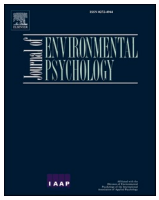
Journal of Environmental Psychology 108 (2025) 102806

Contents lists available at ScienceDirect

Journal of Environmental Psychology

journal homepage: www.sciencedirect.com/journal/journal-of-environmental-psychology



A field experiment on expert- versus social-based cues on dish selection in a restaurant

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ARTICLE INFO

Keywords:
Field experiment
Food choice
Influence
Plant-based

ABSTRACT

This field experiment explored whether and to what extent claims about expert recommendations (i.e., those of the chef) and recommendations from other restaurant guests influenced customers' food choices in a restaurant. The menu in the study consisted entirely of vegetarian dishes, two of which were selected to be emphasised either as "Chef's choice" or as "Guests' choice" on the menu, thereby providing expert-based and social-based cues suggesting one of the dishes at different study time points. The selected dishes were a vegetarian version of a conventional Swedish meat dish (a plant-based patty) and a nonconventional dish (lentils with "zero-waste" pesto). Over four weeks, the restaurant's sales data were collected, and customers were invited to participate in a voluntary survey. This survey gathered information regarding sociodemographic characteristics and more details about the dish selection, including subjective ratings of dish liking and overall meal satisfaction. A total of 1540 dishes were sold, and 524 customers participated in the survey. The plant-based patty was the most popular choice across all weeks, and the "Chef's choice" had no additive effect, suggesting its high stability in popularity. Labelling a less popular dish (lentils with "zero-waste" pesto) with "Chef's choice" had a positive impact on its selection, while labelling it with "Guests' choice" made no difference. These results suggest that in the absence of meat options, some customers appear to transfer the concept of a meat-centric dish to a similar vegetarian dish (in this case, a plant-based patty), whereas a less popular dish with no resemblance to a conventional meat dish can become more popular when recommended by a presumable expert on the matter. However, further research is necessary to ascertain the efficacy of this effect in diverse restaurant contexts, based on designs with better possibilities to establish causality.

1. Introduction

Efforts to transform how people eat, in order to improve public health and reduce environmental degradation, exist in different sectors of society and involve a range of behavioural-change tools. A common strategy is to disseminate information through campaigns, advertising, and educational programmes. However, the effects of these approaches on behaviours and behavioural change seem to be limited both for food consumption and other behaviours of relevance for health and environmental impact (Baptista et al., 2025; Chater & Loewenstein, 2023; Chen & Antonelli, 2020; Marteau, 2017; Marteau et al., 2012; Nestle et al., 2009). As a consequence, researchers have explored various other interventions to influence food choice in real-life settings, often outside of home (Cadario & Chandon, 2020; Greene et al., 2023).

With the rise in household expenditures on activities outside of the home, including dining at restaurants (European Commission: Eurostat, 2023), and the continuous growth in the global food service industry (Statista, 2023), the restaurant business has an important role to play in influencing food habits, and thus contributing to a sustainable food system. Every day, restaurants feed billions of people, and thereby act as a gatekeeper of what food is eaten by a large part of the population. With that, they also have the potential to be frontrunners of gastronomic innovation. However, to date only a limited number of studies on environmentally sustainable food choices have examined actual consumer behaviour in non-artificial restaurant settings (Greene et al., 2023). Some exceptions come from studies carried out in universities or

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https://doi.org/10.1016/j.jenvp.2025.102806
Received 30 January 2025; Received in revised form 22 September 2025; Accepted 10 October 2025
Available online 18 October 2025

workplace cafeterias, providing important pieces of information about what influences the food choices of certain parts of the population. Nevertheless, studies of broader and more varied groups of people are rare.

Feeding into this gap, the present article focuses on drivers of food choices among customers of full-service restaurants. Specifically, it investigates and compares whether and to what extent different claims presented on a restaurant menu can make people choose one dish over another in a real-life setting. In doing so, the focus is on two types of influences that have been widely studied but have shown inconclusive and at times contradictory results: expert-based cues (i.e. "chef's recommendations") and social cues based on other guests' preferences. This would provide insight into the manner in which physical and social environments shape human behaviour, including decisions made in everyday contexts such as dining out.

1.1. Strategies to influence people's choices

A large array of studies has highlighted the influence of other people and social norms on individual choices, as people perceive and use information from what others do (and what they do not do) to help their decision-making processes (Burchell et al., 2013; Cialdini & Goldstein, 2004; Rivis & Sheeran, 2003). The influence of social norms has been examined in a wide variety of contexts, including the (re)use of hotel towels (Goldstein et al., 2008), music downloads (Salganik et al., 2006), energy consumption (Harries et al., 2013), and food waste recycling (Nomura et al., 2011). Within restaurant settings, Cai et al. (2009) found that providing information about popular dishes, including popularity rankings, to full-service restaurant customers in China could lead to an increased demand for the most popular suggested dishes. However, a recent meta-analysis on environmentally friendly food choices indicated that norm-based interventions have a relatively limited effect on real-life food habits (Greene et al., 2023). For example, normative information ("many people here choose 'green' options") did not increase the total sales of vegetarian foods at Swedish fast-food restaurants (Reinholdsson et al., 2023). Similarly, a four-month randomised controlled trial found no effect of repeated social influences on the share of animal or plant foods consumed (Zorell et al., 2024).

At the same time, the role of chefs has evolved in recent years beyond that of a mere food preparer. People are ever more seeking out expert advice, especially regarding the question of what to choose for environmental and health reasons. In this context, the public influence of chefs as gastronomic experts has steadily grown (Fusté-Forné, 2020; Leer, 2016, 2019; Lewis & Huber, 2015; McBride & Flore, 2019; Neuman, 2018). Chefs have become human brands with the potential to influence people's food choices as well as what food is produced and offered (Rodrigues et al., 2023). This is visible, among other things, in the great variety of food products in supermarkets that are marketed with the names of famous chefs (Fusté-Forné, 2020).

In this vein, the utilisation of "chef's recommendations" has been identified as one of the five best strategies to promote sustainable choices (better for health and the environment) within the food service sector (Gössling & Hall, 2021; Lachat et al., 2011). A couple of studies have examined the use of a (chef's) recommendation label to highlight a food option in menus, but the results are somewhat inconsistent. For instance, a survey study by Bacon and Krpan (2018) found that labelling a dish as a chef's recommendation increased the likelihood of selecting a vegetarian dish among individuals who consumed vegetarian foods infrequently. However, the treatment was not solely the recommendation; the dish was also emphasised by surrounding the text with a "box" (a square of bold text), which raises the question of whether the effect came from the recommendation itself or from the text layout.

Another survey found a recommendation effect when the sign was placed on the popular dish, and this dish was less expensive than the alternative dish (Catarci et al., 2024). Nevertheless, the interaction between popularity and recommendation was found to be limited. Bookwala and colleagues examined the impact of expert-based recommendations (i.e., those of the baker) and popularity-based recommendations (i.e. the most popular choice among customers) on cupcake selection at food festivals (Bookwala et al., 2022). In their study, the popularity-based recommendations increased the selection rate of recommended cupcakes in comparison to the no-recommendation condition. However, it should be noted that in this study, participants received their selected cupcakes free of charge, which may have had a distorting effect on the study's results.

1.2. The restaurant menu as a tool for influencing consumer choice

Modifying menus in different ways has been explored as a promising approach to influence customers' food choices in restaurant contexts. Menus are instrumental in facilitating communication between restaurants and their customers. They provide information not only about dish names and prices, but also the details of ingredients and other aspects such as health and environmental sustainability (Behnke et al., 2024; Lo et al., 2017; McCall & Lynn, 2008). Menus have also been utilised in many empirical studies as a means for experimental interventions (Auchincloss et al., 2013; Gravert & Kurz, 2021; Perez-Cueto, 2021; Reinders et al., 2024; Rummo et al., 2023). Still, great uncertainties remain about which menu design approaches are the most effective; moreover, this is likely to differ depending on the food served, the profile of a given restaurant, and the composition of its customer base. Tying in with this literature, the present study made small modifications to the menu on a weekly basis, emphasising a dish as either a chef's choice or guests' choice. By switching these labels and which dish was highlighted, it became possible to experimentally examine the presence and comparative sizes of effects.

1.3. Research questions

It is still unclear whether social-based and/or expert cues can make people choose certain foods over others in restaurant settings. Likewise, there is only limited understanding of whether one or the other kind of influence may have a stronger or weaker effect (if any). To this end, the present study involved a four-week field experiment at a restaurant known for its pro-environmental menus in Stockholm, Sweden. Two main questions drove the design of the study: 1) What is more influential in making people choose a given dish – a "chef's choice" (expert cue) or the "guests' choice" (social cue)? and 2) Are the effects of these two cues the same for different types of dishes, especially if one resembles a conventional meat dish or one that does not?

The results contribute to the literature on how food choices in restaurants can be influenced in relatively simple, non-intrusive, and cheap ways. They also increase our understanding of how the restaurant and food service industry can more actively and effectively influence food consumption in out-of-home settings. Lastly, while the study is limited to vegetarian dishes, we still engage in the question of animal- and plant-food consumption in our comparison of a dish based on a "meat-centric" culinary logic to one without it.

2. Method

2.1. Study setting

The study was conducted during the lunch service at a contemporary casual dining restaurant located inside a museum in Stockholm, Sweden. The restaurant is known for its "conscious kitchen" and has been

described as Sweden's best and most environmentally sustainable restaurant.[1] It offers a sit-down table service with an upscale theme, using seasonal ingredients sourced from local farmers, while maintaining moderate prices for an inner-city Stockholm restaurant; at the time of the study in May 2024, lunch prices ranged between 145 and 185 Swedish kronor, or approximately 12.5–16 Euro. The typical customers are visitors to the museum (an entrance ticket to the museum is required to dine at the restaurant) and personnel from neighbouring offices and the museum, who have free access to the restaurant. Lunch is served Monday to Friday from 11 a.m. to 3 p.m., and the menu typically consists of two main dishes, a soup, a salad, sides, desserts, and beverages. The dishes usually change every three to four days, in accordance with seasonality and availability of produce.

For the present study, all dishes on the menu were vegetarian and were collaboratively designed by the restaurant chef and the research team[2] (Figure A1). One of the two main dishes was pannbiff, a dish that is deeply established in Swedish food culture. Pannbiff is normally based on beef mixed with pork; however, the version that was served during the study was made with mushrooms and a pea-based meat alternative (hereafter referred to as the *plant-based patty*). The second main dish was lentils with a "zero-waste" pesto; that is, a pesto made with vegetable scraps from other preparations (hereafter referred to as *lentils*). The soup option was a potato and ramson soup, while the salad option was a salad composed of different salad greens cultivated in the restaurant's cellar and served with potato, baked beetroot, and Dijon mayonnaise. The prices (approximated in Euros) for the plant-based patty, lentils, soup, and salad were 185 kronor (16 Euro), 175 kronor (15 Euro), 145 kronor (12.5 Euro), and 175 kronor (15 Euro), respectively. Dishes were presented on the menu card in the following order from top to bottom: the plant-based patty, the lentils, the soup, and the salad. The same dishes were served throughout the study period, and the listing order of dishes on the menu card remained unchanged.

2.2. Study design

Given the nature of the study being a field study, it was difficult to specifically determine the sample size *a priori*, as customers' visits to the restaurant were at their own will. The duration of each study condition was predetermined to be one week in order to ensure the collection of a sufficient sample size, which was based on similar previous studies (Bookwala et al., 2022; Reinders et al., 2024) and the observation made by the restaurant's staff that the average daily sales at the restaurant were around 70. Moreover, a sensitivity power analysis was performed using G*Power version 3.1 (Faul et al., 2007) to determine the minimum effect size based on our final sample size (n = 1540). The result of this calculation reveals that the study is powered to detect small effects, with a power of 80 % and an alpha level of 0.05.

In May 2024, walk-in restaurant customers were exposed to one of four conditions depending on the week they visited (Table 1 and Figure A2). The first week was a control condition in which all dishes were presented with their original names and without any cues on the menu (week 1). This was followed by two weeks of expert cue condition, in which each of the main dishes in turn was highlighted as the "Chef's choice": the plant-based patty in week 2, and the lentil dish in week 3. Finally, in a social cue condition, the lentil dish was highlighted as the "Guests' choice" (week 4). The originally planned study design focused solely on the impact of cues on the plant-based patty. However, the plant-based patty was sold in greater quantities than the other menu items regardless of the presence or absence of the cue. As a result, the design was modified midway through the second week of the study to include the less popular dish, the lentils, as a new target dish for the expert cue in week 3 and for the social cue in week 4.

Table 1
Design of the experiment. The treatment condition for each respective week is highlighted in bold text.

Control (week 1, $n = 504$)	Expert cue (week 2, $n = 311$)	Expert cue (week 3, $n = 399$)	Social cue (week 4, $n = 326$)
Plant-based patty	**Plant-based patty**	Plant-based patty	Plant-based patty
Lentils	Lentils	**Lentils**	**Lentils**
Soup	Soup	Soup	Soup
Salad	Salad	Salad	Salad

Note: The sequence of dishes presented in each row is consistent with the actual sequence presented on the menu. The dishes that were highlighted as either "chef's choice" or "guests' choice" based on each experimental week are marked in **bold**.

The restaurant's sales data were collected for the main analysis of the experimental treatments. In order to gain further insight into the background and subjective experiences of the customers, those who dined during the experiment period were invited to complete a survey (details below). The study was conducted in accordance with the Declaration of Helsinki (2013) and assessed for compliance with national research requirements in an internal process at the School of Hospitality, Culinary Arts and Meal Science, Örebro University, Sweden. The study was approved on April 3rd, 2024. All data were collected and handled in accordance with the European Union General Data Protection Regulation (GDPR) (2016/679).

2.2.1. Survey

To distribute the survey, an advertisement note was printed on paper and placed on each table, including the information that individuals 16 years or older could participate, and that participants would receive a free cup of coffee or tea. The printout had a QR code for the participants to access the questionnaire via their own mobile phone devices. All participants who answered the survey provided their informed consent. Their participation was completely anonymous. Participants were asked about age (numeric open answer), gender (female, male, other, prefer not to say), country of origin (Sweden, other Nordic country, other European country, or non-European country), educational level (uncompleted compulsory school, primary school, secondary education, post-secondary education, college or university, postgraduate education), employment status (employed, unemployed, student, retired, leave (e.g. parental), or prefer not to say), employment condition (full-time, part-time, self-employed), dietary orientation (omnivore, flexitarian, pescatarian, vegetarian, vegan, or other), meal companion (solo, friend, partner, family, colleague, or other), whether they had previously visited the restaurant (yes, no), whether they had participated in the study before (yes, no), and whether they had a museum membership (yes, no).

Hedonic values of the dish were measured in terms of overall liking, appearance, aroma, taste, and texture, using a 5-point ordinal scale (1 = extremely dislike, 3 = neither like nor dislike, and 5 = extremely like). Meal experience was assessed through participants' satisfaction with their choice of dish, the perceived pleasantness of the dining experience, and their intention to return to the restaurant, again using a 5-point ordinal scale but with different response alternatives (1 = strongly disagree, 3 = neither agree nor disagree, and 5 = strongly agree).

[1] The restaurant is located within the premises of a photography museum. In 2021, it was awarded a Green Star by the Michelin Guide and was recognised as Sweden's best and most sustainable restaurant by 360° Eat Guide. For more information, see https://www.fotografiska.com/sto/en/mat-dryck.

[2] The study exclusively considered vegetarian menu options in order to rule out the possibility that dietary orientation would guide the choice rather than the cue (such as a meat eater wanting to eat meat and a vegetarian ruling out the meat dish by default). In addition, the main dishes were designed with two distinct approaches. The first was a conventional dish that was usually meat-based but here used a plant-based meat alternative, while the second employed seasonal ingredients and a more creative approach to cuisine.

2.3. Data analysis

The primary objective was to ascertain whether each of the conditions (expert and social cues) systematically influenced the customers' choice of dish. To this end, the weekly sales data was analysed using chi-square tests. To identify which weeks exhibited statistical differences, the Marascuillo procedure was applied as *post-hoc* analysis. Furthermore, Cramer's V effect sizes were calculated, and the interpretation of observed effects was as follows: small (0.06), medium (0.17), and large (0.29) (Kim, 2017). In addition, a transition in the weather patterns was observed during the data collection process. The daily temperatures were collected,[3] and the average temperature per week was as follows: 11 °C for week 1, 22 °C for week 2, 20.2 °C for week 3, and 24.4 °C for week 4. The relationship between temperature and the sales proportion was analysed using a centred log-ratio (CLR) transformation followed by linear regression. Given that daily sales proportions for four dish categories are compositional data, it was first transformed using the CLR method, which enables the valid application of standard statistical analysis (Aitchison, 1982). After the transformation, separate linear regression models were fitted for each CLR-transformed component, with daily temperature serving as the predictor.

A subset of the sales data was complemented with additional data from the customers who voluntarily participated in the survey. Of the 1540 customers who visited the restaurant during the four-week experiment period, 532 completed the survey. Eight respondents were excluded from the analysis: one participant was excluded due to an erroneous entry of age, and seven were excluded because they reported participating in the survey previously (six of these seven selected the same dish they had previously chosen, while one made a different choice). The final sample size was therefore 524.

The average weekly response rate to the survey was 34 %. The data obtained from the survey indicated that the proportion of dishes ordered by customers who completed the survey was comparable to the general pattern from the complete sales data. This suggests that the sample size from the survey was nearly representative of the true values in the customer population, and that the requisite sample size for logistic regression was met (Bujang et al., 2018). Consequently, logistic regression was utilised to ascertain whether there were any independent variables (e.g. age, gender, dietary orientation, education, employment status, geographical origin of the participant, etc.) associated with the customers' selections of dishes. To ensure the validity of logistic regression results, the minimum number of ten events per variable was followed (Peduzzi et al., 1996). With regard to gender, six participants reported "other" or "prefer not to say"; due to the low number, these participants were excluded from the gender-based analyses, therefore, the sample size used in logistic regression was 518. Some independent variables that were not normally or evenly distributed and were thus aggregated as follows: education level as university degree or above versus all other levels, employment status as employed versus all other statuses, and dietary orientation as omnivore versus all other dietary orientations.

The primary objective of the survey data was to identify the factors associated with dish choices, in particular for the two main target dishes among the four dish choices (plant-based patty and lentils, analysed separately). Although binomial models do not fully account for the interdependence among the four dish options, this approach allowed a more targeted and interpretable assessment of factors for each dish of interest. We considered this a reasonable simplification given our particular research question, acknowledging that this approach may sacrifice some explanatory power relative to the multinomial model but offers clearer insight into the factors of a single dish choice. During the analysis, we observed a potential confounding effect between the experimental conditions (weeks) and ambient temperature (Table A2). When temperature was included as a continuous covariate, the estimated effects of the experimental conditions were attenuated, and the resulting wide confidence intervals — particularly for salad, which exhibited a positive linear association with temperature — suggested increasing uncertainty and reducing statistical power to detect independent effects. To mitigate this collinearity and improve the interpretability of the results, we excluded temperature from the final models that focused on the two target dishes.

The analysis of hedonics and meal experience data was performed using the Kruskal-Wallis test with the Dunn-Bonferroni *post-hoc* test and a Bonferroni corrected significance level of $p < 0.05$, given that the Shapiro-Wilk test indicated non-normality in the data. Additionally, Cohen's *d* effect sizes were calculated (Lenhard & Lenhard, 2022). The established criteria for interpreting Cohen's *d* define the magnitude of observed effects as follows: no effect (0–0.1), small effect (0.2–0.4), moderate effect (0.5–0.7), and large effect (≥0.8).

The linear regression and logistic regression were analysed with version 4.3.0 of R (RStudio Inc., Boston, MA, USA), while all other statistical analyses were performed using version 2022.2.1 of XLSTAT (Addinsoft, New York, NY, USA). The level of significance was set at $p < 0.05$ for all statistical tests.

3. Results

3.1. Experimental effect on target dish — complete sales data

A total of 1540 dishes were sold during the study period (Fig. 1). Overall, the plant-based patty was the most sold dish, accounting for 42 % (214/504), 41 % (128/311), 36 % (143/399), and 37 % (119/326) of the sales over the four weeks, respectively, with no statistically significant difference between weeks ($x^2 = 5.63$, $df = 3$, $p = 0.13$) with small effect size (Cramer's V = 0.06). Lentils were the second most sold dish except for week 1, accounting for 19 % (98/504), 24 % (74/311), 28 % (110/399), and 25 % (80/326) of the sales in the four weeks. The proportion of the sales of lentils increased significantly during the study period ($x^2 = 8.50$, $df = 3$, $p = 0.037$) with small effect size (Cramer's V = 0.09). Particularly, the Post-hoc Marascuillo test showed a significant difference between the control (week 1) and the chef's choice condition (week 3). Although soup and salad were not the targets of the present study, a significant decrease in the proportion of soup sales was observed ($x^2 = 20.05$, $df = 3$, $p = 0.000$) with small effect size (Cramer's V = 0.15), especially between the week 1 (25 %; 127/504) and week 2 (13 %; 40/311). Conversely, a significant increase in salad sales was observed ($x^2 = 14.87$, $df = 3$, $p = 0.002$) with small effect size (Cramer's V = 0.13), particularly between the week 1 (19 %; 65/504) and weeks 2 (24 %; 69/311) and 4 (25 % 69/326). Furthermore, only salad sales showed a statistically significant positive relationship with temperature ($\beta = 0.03$, $p = 0.011$), with R^2 of 0.31 (Table A1).

3.2. Customer characteristics and choice of dish — survey data

Table 2 presents the sociodemographic characteristics of survey respondents based on their dish choices. Slightly more than half were visiting the restaurant for the first time, and about half were of Swedish origin. The majority had at least a university degree or above (81.7 %), and slightly above 60 % were women. Hence, a general pattern of the respondents is that they were diverse from nationality and gender perspectives but skewed in terms of education. There was also a broad representation of dietary orientations, with the majority being omnivores (62.6 %) followed by flexitarians (24.4 %), and the remaining orientations making up a clear minority. Overall, the dish popularity of the survey sample was largely aligned with the complete sales data, with the plant-based patty as the most common selection (42.8 %), followed by lentils (23.1 %).

[3] The highest temperature recorded for the day was obtained from the following source: https://www.accuweather.com/en/se/stockholm/314929/may-weather/314929?year=2024.

Table 2
Characteristics of the customers who answered the survey, divided by their choice of dish ($n = 524$).

	Plant-based patty	Lentils	Soup	Salad	Total
N (%)	224 (42.8 %)	121 (23.1 %)	94 (17.9 %)	85 (16.2 %)	524 (100 %)
Condition					
Control	82 (36.6 %)	25 (20.7 %)	32 (34.0 %)	17 (20.0 %)	156 (29.8 %)
Chef's choice: plant-based patty	31 (13.8 %)	14 (11.6 %)	13 (13.8 %)	17 (20.0 %)	75 (14.3 %)
Chef's choice: lentils	55 (24.6 %)	46 (38.0 %)	26 (27.7 %)	22 (25.9 %)	149 (28.4 %)
Guests' choice: lentils	56 (25.0 %)	36 (29.7 %)	23 (24.5 %)	29 (34.1 %)	144 (27.5 %)
Gender					
Female	114 (50.9 %)	94 (77.7 %)	71 (75.5 %)	55 (64.7 %)	334 (63.7 %)
Male	107 (47.8 %)	25 (20.7 %)	23 (24.5 %)	29 (34.1 %)	184 (35.1 %)
Other	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	1 (1.2 %)	1 (0.2 %)
Prefer not to say	3 (1.3 %)	2 (1.6 %)	0 (0.0 %)	0 (0.0 %)	5 (1.0 %)
Age, mean (SD)	47.9 (16.5)	48.2 (15.1)	49.5 (17.9)	50.9 (15.2)	48.8 (16.3)
Dietary orientation					
Omnivore	149 (66.5 %)	73 (60.3 %)	58 (61.7 %)	48 (56.5 %)	328 (62.6 %)
Flexitarian	51 (22.8 %)	34 (28.1 %)	23 (24.5 %)	20 (23.5 %)	128 (24.4 %)
Pescatarian	11 (4.9 %)	5 (4.1 %)	6 (6.4 %)	6 (7.0 %)	28 (5.3 %)
Vegetarian	6 (2.7 %)	9 (6.6 %)	4 (4.3 %)	8 (9.4 %)	26 (5.0 %)
Vegan	1 (0.4 %)	0 (0.0 %)	1 (1.0 %)	1 (1.2 %)	3 (0.6 %)
Other	6 (2.7 %)	1 (0.8 %)	2 (2.1 %)	2 (2.4 %)	11 (2.1 %)
Country of origin					
Sweden	124 (55.3 %)	56 (46.3 %)	52 (55.3 %)	25 (29.4 %)	257 (49.1 %)
Other Nordic countries	17 (7.6 %)	11 (9.1 %)	7 (7.5 %)	8 (9.4 %)	43 (8.2 %)
Other European countries	51 (22.8 %)	36 (29.7 %)	19 (20.2 %)	36 (42.4 %)	142 (27.1 %)
Other countries	32 (14.3 %)	18 (14.9 %)	16 (17.0 %)	16 (18.8 %)	82 (15.6 %)
Education					
Less than primary education	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	1 (1.2 %)	1 (0.2 %)
Primary education	2 (0.9 %)	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	2 (0.4 %)
Secondary education	21 (9.4 %)	2 (1.7 %)	14 (14.9 %)	5 (5.9 %)	42 (8.0 %)
Post-secondary education	26 (11.6 %)	7 (5.8 %)	9 (9.6 %)	9 (10.6 %)	51 (9.7 %)
College/university education	136 (60.7 %)	84 (69.4 %)	53 (56.4 %)	45 (52.9 %)	318 (60.7 %)
Postgraduate education	39 (17.4 %)	28 (23.1 %)	18 (19.1 %)	25 (29.4 %)	110 (21.0 %)
Employment status					
Employed	155 (69.2 %)	86 (71.1 %)	65 (69.1 %)	60 (70.6 %)	366 (69.9 %)
Leave (sick, parental, etc.)	1 (0.5 %)	1 (0.8 %)	0 (0.0 %)	0 (0.0 %)	2 (0.4 %)
Retired	52 (23.2 %)	22 (18.2 %)	24 (25.5 %)	18 (21.2 %)	116 (22.1 %)
Student	11 (4.9 %)	5 (4.1 %)	4 (4.3 %)	5 (5.9 %)	25 (4.8 %)
Unemployed	3 (1.3 %)	4 (3.3 %)	0 (0.0 %)	0 (0.0 %)	7 (1.3 %)
Prefer not to say	2 (0.9 %)	3 (2.5 %)	1 (1.1 %)	2 (2.3 %)	8 (1.5 %)
Had visited the restaurant before					
Yes	119 (48.6 %)	49 (20.0 %)	49 (20.0 %)	28 (11.4 %)	245 (46.1 %)
No	107 (37.4 %)	74 (25.9 %)	47 (16.4 %)	58 (20.3 %)	286 (53.9 %)

To gain a deeper understanding of the specific factors associated with customers' dish choices, logistic regression was conducted separately for the plant-based patty and the lentils (Table 3). The experimental effects observed in the survey data were consistent with the associations observed in the sales data. In other words, advertising the plant-based patty as the "Chef's choice" had no effect on dish selection compared with the control condition. However, in comparison to the control week, customers were significantly less likely to report choosing the plant-based patty when the lentils were presented as either the chef's choice ($p = 0.019$, OR = 0.55, 95 % CI = 0.33–0.90) or the guests' choice ($p = 0.015$, OR = 0.54, 95 % CI = 0.32–0.88). Conversely, just as with the results from the sales data, the lentils were reported as being selected at a significantly higher rate in the "Chef's choice" treatment week ($p = 0.005$, OR = 2.31, 95 % CI = 1.29–4.22) compared to the control condition, whereas no significant association was seen between the "Guests' choice" condition and the control condition.

Men were significantly more likely than women to report choosing the plant-based patty ($p < 0.001$, OR = 3.09, 95 % CI = 2.08–4.64), and significantly less likely to opt for the lentils ($p < 0.001$, OR = 0.39, 95 % CI = 0.23–0.65). By contrast, customers from European countries other than Sweden were less likely to choose the plant-based patty than Swedish customers ($p = 0.043$, OR = 0.58, 95 % CI = 0.34–0.98). First-time visitors showed a lower tendency to choose the patty than customers who had visited the restaurant before ($p = 0.042$, OR = 0.63, 95 % CI = 0.40–0.98). There was a small negative association between plant-based patty choices and age ($p = 0.018$, OR = 0.98, 95 % CI = 0.97–0.10), but no statistically significant relationship between age and the likelihood of choosing lentils. Finally, customers without a university degree exhibited a lower likelihood of choosing the lentils than those with at least a university degree ($p = 0.002$, OR = 0.30, CI = 0.14–0.61).

3.3. Liking of dishes and meal experience

Overall, all of the hedonic attributes were rated above 4.1 on the 5-point scale for all four dishes (Fig. 2A), but the plant-based patty was rated lowest for taste liking ($p = 0.007$) with a small effect size ($d = 0.27$). A significant difference was observed in appearance liking among the experimental conditions ($p = 0.048$) with a very small effect size (d

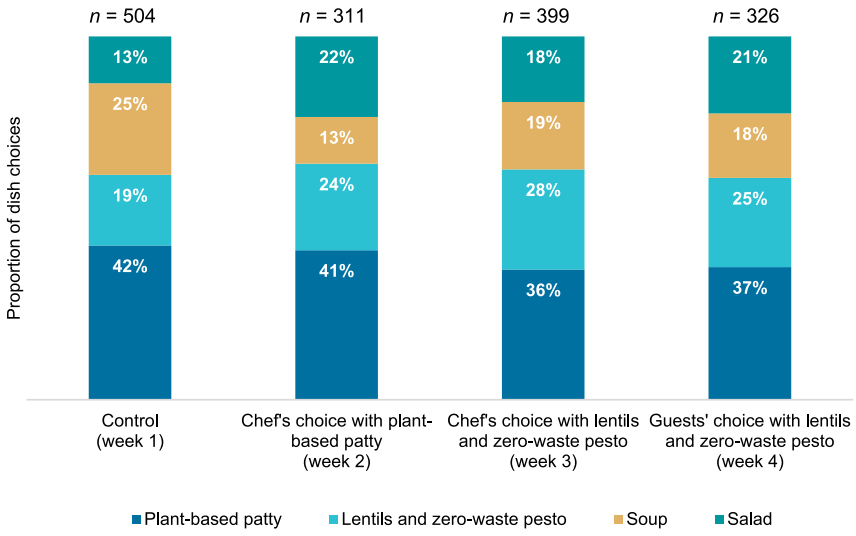

Fig. 1. Weekly sales distribution of four dishes (100 % stacked column chart). Note: Each bar represents a specific week, with segments colour-coded to indicate the relative proportion of each dish's sales within that week. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Table 3
Results of the logistic regression separately for the plant-based patty and lentils, based on the customer survey.

	Plant-based patty OR (95 % CI)	Lentils OR (95 % CI)
Condition		
Control	Ref.	Ref.
Chef's choice: plant-based patty	0.66 (0.35–1.22)	1.09 (0.49–2.38)
Chef's choice: lentils	0.55 (0.33–0.90)*	2.31 (1.29–4.22)**
Guests' choice: lentils	0.54 (0.32–0.88)*	1.82 (0.99–3.37)
Gender		
Female	Ref.	Ref.
Male	3.09 (2.08–4.64)***	0.39 (0.23–0.65)***
Age	0.98 (0.97–1.00)*	1.00 (0.99–1.02)
Dietary orientation		
Omnivore	Ref.	Ref.
Other	0.91 (0.62–1.35)	0.95 (0.60–1.48)
Country of origin		
Sweden	Ref.	Ref.
Other Nordic countries	0.64 (0.30–1.31)	1.42 (0.61–3.13)
Other European countries	0.57 (0.33–0.97)*	1.09 (0.60–1.97)
Other countries	0.79 (0.42–1.49)	0.70 (0.33–1.45)
Education level		
University degree or above	Ref.	Ref.
Other	1.35 (0.84–2.18)	0.30 (0.14–0.61)**
Employment status		
Employed	Ref.	Ref.
Other statuses	1.26 (0.79–2.01)	1.02 (0.59–1.75)
Had visited the restaurant		
Yes	Ref.	Ref.
No	0.63 (0.41–0.99)*	1.56 (0.93–2.64)

Note: Logistic regression was performed on the survey data, separately for the plant-based patty (coded as 1, n = 221) versus all other dishes (coded as 0, n = 297); and lentils (coded as 1, n = 119) versus all other dishes (coded as 0, n = 399). CI = confidence interval, OR = odds ratio, Ref. = reference category for each independent variable. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

= 0.19). However, the *post-hoc* test did not yield any statistical significance in identifying the specific week in which the observed difference occurred. Nevertheless, all of the dishes were rated as enjoyable by the customers, and the experimental conditions did not seem to affect the customers' liking of the dishes they had consumed. There were no significant differences in the meal experience, namely the satisfaction with the selected dish, the perceived pleasantness of the dining experience, and the intention to return to the restaurant, regardless of the dishes or experimental condition. All meal experience factors were rated at least 4.3 on the 5-point scale, indicating that customers generally enjoyed their restaurant experience (Fig. 2B).

4. Discussion

4.1. General discussion

The aim of the present study was to investigate in a field experiment whether presenting dishes on a restaurant menu as either "Chef's choice" or "Guests' choice" influenced customer choice in a real-life restaurant setting. In addition, the study sought to determine whether these expert-based and social-based cues had the same (potential) effect on vegetarian dishes that mimicked a culturally established meat dish or one that did not mimic a meat dish. The findings indicate that an expert cue such as labelling a dish as the "Chef's choice" makes people substantially more likely to choose the dish did not mimic a meat dish; in the case of this study, lentils with "zero-waste" pesto. This dish tended to be the second least popular choice (out of four possible) in the control condition, yet the treatment elevated it to become the second most popular by a margin. In contrast, the expert cue did not have any treatment effect on an already popular dish; in the present case, a plant-based patty resembling a traditional Swedish meat dish ("pannbiff"). Complementary survey data indicated that men and customers of lower educational levels were less likely to choose lentils compared to women and those of higher educational levels, regardless of treatment conditions. Hedonic reports were high across the board during all four weeks.

Similar results to our main findings were seen in a study conducted by Saulais et al. (2019). Using a "Dish of the Day" (DoD) strategy to influence food choice, the study found that when the less popular dish (a vegetarian burger) was highlighted as the DoD, the size of the DoD effect was larger than when the popular dish (a meatball) was the DoD (Saulais et al., 2019). However, our results differ somewhat, in that the plant-based patty was the most popular choice in all experimental conditions. One explanation could be the positioning of this dish at the top of the menu, as this has been demonstrated to influence choice in previous research (Deek et al., 2022). However, even though the lentils were positioned second from the top of the menu throughout the study

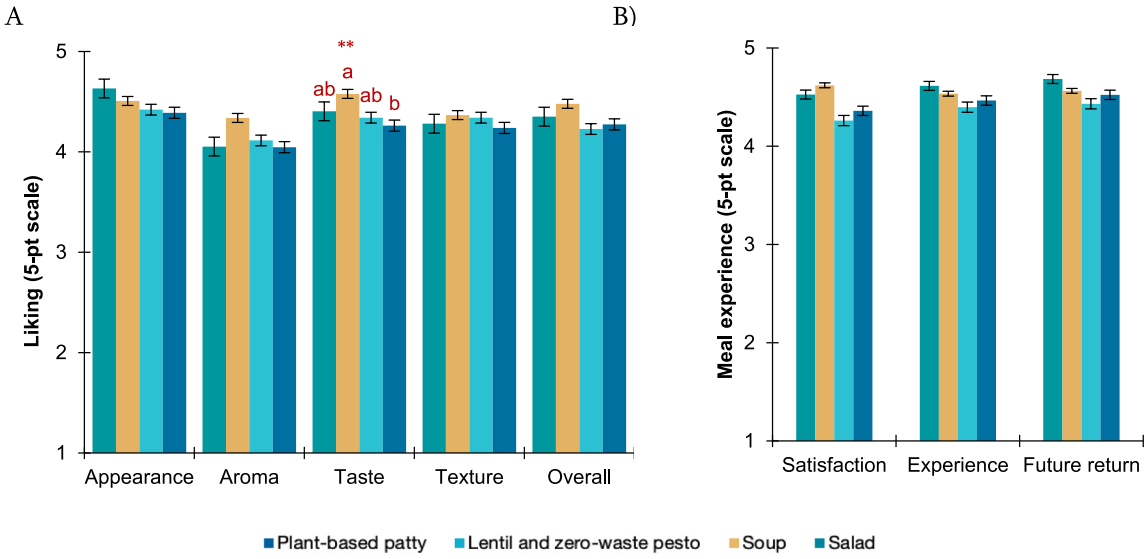

Fig. 2. Mean scores for A) likings and B) meal experience by dishes (mean ± standard error [SE]). *Note*: Means that share the same superscript letters (e.g. 'ab' vs. 'a' or 'b') are not significantly different, and those with entirely different letters (e.g. 'a' vs. 'b') differ significantly according to Kruskal-Wallis and post-hoc Dunn-Bonferroni tests ($p > 0.05$). $^{**}p < 0.01$.

period, marking them as the "Chef's choice" both significantly increased the likelihood of their being chosen, as evidenced in both the sales data and the survey. This suggests that for less popular dishes, an expert cue such as "Chef's choice" has a stronger effect than menu placement. Conversely, this expert cue has no additional effect for a dish that is already popular and presented at the top of the menu.

Another potential explanation for the varying impact of the "Chef's choice" across different types of dishes could be driven by the diverse range of food choice strategies employed by restaurant guests. While customers frequently seek familiar dishes when dining out, they also consider novel options, particularly in the context of general or upscale restaurants in comparison to fast-food outlets and pubs (Greene et al., 2024). Thus, customers' tendency to try new options may have been reinforced by expert recommendations, which in turn may influence their food choices.

The absence of any identified effect of the social cue reinforces the ambiguity of the literature as a whole, as studies using a wide variety of methods have reported varying results (Bacon & Krpan, 2018; Bookwala et al., 2022; Cai et al., 2009; Reinholdsson et al., 2023; Zorell et al., 2024). One potential explanation is that people hold strong personal opinions regarding food, which moderates potential treatment effects (Reinholdsson et al., 2023). Another could be that social effects operate over time, in that complex behaviour requires repeated social reinforcement to be adopted, and that this occurs primarily through strong social ties (Centola, 2010, 2018). If so, the sporadic restaurant selection might be influenced more strongly by exposure to the opinion of a strong figure (e.g. a chef, an identified gastronomic expert), rather than the opinions of anonymous "customers". Additionally, studies that have identified influences of social norms on food choices have evaluated them in terms of popularity, such as the "most popular" (Bookwala et al., 2022) or the ranking of popular dishes (Cai et al., 2009). These approaches may facilitate a more direct and intuitive understanding of the behaviours of others, compared to using a potentially ambiguous cue such as "Guests' choice" that implies popularity without making its relative popularity to other choices explicit.

While no meat-containing options were available on the study menu, a dish that followed a "meat-centric" gastronomic logic was compared to one that did not. The former, that is, the dish mimicking a conventional Swedish meat dish, was also the most popular. As eating is a routine and habitual practice (Warde, 2016), the "proper" meal for any given context is codified into its main and complementary components (Niva & Mäkelä, 2020). It is therefore likely that the plant-based patty's popularity in this vegetarian form simply followed from its popularity in its conventional meat form; the fact that this was most popular among survey respondents born in Sweden speaks in favour of this interpretation. As shown in a study on eating out in England, the choice of a meat dish is associated with the regional cuisine of the dish, with North American/European choices more likely to include red meat (compared to those of East Asia) (Neuman et al., 2020). In addition, studies suggest that especially when eating outside the home, people often choose meat dishes (Ritzel & Mann, 2023), particularly when seeking a special treat (Biermann & Rau, 2020).

Thus, whereas the plant-based patty did not contain meat, we contend that its meat resemblance compared to the lentils suggests that our results can be informative to the general discussion about promoting healthy and sustainable plant foods. This is also strengthened by the sociodemographic patterns in the data. To begin with, men were more likely to choose the plant-based patty, while women were more likely to report the lentils as their choice. Thus, it seems as if the general pattern of associating meat eating with men and masculinity (Sobal, 2005) could be transferred to plant-based foods as well, in the sense that when vegetarian dishes are the only options available, men are still more likely to prefer one that mimics a common meat dish. Furthermore, customers with a university degree or higher level exhibited a greater propensity to choose lentils than those without university degrees. This is consistent with the widely documented finding that women and people of higher education are more inclined to eat vegetarian (Rosenfeld, 2018; Ruby, 2012), as the present results suggest that this finding is also applicable to vegetarian dishes mimicking common meat dishes, in comparison to vegetarian dishes with no such resemblance. All in all, food-cultural and sociodemographic patterns previously associated with pro-environmental eating behaviours were confirmed in this study, providing further behavioural insights into the complexities of environmentally sustainable diets.

Finally, the high hedonic performance of the dishes illustrates the potential for transforming plant-based ingredients that are often perceived as unappealing into palatable dishes (Mouritsen & Styrbæk, 2020). In line with previous studies, which showed no difference in dish liking and satisfaction with the treatment (Saulais et al., 2019; Visschers & Siegrist, 2015), the present study indicates that the cue did not backfire on customer liking and satisfaction with their dish choice. However, the results were based on a between-subject rather than

within-subject design, and thus it remains uncertain whether liking would have been substantially different if a guest had chosen the alternative dish.

4.2. Strengths and limitations

The main strength of this study is ecological validity, since it was conducted in a real-world restaurant with paying customers who were making actual food choices. It also offers insights from a large sample of sales data and more than 500 customer surveys. The close alignment between the distribution of dish selection in the sales data and that of the survey responses indicates that the questionnaire sample was representative of the total customer population over the study period, at least with regard to the observed selections. Moreover, the high ratings of liking and meal enjoyment validate the treatment effect, at least to the extent of being able to reject the notion of superior taste as a reason for the choice patterns.

That said, it is important to acknowledge the limitations of the study. First, unlike laboratory studies or online surveys, it was not possible to control the allocation of participants. Moreover, given that the study was conducted in an operating restaurant, the randomisation of the experimental conditions was not feasible. This meant that the sample size for each menu option and experimental condition varied slightly and that biases regarding the participants (e.g. demographic characteristics) and external conditions beyond our control (e.g. weather, holidays) can be expected. Although no statistically significant relationship was found between ambient temperature and the treatment dishes, sales of salad exhibited a clear positive trend with increasing temperature. This might be related to the increasing warmth of the weather, which encourages a shift in consumer preferences toward lighter, more hydrating, and refreshing food choices (Labbe et al., 2009; Ramirez et al., 2022). There is also a possibility that seasonal preferences could have played a role in the customers' choices. However, it is important to note that the restaurant in question focuses on ingredients in season all year long, so such a bias should not have been particularly influential on the intervention week compared to any other week. The stability of the plant-based patty's popularity (a dish with no specific seasonal associations in the Swedish food culture) and the generally high liking across the menu also suggests that this was not a major influence. Indeed, these seasonal patterns are not solely physiological but also shaped by cultural associations and habitual consumption (Spence, 2021). Therefore, further research is needed to explore how the interaction between ambient environmental factors, cultural and habitual consumer behaviours influences food choices demand across different markets. Furthermore, the limitations of control and lack of randomisation also prevent firm conclusions from being drawn about the identification of causal effects. Therefore, future research could include the randomisation of the menu exposure among customers, rather than exposing all to the same menu on a specific day. Also, if feasible, the intervention period could be extended and the menu design randomised on a daily basis. In order to offer a more comprehensive perspective on the pressing environmental issue of meat versus plant-food consumption, it would be preferable for at least one dish on the menu to be a genuine meat dish.

Second, the profile of the restaurant and its specific conditions – known for its pro-environmental actions and serving guests at a museum in Stockholm who have paid for entrance – requires some reflection. It can be reasonably assumed that this clientele has a relatively high level of cultural capital, given that it is predominantly comprised of individuals with a high level of education who have visited or even work at a museum. The observed demographics and dietary orientations, along with the profile of the restaurant, also suggest that the customers in this study comprise a group of people who are generally more conscious of sustainability issues. For example, it has been shown that higher socioeconomic status is associated with patronage of restaurants that follow environmentally sustainable practices (Hu et al., 2010). Therefore, similar studies in restaurants with different profiles and customer segments are warranted, especially designs with improved possibilities of establishing causality, and may yield conflicting outcomes.

Third, the study design was modified during the data collection, preventing the evaluation of the "Guests' choice" with the plant-based patty condition. However, this change occurred early in the data collection phase (midway through week 2) and ultimately strengthened the current study by enhancing the investigation of cue effects on different types of dishes. Unfortunately, the restaurant was unable to extend the duration of the experiment by a further week, making it impossible to add the plant-based patty under the "Guests' choice" treatment into the study conditions. The lentils dish was prioritized in both treatment conditions because the plant-based patty had been shown to be popular with and without cues. Therefore, given the constraints imposed by the circumstances, the focus was directed towards the less popular dish, lentils, with cues.

Fourth and lastly, the dishes in this experiment were different in various aspects besides similarity to meat, including flavour profile, caloric content, perceived healthiness, and perceived environmental value. This has consequences for the internal validity of the study, as it makes the comparison less standardised than what would be optimal for an experiment. However, perfectly standardised comparisons are not what customers of restaurants encounter in real life, hence the benefits of practical relevance must be weighed against methodological perfection.

5. Conclusion

The present study sought to investigate whether expert or social cues, operationalised as "Chef's choice" or "Guests' choice" on a restaurant menu, could influence customers' dish selection in a real-life restaurant setting. A vegetarian dish that imitated a conventional meat dish was the most popular throughout the study, independent of the treatment. This indicates that even when there is no meat option, a dish that resembles the meat-centric meal composition can give customers a similar sense of a meat-centric dish. However, when the chef recommended a less popular dish with no resemblance to a meat-centric dish, customers were more likely to choose it. Highlighting this dish as the guests' recommendation had no impact.

These results suggest two key points: in the absence of meat options, some people seem to transfer the idea of a proper meal, known to be meat-centric in the present national context, to a vegetarian dish that is similar to a conventional meat dish. Second, an expert cue, such as a recommendation from a chef, has the potential to promote a less popular or comparatively unconventional meal option in the food service setting. The findings suggest that the utilisation of expert cues has the potential to influence customer choice in full-service restaurants, offering a simple and cost-effective approach. However, further research is necessary to ascertain the efficacy of this effect in diverse restaurant contexts, based on designs with better possibilities to establish causality.

CRediT authorship contribution statement

Ansung Kim: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Iuri Baptista:** Writing – review & editing, Conceptualization. **Carolin Zorell:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Nicklas Neuman:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Jun Niimi:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Åsa Öström:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization.

Ethics statement

The study was conducted in compliance with the Declaration of Helsinki (2013) and was assessed for compliance with national research requirements by an internal process at the School of Hospitality, Culinary Arts and Meal Science, Örebro University, Sweden. The study was approved on April 3rd, 2024. All data were collected and handled in accordance with the European Union General Data Protection Regulation (GDPR) (2016/679). All customers who participated in the survey gave their informed consent and received complimentary refreshments (a cup of coffee or tea) after completing the survey.

Acknowledgements

This work was supported by FORMAS, the Swedish government research council for the environment, agricultural sciences, and spatial planning (reference no. 2020–02843). The authors would like to thank the chefs and staff at Fotografiska for their contribution to data collection.

Appendix

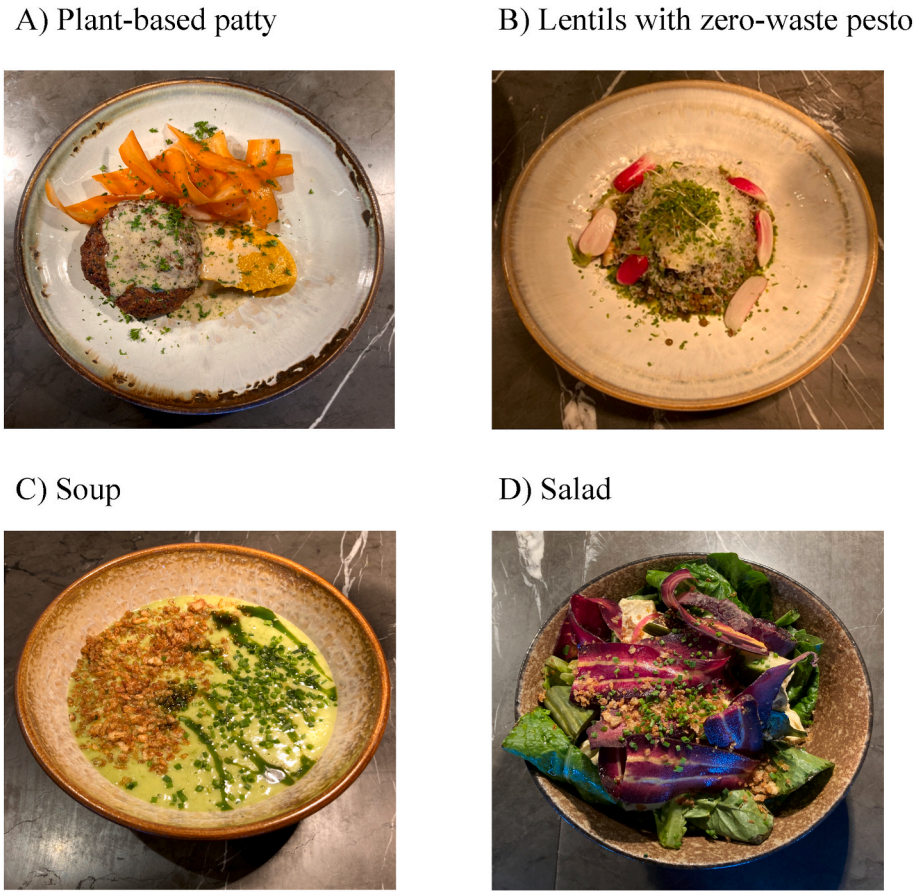

Fig. A1. The four dishes served by the restaurant during the study.

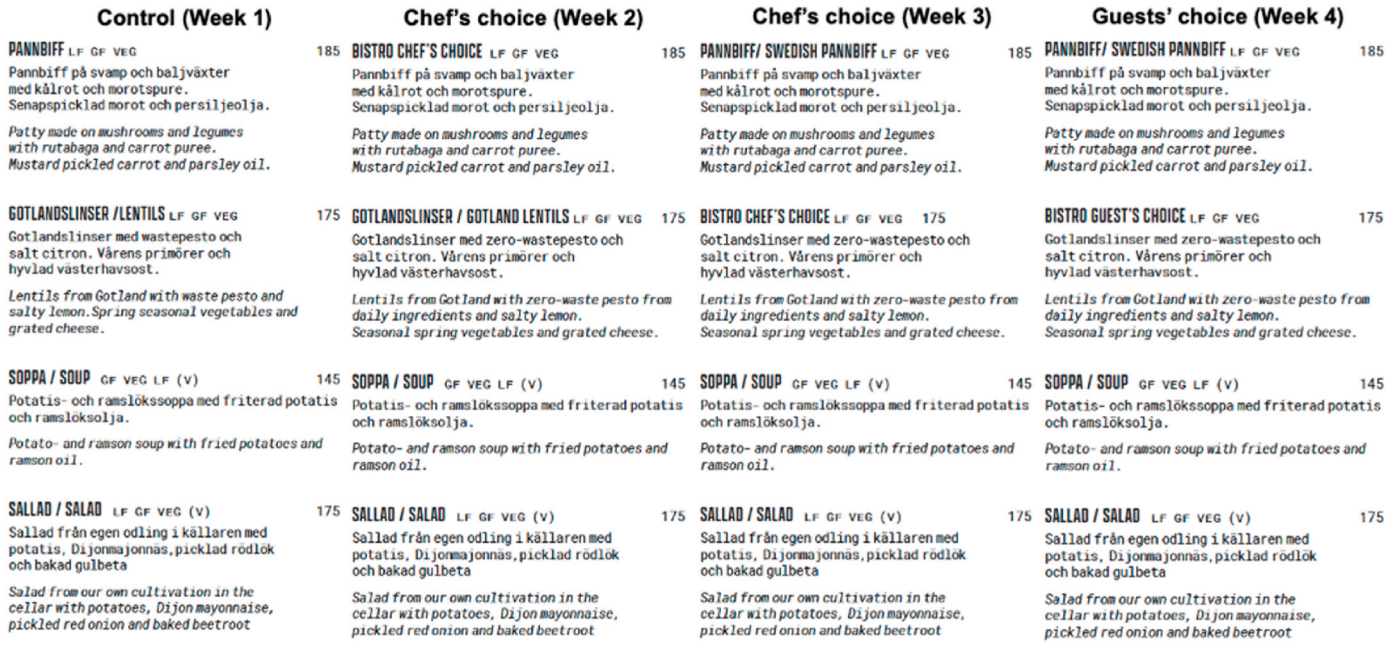

Fig. A2. The menus used during the four weeks: control (week 1), plant-based patty as chef's choice (week 2), lentils as chef's choice (week 3) and lentils as guests' choice (week 4).

Table A1
Results of linear regression based on CLR-transformed sales proportions and temperature.

Dish	Estimate (β)	p-value	R^2
Plant-based patty	−0.01	0.090	0.152
Lentils	0.01	0.316	0.056
Soup	−0.02	0.098	0.145
Salad	0.03	**0.011**	0.311

Note: CLR = centred log-ratio transformation. β = unstandardised regression coefficient for temperature. All models are simple linear regressions with temperature as the predictor. R^2 represents the proportion of variance explained.

Table A2
Results of the logistic regression separately for all dishes, based on the customer survey.

	Plant-based patty OR (95 % CI)	Lentils OR (95 % CI)	Soup OR (95 % CI)	Salad OR (95 % CI)
Condition				
Control	Ref.	Ref.	Ref.	Ref.
Chef's choice: plant-based patty	0.81 (0.26–2.50)	0.86 (0.22–3.32)	0.34 (0.08–1.38)	7.26 (1.54–36.22)*
Chef's choice: lentils	0.65 (0.26–1.63)	1.91 (0.66–5.56)	0.37 (0.11–1.16)	3.59 (0.97–13.62)
Guests' choice: lentils	0.69 (0.19–2.49)	1.36 (0.30–6.02)	0.22 (0.04–1.08)	9.34 (1.59–57.67)*
Gender				
Female	Ref.	Ref.	Ref.	Ref.
Male	3.10 (2.08–4.66)***	0.39 (0.23–0.64)***	0.52 (0.30–0.87)*	0.78 (0.46–1.32)
Age	0.98 (0.97–1.00)*	1.00 (0.98–1.02)	1.00 (0.99–1.02)	1.03 (1.01–1.05) **
Dietary orientation				
Omnivore	Ref.	Ref.	Ref.	Ref.
Other	0.91 (0.62–1.35)	0.94 (0.60–1.48)	1.06 (0.65–1.71)	1.16 (0.70–1.92)
Country of origin				
Sweden	Ref.	Ref.	Ref.	Ref.
Other Nordic countries	0.65 (0.31–1.33)	1.44 (0.62–3.19)	0.90 (0.34–2.16)	1.69 (0.63–4.21)
Other European countries	0.58 (0.34–0.98)*	1.11 (0.61–2.00)	0.83 (0.42–1.62)	2.51 (1.26–5.07) **
Other countries	0.80 (0.42–1.50)	0.70 (0.33–1.45)	1.37 (0.63–2.90)	1.69 (0.73–3.88)
Education level				
University degree or above	Ref.	Ref.	Ref.	Ref.
Other	1.35 (0.84–2.18)	0.31 (0.14–0.61)**	1.61 (0.91–2.77)	1.04 (0.53–1.94)
Employment status				
Employed	Ref.	Ref.	Ref.	Ref.
Other statuses	1.26 (0.79–2.01)	1.02 (0.59–1.76)	0.88 (0.50–1.55)	0.70 (0.36–1.31)
Had visited the restaurant				
Yes	Ref.	Ref.	Ref.	Ref.
No	0.63 (0.41–0.98)*	1.55 (0.93–2.62)	0.79 (0.46–1.37)	1.70 (0.92–3.20)
Temperature	0.98 (0.90–1.07)	1.02 (0.93–1.13)	1.09 (0.98–1.22)	0.91 (0.81–1.02)

Note: Logistic regression was performed on the survey data, separately for the plant-based patty (coded as 1, n = 221) versus all other dishes (coded as 0, n = 297); and lentils (coded as 1, n = 119) versus all other dishes (coded as 0, n = 399); soup (coded as 1, n = 94) versus all other dishes (coded as 0, n = 424; salad (coded as 1, n = 84) versus all other dishes (coded as 0, n = 434). CI = confidence interval, OR = odds ratio, Ref. = reference category for each independent variable. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

References

Aitchison, J. (1982). The statistical analysis of compositional data. *Journal of the Royal Statistical Society, 44*(2), 139–177.

Auchincloss, A. H., Mallya, G. G., Leonberg, B. L., Ricchezza, A., Glanz, K., & Schwarz, D. F. (2013). Customer responses to mandatory menu labeling at full-service restaurants. *American Journal of Preventive Medicine, 45*(6), 710–719. https://doi.org/10.1016/j.amepre.2013.07.014

Bacon, L., & Krpan, D. (2018). (Not) eating for the environment: The impact of restaurant menu design on vegetarian food choice. *Appetite, 125*, 190–200. https://doi.org/10.1016/j.appet.2018.02.006

Baptista, I., Garnett, E., & Öström, Å. (2025). How can consumer science help the foodservice industry replace meat? A critical review. *Appetite, 207*, Article 107861. https://doi.org/10.1016/j.appet.2025.107861

Behnke, C., Jung, S. (Sangwon), & Bai, Y. (Mabel) (2024). Writing restaurant menu descriptions: The influence of word choice on consumer behavior. *International Journal of Hospitality Management, 123*, Article 103923. https://doi.org/10.1016/j.ijhm.2024.103923

Biermann, G., & Rau, H. (2020). The meaning of meat: (Un)sustainable eating practices at home and out of home. *Appetite, 153*, Article 104730. https://doi.org/10.1016/j.appet.2020.104730

Bookwala, K., Gallemore, C., & Gómez-Miñambres, J. (2022). The influence of food recommendations: Evidence from a randomized field experiment. *Economic Inquiry, 60*(4), 1898–1910. https://doi.org/10.1111/ecin.13106

Bujang, M. A., Sa'at, N., Tg Abu Bakar Sidik, T. M. I., & Chien Joo, L. (2018). Sample size guidelines for logistic regression from observational studies with large population: Emphasis on the accuracy between statistics and parameters based on real life clinical data. *Malaysian Journal of Medical Sciences, 25*(4), 122–130. https://doi.org/10.21315/mjms2018.25.4.12

Burchell, K., Rettie, R., & Patel, K. (2013). Marketing social norms: Social marketing and the 'social norm approach'. *Journal of Consumer Behaviour, 12*(1), 1–9. https://doi.org/10.1002/cb.1395

Cadario, R., & Chandon, P. (2020). Which healthy eating nudges work best? A meta-analysis of field experiments. *Marketing Science, 39*(3), 465–486. https://doi.org/10.1287/mksc.2018.1128

Cai, H., Chen, Y., & Fang, H. (2009). Observational learning: Evidence from a randomized natural field experiment[no title found]. *American Economic Review, 99*(3).

Catarci, D., Laasner Vogt, L., & Reijnen, E. (2024). Online food choices: When do "Recommended By" labels work? *Foods, 13*(6), 928. https://doi.org/10.3390/foods13060928

Centola, D. (2010). The spread of behavior in an online social network experiment. *Science, 329*(5996), 1194–1197. https://doi.org/10.1126/science.1185231

Centola, D. (2018). *How behavior spreads: The science of complex contagions*. Princeton University Press.

Chater, N., & Loewenstein, G. (2023). The i-frame and the s-frame: How focusing on individual-level solutions has led behavioral public policy astray. *Behavioral and Brain Sciences, 46*, Article e147. https://doi.org/10.1017/S0140525X22002023

Chen, P.-J., & Antonelli, M. (2020). Conceptual models of food choice: Influential factors related to foods, individual differences, and society. *Foods, 9*(12), 1898. https://doi.org/10.3390/foods9121898

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology, 55*(1), 591–621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Deek, M. R., Kemps, E., Prichard, I., & Tiggemann, M. (2022). The effect of a healthy food cue on choices from an online fast-food menu. *Eating Behaviors, 45*, Article 101632. https://doi.org/10.1016/j.eatbeh.2022.101632

European Commission: Eurostat. (2023). *Key figures on Europe – 2023 edition*. Publications Office of the European Union. https://doi.org/10.2785/494153

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146

Fusté-Forné, F. (2020). Star chefs and the table: From restaurant to home-based culinary experiences. *Journal of Culinary Science & Technology, 18*(3), 192–200. https://doi.org/10.1080/15428052.2018.1563933

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research, 35*(3), 472–482. https://doi.org/10.1086/586910

Gössling, S., & Michael Hall, C. (2021). *The sustainable chef: The environment in culinary arts, restaurants, and hospitality* (1st ed.). Routledge. https://doi.org/10.4324/9781315187488

Gravert, C., & Kurz, V. (2021). Nudging à la carte: A field experiment on climate-friendly food choice. *Behavioural Public Policy, 5*(3), 378–395. https://doi.org/10.1017/bpp.2019.11

Greene, D., Nguyen, M., & Dolnicar, S. (2023). How to entice restaurant patrons to order low-emissions meals? A meta-analysis and research agenda. *Appetite, 188*, Article 106612. https://doi.org/10.1016/j.appet.2023.106612

Greene, D., Nguyen, M., & Dolnicar, S. (2024). How do you choose your meal when you dine out? A mixed methods study in consumer food-choice strategies in the restaurant context. *Appetite*. , Article 107683. https://doi.org/10.1016/j.appet.2024.107683

Harries, T., Rettie, R., Studley, M., Burchell, K., & Chambers, S. (2013). Is social norms marketing effective?: A case study in domestic electricity consumption. *European Journal of Marketing, 47*(9), 1458–1475. https://doi.org/10.1108/EJM-10-2011-0568

Hu, H.-H., Parsa, H. G., & Self, J. (2010). The dynamics of green restaurant patronage. *Cornell Hospitality Quarterly, 51*(3), 344–362. https://doi.org/10.1177/1938965510370564

Kim, H.-Y. (2017). Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. *Restorative Dentistry & Endodontics, 42*(2), 152. https://doi.org/10.5395/rde.2017.42.2.152

Labbe, D., Almiron-Roig, E., Hudry, J., Leathwood, P., Schifferstein, H. N. J., & Martin, N. (2009). Sensory basis of refreshing perception: Role of psychophysiological factors and food experience. *Physiology & Behavior, 98*(1–2), 1–9. https://doi.org/10.1016/j.physbeh.2009.04.007

Lachat, C., Naska, A., Trichopoulou, A., Engeset, D., Fairgrieve, A., Marques, H.Á., & Kolsteren, P. (2011). Essential actions for caterers to promote healthy eating out among European consumers: Results from a participatory stakeholder analysis in the HECTOR project. *Public Health Nutrition, 14*(2), 193–202. https://doi.org/10.1017/S1368980010002387

Leer, J. (2016). The rise and fall of the new nordic cuisine. *Journal of Aesthetics & Culture, 8*(1), Article 33494. https://doi.org/10.3402/jac.v8.33494

Leer, J. (2019). New Nordic men: Cooking, masculinity and nordicness in René Redzepi's *Noma* and Claus Meyer's *Almanak*. *Food, Culture & Society, 22*(3), 316–333. https://doi.org/10.1080/15528014.2019.1582250

Lenhard, W., & Lenhard, A. (2022). Computation of effect sizes. *Psychometrica*. https://doi.org/10.13140/RG.2.2.17823.92329

Lewis, T., & Huber, A. (2015). A revolution in an eggcup?: Supermarket wars, celebrity chefs and ethical consumption. *Food, Culture and Society, 18*(2), 289–307. https://doi.org/10.2752/175174415X14190821960798

Lo, A., King, B., & Mackenzie, M. (2017). Restaurant customers' attitude toward sustainability and nutritional menu labels. *Journal of Hospitality Marketing & Management, 26*(8), 846–867. https://doi.org/10.1080/19368623.2017.1326865

Marteau, T. M. (2017). Towards environmentally sustainable human behaviour: Targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 375*(2095), Article 20160371. https://doi.org/10.1098/rsta.2016.0371

Marteau, T. M., Hollands, G. J., & Fletcher, P. C. (2012). Changing human behavior to prevent disease: The importance of targeting automatic processes. *Science, 337*(6101), 1492–1495. https://doi.org/10.1126/science.1226918

McBride, A. E., & Flore, R. (2019). The changing role of the chef: A dialogue. *International Journal of Gastronomy and Food Science, 17*, Article 100157. https://doi.org/10.1016/j.ijgfs.2019.100157

McCall, M., & Lynn, A. (2008). The effects of restaurant menu item descriptions on perceptions of quality, price, and purchase intention. *Journal of Foodservice Business Research, 11*(4), 439–445. https://doi.org/10.1080/15378020802519850

Mouritsen, O. G., & Styrbæk, K. (2020). Design and 'umamification' of vegetable dishes for sustainable eating. *International Journal of Food Design, 5*(1), 9–42. https://doi.org/10.1386/ijfd_00008_1

Nestle, M., Wing, R., Birch, L., DiSogra, L., Drewnowski, A., Middleton, S., Sigman-Grant, M., Sobal, J., Winston, M., & Economos, C. (2009). Behavioral and social influences on food choice. *Nutrition Reviews, 56*(5), 50–64. https://doi.org/10.1111/j.1753-4887.1998.tb01732.x

Neuman, N. (2018). An imagined culinary community: Stories of morality and masculinity in "Sweden – the new culinary nation". *Scandinavian Journal of Hospitality and Tourism, 18*(2), 149–162. https://doi.org/10.1080/15022250.2017.1338616

Neuman, N., Mylan, J., & Paddock, J. (2020). Exploring (non-)meat eating and "translated cuisines" out of home: Evidence from three English cities. *International Journal of Consumer Studies, 44*(1), 25–32. https://doi.org/10.1111/ijcs.12542

Niva, M., & Mäkelä, J. (2020). Meals in Western eating and drinking. In *The handbook of eating and drinking: Interdisciplinary perspectives*. Springer International Publishing.

Nomura, H., John, P., & Cotterill, S. (2011). The use of feedback to enhance environmental outcomes: A randomized controlled trial of a food waste scheme. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1760859

Peduzzi, P., Concato, J., Kemper, E., Holford, T. R., & Feinstein, A. R. (1996). A simulation study of the number of events per variable in logistic regression analysis. *Journal of Clinical Epidemiology, 49*(12), 1373–1379. https://doi.org/10.1016/S0895-4356(96)00236-3

Perez-Cueto, F. J. A. (2021). Nudging plant-based meals through the menu. *International Journal of Gastronomy and Food Science, 24*, Article 100346. https://doi.org/10.1016/j.ijgfs.2021.100346

Ramirez, J. L., Hampton, A., & Du, X. (2022). Examining the consumer view of refreshing perception, relevant fruits, vegetables, soft drinks, and beers, and consumer age and

gender segmentations. *Food Science and Nutrition, 10*(8), 2516–2531. https://doi.org/10.1002/fsn3.2857

Reinders, M. J., Bouwman, E. P., & Onwezen, M. C. (2024). Reducing meat consumption in restaurants: Exploring the default mechanism in a surprise menu, combined with effort and price incentives. *Journal of Environmental Psychology, 98*, Article 102402. https://doi.org/10.1016/j.jenvp.2024.102402

Reinholdsson, T., Hedesström, M., Ejelöv, E., Hansla, A., Bergquist, M., Svenfelt, Å., & Nilsson, A. (2023). Nudging green food: The effects of a hedonic cue, menu position, a warm-glow cue, and a descriptive norm. *Journal of Consumer Behaviour, 22*(3), 557–568. https://doi.org/10.1002/cb.2129

Ritzel, C., & Mann, S. (2023). Exploring heterogeneity in meat consumption and eating out by using a latent class model. *British Food Journal, 125*(1), 132–144. https://doi.org/10.1108/BFJ-11-2021-1183

Rivis, A., & Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current Psychology, 22*(3), 218–233. https://doi.org/10.1007/s12144-003-1018-2

Rodrigues, P., Brochado, A., Sousa, A., Borges, A. P., & Barbosa, I. (2023). What's on the menu? How celebrity chef brands create happiness. *European Journal of Marketing, 57*(9), 2513–2543. https://doi.org/10.1108/EJM-12-2021-0988

Rosenfeld, D. L. (2018). The psychology of vegetarianism: Recent advances and future directions. *Appetite, 131*, 125–138. https://doi.org/10.1016/j.appet.2018.09.011

Ruby, M. B. (2012). Vegetarianism. A blossoming field of study. *Appetite, 58*(1), 141–150. https://doi.org/10.1016/j.appet.2011.09.019

Rummo, P. E., Mijanovich, T., Wu, E., Heng, L., Hafeez, E., Bragg, M. A., Jones, S. A., Weitzman, B. C., & Elbel, B. (2023). Menu labeling and calories purchased in restaurants in a US national fast food chain. *JAMA Network Open, 6*(12), Article e2346851. https://doi.org/10.1001/jamanetworkopen.2023.46851

Salganik, M. J., Dodds, P. S., & Watts, D. J. (2006). Experimental Study of inequality and unpredictability in an artificial cultural market. *Science, 311*(5762), 854–856. https://doi.org/10.1126/science.1121066

Saulais, L., Massey, C., Perez-Cueto, F. J. A., Appleton, K. M., Dinnella, C., Monteleone, E., Depezay, L., Hartwell, H., & Giboreau, A. (2019). When are "Dish of the Day" nudges most effective to increase vegetable selection? *Food Policy, 85*, 15–27. https://doi.org/10.1016/j.foodpol.2019.04.003

Sobal, J. (2005). MEN, meat, and marriage: Models of masculinity. *Food and Foodways, 13*(1–2), 135–158. https://doi.org/10.1080/07409710590915409

Spence, C. (2021). Explaining seasonal patterns of food consumption. *International Journal of Gastronomy and Food Science, 24*, Article 100332. https://doi.org/10.1016/j.ijgfs.2021.100332

Statista. (2023). Market size of the global food service industry in 2021, with a forecast for 2028 *(in trillion U.S. dollars)* https://www.statista.com/statistics/1095667/global-food-service-market-size/.

Visschers, V. H. M., & Siegrist, M. (2015). Does better for the environment mean less tasty? Offering more climate-friendly meals is good for the environment and customer satisfaction. *Appetite, 95*, 475–483. https://doi.org/10.1016/j.appet.2015.08.013

Warde, A. (2016). *The practice of eating.* Polity Press.

Zorell, C. V., Kim, A., & Neuman, N. (2024). Studying factual versus social cues as triggers of change in food behaviour. *Journal of Nutritional Science, 13*, e88. https://doi.org/10.1017/jns.2024.82