Nudging plant-based meals through the menu

Perez-Cueto, Federico J. A.

Published in:
International Journal of Gastronomy and Food Science

DOI:
10.1016/j.ijgfs.2021.100346

Publication date:
2021

Document version
Publisher's PDF, also known as Version of record

Document license:
CC BY-NC-ND

Citation for published version (APA):
Culinary Concept

Nudging plant-based meals through the menu

Federico J.A. Perez-Cueto

University of Copenhagen, Future Consumer Lab - Department of Food Science, Rolighedsvej 26, 1958, Frederiksberg C, Denmark

ARTICLE INFO

Keywords:
Nudging
Plant-based
Meals
Foodservice

ABSTRACT

A nudge experiment was performed to evaluate the effectiveness of presenting a menu with the dish-of-the-day (DoD) vs. a menu with free choice to facilitate consumer choice towards a fully plant-based, nutritious and tasty meal in foodservice setting. A menu card in control condition included the appetizer, the three mains and a dessert. The menu card in the intervention included the appetizer, eggplant lasagne as the DoD, and the dessert. Thirty-three volunteers ate twice at Future Consumer Lab in Copenhagen, once in each condition (67% women; mean age 25y; SD2.1). Three innovative 100% plant-based main courses were designed for the purpose of this study, Black bean & quinoa burger, Lentil curry and Eggplant lasagne. Compared with the control situation, DoD was successful in achieving 85% of the choice. Menu design and innovative meal design can contribute jointly to the uptake of plant-based meals in foodservice.

Introduction

Changing food behaviour is one of the current key societal challenges, in particular as we need to move quickly towards the production and consumption of more sustainable healthy foods and meals (Aschemann-Witzel et al., 2020; Hallström et al., 2015; Perez-Cueto, 2020; Saxe et al., 2019). This great food transformation requires structural changes and innovative strategies (Mete et al., 2019; Willett et al., 2019) to facilitate the uptake and consumption of foods with low environmental footprint while reducing (or eliminating) those with high environmental footprint (Herrero et al., 2021; Poore and Nemecek, 2018). Of particular interest are foods of plant origin that are considered beneficial to health as they are associated with reduced risk of chronic disease and improved quality of life (Bouvard et al., 2015; Campbell, Fidahusain, & Campbell II, 2019; Choi et al., 2020; Hu et al., 2019; Schulze et al., 2018; Varrasso et al., 2019). Moreover, compared with foods of animal origin, plant-based foods require considerably less water and land while they produce less greenhouse gases (Chai et al., 2019; Poore and Nemecek, 2018; Rabes et al., 2020; Springmann et al., 2018; Willett et al., 2019).

Lastly, plant-rich diets are gaining momentum among consumers pursuing ethical choices that are more compassionate towards animals (Beck and Ladwig, 2021; Guachalla, 2021; Mckown and Dunn, 2021; Nierenberg, 2005). The most common strategies for food behaviour change have been usually nutrition education and labelling with different degrees of success (Perez-Cueto, 2019). Choice architecture or nudging is one of the complementary strategies acknowledged for successful behaviour change and that can be easily implemented by catering services e.g. to promote meat alternatives (Appleton et al., 2016; Attwood et al., 2020; Bauer and Reisch, 2019; Bianchi et al., 2018; Bucher et al., 2016; Dinnella et al., 2016; Nornberg, Houlby, Skov and Perez-Cueto, 2016; Nornberg, Skov, Houlby and Perez-Cueto, 2016). In foodservice, the dish-of-the-day (DoD) or the recommendation of the chef has been recognised as facilitating healthy consumer choices (Lachat et al., 2011).

Our previous work on using the DoD as nudge to introduce plant-based meals focused on replacing meatballs in tomato sauce with pulses-based patties in very similar, well-known and familiar dish presentations, namely with pasta for adolescents, and with rice for older consumers. In restaurant setting, the menu card was used to perform the choice task, where all dishes were usually visible, and the intervention consisted of surrounding the DoD by a box (Hartwell et al., 2020). However, the interventions were not successful among adolescents (dos Santos et al., 2020) or older consumers (Zhou et al., 2019) in 4 EU Countries. Upscaling nudges from living labs to real life situations is still a challenge (Hartwell et al., 2020). DoD is more efficient if it is in a context with more than two choices, and when the choices are very different from each other (Saulais et al., 2019). Moreover, food choices can be influenced by restaurant menu design such as the visual design of the menu, how the items are described and the location of the items on the menu (Bacon and Krpan, 2018). Therefore, the objectives of this study were twofold, first to investigate the effectiveness of presenting a menu with a pre-selected DoD vs. a menu with three main course options on actual consumer choice; second, to refine the mode of DoD nudge administration through the menu card.

E-mail address: apce@food.ku.dk.

https://doi.org/10.1016/j.ijgfs.2021.100346
Received 2 March 2021; Received in revised form 7 April 2021; Accepted 11 April 2021
Available online 15 April 2021
1878-450X/© 2021 The Author. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license
Methods

A cross-over design study was conducted at the Future Consumer Lab in May 2019. Participants were volunteers recruited through advertisement posters, social media (e.g. Facebook) and followed a snowball effect. Data were collected anonymously, and in compliance with General Data Protection Regulation (GDPR). Volunteer participants were all adults, gave consent to participate in the study and were given a unique identification number that they had to bring in each of the two free meal occasions. The number was also used to label the plate where the dish was served. To mirror the usual customers of restaurants, no exclusion criteria for recruitment was specified. Each participant attended one control and one intervention session. The order of the sessions was randomized. In total, there were 4 test days, two control days and two intervention days with a week of “washout” in between each treatment session. Participants could show up between 11:30 a.m. and 2:00 p.m.

Additionally, eggplant lasagne was termed as the DoD with no other options being visible on the menu. Nonetheless, participants could easily opt-out of the pre-set choice if desired, by asking the staff for alternatives. Additionally, eggplant lasagne was less energy dense option. In the control condition, participants were asked to select the main course from the three following options 1) eggplant lasagne, 2) black-bean and quinoa burger, or 3) lentil curry. The nutritional composition of the meals is provided as supplementary material. In the intervention condition, eggplant lasagne was termed as the DoD with no other options being visible on the menu. Nonetheless, participants could easily opt-out of the pre-set choice if desired, by asking the staff for alternatives. Additionally, eggplant lasagne was less energy dense option.

Participants filled a before and after questionnaire (Supplementary materials). The “before” questionnaire provided general sociodemographic information, specifically sex (female, male), age in y, education level (primary, secondary superior), eating lifestyle (omnivorous, vegetarian, flexitarian, vegan), hunger level estimated on a 10 points scale from starving to full, and attitudes towards plant-based meals.

Results

Participants (N = 33) were relatively young as their age ranged from 22 to 29 y (M = 25y, SD = 2.07). Participants were 22 women (66.7%) and 11 men. All participants were MSC students. Participants categorized themselves as omnivores 45.5% (n = 15), flexitarians 42.4% (n = 14), vegetarians 3.0% (n = 1) and vegans 9.1% (n = 3).

Table 1 shows the proportion of dish choice between conditions. Nudging the eggplant lasagne dish resulted in 85% of consumers choosing this dish, compared to 9% in the control situation. There was a significant association between the intervention condition and the nudged dish choice (Chi2 = 42, p < 0.001). The more frequently stated reasons for choosing the dish in control situation were a) liking of the description (n = 10); b) wanting to try the plant-based version of a known dish (n = 6); c) willingness to try new dishes (n = 4); d) considering it more fulfilling or appealing than other options (n = 4). In the intervention situation, less people reported the reasons, but they specified a) they had a similar dish before and like it (n = 4); b) lack of visible options (n = 3) and c) not realising they could have asked for other dishes (n = 2).

A paired-sample t-test was conducted to compare hunger, satiety and hedonic evaluation of the meal in control and intervention conditions. There was no difference between conditions neither in the hunger scores

![Fig. 1. Three course menu presentation.](image-url)
International Journal of Gastronomy and Food Science 24 (2021) 100346

3

(p = 0.304), nor in the satiety scores (p = 0.702). Furthermore, there were no differences in the hedonic evaluation performed on the overall liking of the meal, the odour or the texture in either situation (independently of what it was). Nevertheless, the evaluations of the appearance (p < 0.001) and the taste (p = 0.03) were significantly different between the two sessions, being higher in the control situation. Attitudes towards plant-based meals were assessed in each condition. As there were no statistical differences in the attitudinal scale, the mean between both sessions is presented in Table 2. It is noticeable that the largest importance given was to the taste of a plant-based meal, and followed by healthiness, environmental friendliness, filling/satiating capacity and animal welfare. Furthermore, participants considered that the 3 course meals were well balanced in both situations (p = 0.184), and that they did not miss animal sourced foods in their meals (p = 0.724).

Table 1
Proportion of choices in each condition.

<table>
<thead>
<tr>
<th>Main course choice</th>
<th>Control (%) (n = 33)</th>
<th>Intervention (%) (n = 33)</th>
<th>p-value(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lentil curry</td>
<td>21.2</td>
<td>12.1</td>
<td>0.325</td>
</tr>
<tr>
<td>Eggplant lasagne</td>
<td>9.1</td>
<td>84.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Black bean &amp; quinoa burger</td>
<td>69.7</td>
<td>3.0</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

\(^a\) Chi square test.

Table 2
Attitudes towards plant-based meals.

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>4.12</td>
<td>0.84</td>
</tr>
<tr>
<td>Environmentally friendly</td>
<td>4.11</td>
<td>0.54</td>
</tr>
<tr>
<td>Takes into account animal welfare</td>
<td>3.86</td>
<td>0.80</td>
</tr>
<tr>
<td>Tasty</td>
<td>4.54</td>
<td>0.59</td>
</tr>
<tr>
<td>Cheap</td>
<td>3.69</td>
<td>0.80</td>
</tr>
<tr>
<td>Filling enough</td>
<td>3.98</td>
<td>0.70</td>
</tr>
<tr>
<td>Easy to cook</td>
<td>3.78</td>
<td>0.87</td>
</tr>
</tbody>
</table>

\(^\text{a}\) Measured on a 5-point Likert scale from fully disagree (1) to fully agree (5).

Discussion and conclusion

This paper contributes to the current studies on nudging as tool to promote healthier eating in food service and addresses some of the issues stated by previous work (Bauer and Reisch, 2019; Bucher et al., 2016; T. R. Nørnberg, Houby, Jørgensen, He and Perez-Cueto, 2014; Trine Riebeling Nørnberg, Skov, et al., 2016; Perez-Cueto, 2019). First, it shows that designing the menu card has a quantifiable and significant influence in the choice made by customers, and the effect is of similar magnitude as reported previously (Saulais et al., 2019). Second, it shows that the implementation of the nudge can be refined. In the studies performed earlier we chose to simply adding a bold line box around the chosen item to the control menu (Hartwell et al., 2020), with limited effect among adolescents (dos Santos et al., 2020) or older consumers (Zhou et al., 2019). In this case, we preselected the choice, and additional to the bold box around the DoD, we specifically indicated that the participants could ask for alternatives, but those alternatives were intentionally not shown on the intervention menu card. It required actively pursuing the alternative. Third, it shows that the effect of this kind of nudge is independent of the dietary lifestyle, as participants were mainly self-reported omnivores or flexitarians, and congruent with other studies (Bacon and Krpan, 2018).

This paper has strengths and limitations. The usual limitation of observational laboratory is the sample size and the external validity of the study. For the sample size we calculated that the number of paired observations needed to achieve a power of 0.844 is of minimum 11 while the study included 33 paired observations. Therefore, this is a robust experiment, and overcomes the initial limitation. The issue of scalability to real life operations remains unknown. The study, however, is robust enough to suggest that simple measures implemented by foodservice, such as redesigning the menu, could achieve more sustainable or healthier food choices even in larger settings, as findings are aligned to what has been reported elsewhere (Bergeron et al., 2019; Saulais et al., 2019). Moreover, it was carried out at the Future Consumer Lab, and as such, it provided a unique setting that is very similar to a real restaurant in terms of preparing, serving, eating and evaluating meals.

In conclusion, menu design and innovative meal design can contribute jointly to the uptake of plant-based meals in foodservice. The nudge strategy resulted in 85% of participants choosing the DoD. This is a simple way to involve foodservice in transforming its offer towards
more sustainable and healthy meals.

Implications for gastronomy

This paper provides insights on how gastronomy offerings can be made more sustainable and healthy without compromising taste. It showcases how the Gastronomy sector can respond to growing consumer demand towards plant-rich foods.

Moreover, by facilitating the choice through simple strategies as menu design and strategic selection of the dish of the day, the sector can contribute to the desired societal shift towards mainstream consumption of foods with lower environmental impact, namely using more vegetables and pulses in the offer.

The communication provides example of designed meals (3 course meals) with a single appetizer colored arepas filled with caju cream, three main plant-based dishes, eggplant lasagna, black bean & quinoa burger and a lentil curry, and finally, a dessert based on fruits and chia seeds.

From a nutritional perspective, it is possible to nudge a dish that has less energy than the others, without compromising the consumer hedonic evaluation of the meal, the perceived satiety and satisfaction.

CRediT authorship contribution statement

Federico J.A. Perez-Cueto: This paper is based on a MSc thesis by Nuria Castellanos-Feijoo supervised by FJACP as stated in the acknowledgement.

Declaration of competing interest

No financial conflicts of interest to declare.

Acknowledgements

This project did not have external funding. Thanks to Nuria Castellanos-Feijoo for collecting the data in the frame of her MSc thesis, for providing access to the database and for the discussions.

Thanks to Sébastien Bergeron, both for his support with the logistics at the laboratory.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jifgs.2021.100346.

References


Bacon, L., Krpan, D., 2018. (Not) Eating for the environment: the impact of restaurant meals) with a single appetizer colored arepas filled with caju cream, three main plant-based dishes, eggplant lasagna, black bean & quinoa burger and a lentil curry, and finally, a dessert based on fruits and chia seeds.

From a nutritional perspective, it is possible to nudge a dish that has less energy than the others, without compromising the consumer hedonic evaluation of the meal, the perceived satiety and satisfaction.

CRediT authorship contribution statement

Federico J.A. Perez-Cueto: This paper is based on a MSc thesis by Nuria Castellanos-Feijoo supervised by FJACP as stated in the acknowledgement.

Declaration of competing interest

No financial conflicts of interest to declare.

Acknowledgements

This project did not have external funding. Thanks to Nuria Castellanos-Feijoo for collecting the data in the frame of her MSc thesis, and for allowing the use of Figs. 1 and 2 in the present manuscript. Thanks to Sanne Sansolios for her support with the logistics at the laboratory.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jifgs.2021.100346.

References


Bacon, L., Krpan, D., 2018. (Not) Eating for the environment: the impact of restaurant meals) with a single appetizer colored arepas filled with caju cream, three main plant-based dishes, eggplant lasagna, black bean & quinoa burger and a lentil curry, and finally, a dessert based on fruits and chia seeds.

From a nutritional perspective, it is possible to nudge a dish that has less energy than the others, without compromising the consumer hedonic evaluation of the meal, the perceived satiety and satisfaction.


