

Modelling the impact of social marketing campaigns to reduce meat consumption: Results from an agent-based model



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Introduction

Meat consumption needs to reduce as it is a problem for both human health and the environment. Red and processed meat is associated with increased risk of colorectal cancer and livestock production has a high environmental impact⁽¹⁾.

Studies showed that providing **norm-based messages** can be an effective approach to change consumption of foods⁽²⁾. However, little is known about the **network effects** on the effectiveness of these messages.

Aim

To investigate if norm-based messaging in the **workplace** can reduce meat consumption through networks and spill over to households via social influence.

Method

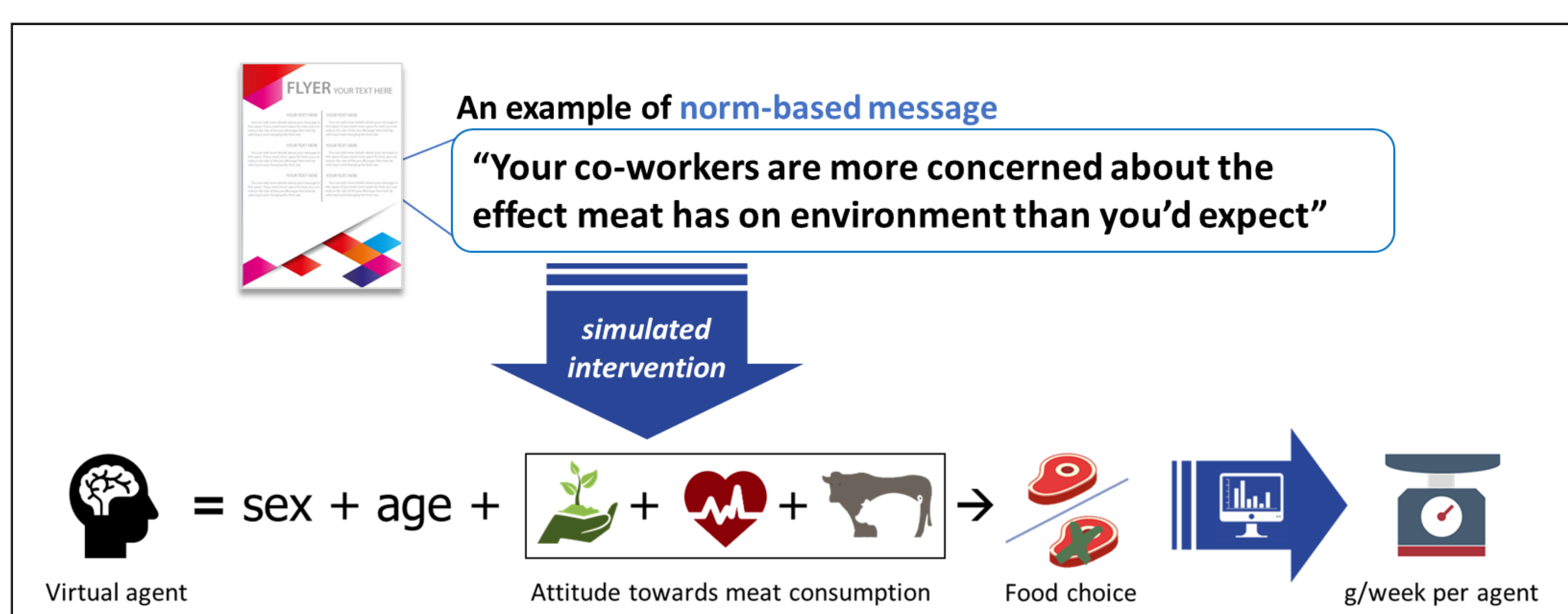
Agent-based modelling is a method for simulating behaviour using virtual agents capable of making decisions that are based on a set of 'rules' and interactions between agents⁽³⁾. Consumption patterns emerge from individuals' decisions.

An **agent-based model** was built to replicate meat consumption and the influence of others on eating behaviour.

- **Agents: consumers** with a range of socio-demographic characteristics
- **Concerns:** agent's personal views about the **impact of eating meat** on the environment, health, and animal welfare.
- **Eating networks:** **co-workers** and **household members**.
- **Intervention:** **norm-based messaging about meat**.

'Rules' for the agents

- Agents only know the concerns of other agents in their networks.
- Agents change their concerns towards agents who have greater concerns than them when an intervention is active.
- Household members have a greater influence than co-workers.



The virtual agents choose their meal depending on their individual characteristics and the influence of peers. Interventions alter their concerns. Mean weekly consumption per consumer is calculated over 100 simulations.

- **Data:** British Social Attitudes survey and National Diet and Nutrition Survey.
- **Outcome:** average weekly consumption (g/week) of meat per consumer.

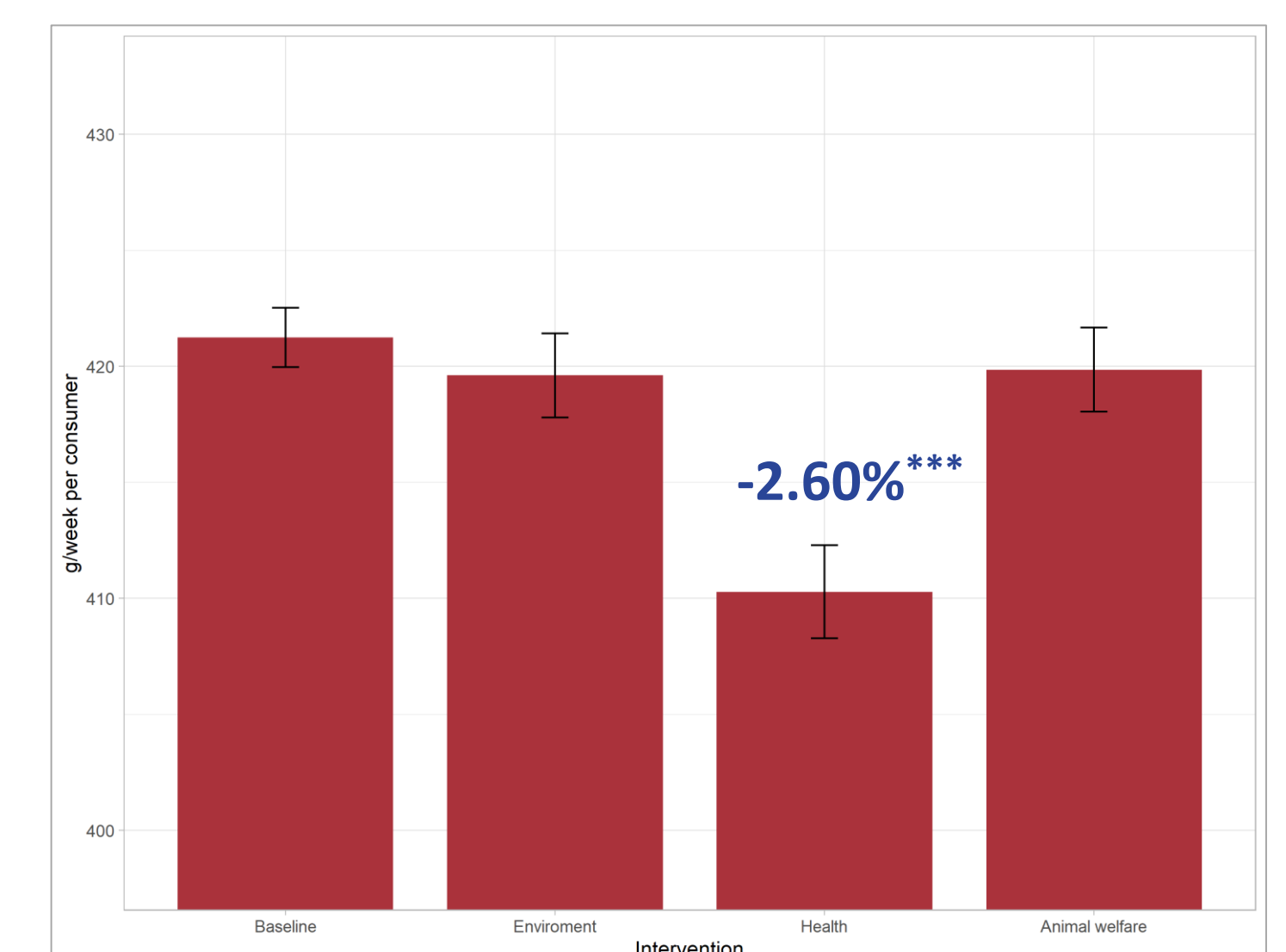
The **interventions** replicate the influence and spread of norm-based messages about the negative impacts of meat consumption on the health, environment, or animal welfare between people in the workplace (e.g. leaflets or posters).

Results

Workers and household members

The **health intervention** showed a **significant reduction** of meat consumed from the baseline (-2.60%, $p < 0.001$).

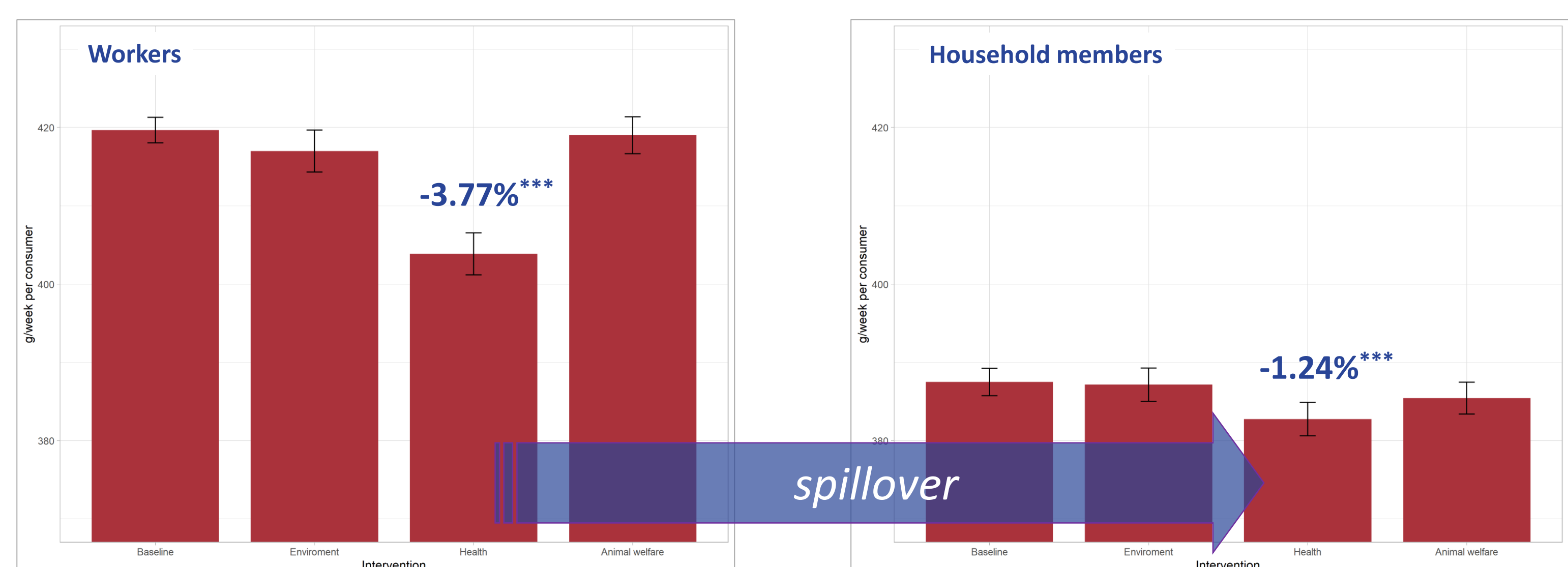
No significant differences were found for the **environmental** or the **animal welfare** intervention (-0.39%, $p = 0.151$, 0.33%, $p = 0.220$, respectively).



Mean ($\pm 95\%$ CIs) weekly meat consumption per consumer at the end of a three-year simulation.

Social spillover

The health intervention showed the **emergence of a social spillover** effect from the workplace to households.



The mean ($\pm 95\%$ CIs) weekly consumption per consumer for workers (left) and household members (right) at the end of a three-year simulation.

Conclusions

The simulation reveals the importance of **network effects** on the spread of norm-based messages. A workplace intervention aimed at reducing meat consumption influenced the behaviour of the workers and **spill over** to members of their household.

The simulation of the influence across eating networks provides an understanding for how interventions to reduce meat consumption should be **developed "in the real-world"**.

References

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