & five meat substitutes – three soybean-, one mycoprotein-, and one oat-based) prepared in a Bolognese sauce. They rated liking for overall, appearance, aroma, flavour/taste and texture. The products were also profiled sensorially with CATA. An extra online sample (N = 288) completed only the cooking ability and food neophobia questionnaires.



Niimi et al. (2022)



Take home message: This synergistic project demonstrates that eating sustainably **does not necessitate compromising on taste**, that some consumer segments **may pay a premium** for climate- and health-friendly options, and that **practical skills** and a sense of **personal agency** are critical in motivating sustainable food choices. On the other hand, habit, sensory concerns and uncertainty represent major barriers, especially among some consumer groups, and there remains some degree of scepticism to the need for meat consumption reduction as well as concerns around greenwashing of products. Even consumers who wish to change their meat consumption habits can land in the **meat paradox**, experience **ambivalence**, and face **social and structural barriers** to long-term change. The importance of agency and choice, practical skills, and sensory enjoyment were recurring themes throughout the project, as well as convenience, value for money, and the desire to feel like a responsible consumer. It is **necessary moving forward to incorporate sensory experience prominently in meat substitute product design, communicate key marketing points effectively, and make meat reduction and sustainable consumption an attractive and fun prospect rather than a rote task**.

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