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Nudging healthy and sustainable food choices: three randomized controlled field experiments using a vegetarian lunch-default as a normative signal

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ABSTRACT

Background This study investigates a simple, generic and easily scalable nudge to promote healthy and sustainable food choices at conferences by using a vegetarian lunch-default as a normative signal.

Methods At three conferences, participants registering electronically were randomized into two groups: Group 1 received a standard lunch registration presenting a non-vegetarian buffet as the default, but allowing the active choice of a vegetarian option; Group 2 received a registration presenting a vegetarian buffet as the default, allowing the active choice of a non-vegetarian option. The study also assessed gender differences for two of the conferences and the participants' acceptance of the nudge at one of the conferences.

Results In experiment A the vegetarian choice increased from 2% to 87% ($N = 108$, $P < 0.001$). In experiment B it increased from 6% to 86% ($N = 112$, $P < 0.001$). In experiment C it increased from 12.5% to 89% ($N = 110$, $P < 0.001$). A significant tendency for men, but not women, to opt out of the vegetarian default was found and a clear majority of participants reported positive attitudes toward the nudge.

Conclusions Changing the lunch-default to a vegetarian option is an effective, generic, easy to scale and well-accepted nudge to promote healthy and sustainable food choices at conferences.

Keywords behaviour, environment, food and nutrition

Introduction

In recent years, it has been increasingly recognized that food choices are not only central to health, but also to global sustainability. In particular, meat production and consumption have been linked to dying prematurely, as well as proven to be a central source of CO_2 emissions responsible for ∼15% of the total global CO_2 emission. A 2012 study from Harvard School of Public Health that included >121 000 people followed for an average of 24 years found that the consumption of (especially processed) red meat increased the risk of dying prematurely.[1] A 2014 study of >50 000 British people's diets found that meat-rich diets (>100 g per day) resulted in 7.2 kg CO_2 emission per day, low meat diets 4.7 kg CO_2 emission per day, vegetarian and fish-eating diets caused ∼3.8 kg CO_2 emission per day, while vegan diets were only responsible for ∼2.9 kg CO_2 per day.[2] Thus, changing people's diets from meat consumption to a vegetarian, or even a vegan diet,—at least partially—may thus prove to be a necessary step in the battle against what has become a global food–health crisis as well as climate change.

Research suggests that many food decisions are influenced by non-rational social and contextual factors.[3,4] This has led to the further suggestion that manipulating such factors may provide cheap, effective and non-invasive interventions called 'nudges' to change food choices and consumption.[5,6] A nudge may be theoretically defined as 'a function of (i) any attempt at influencing people's judgment, choice or behaviour in a predictable way (ii) that is motivated because of cognitive boundaries, biases, routines, and habits in individual and social

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decision-making posing barriers for people to perform rationally in their own self-declared interests, and which (iii) works by making use of those boundaries, biases, routines, and habits as integral parts of such attempts.'[7] Nudges may thus be conceived of as subtle psychologically-informed interventions that seek to influence people's decisions, including food decisions, in directions which, when used benignly, better fit their declared self-interests.

In general, 'nudging' is recognized to provide cost-effective and generic strategies for influencing decisions and behaviour.[8] When it comes to nudging healthy and sustainable food choices, the evidence is promising, albeit insufficient. Examples of effective nudges studied include the effect of placing unhealthy foods further away,[9,10] reducing calorie intake by rearranging buffets,[11] reducing calorie intake as well as food waste by reducing plate sizes,[12,13] among others. This tendency of focusing on out-of-home settings is not coincidental. These settings are known to enable generic interventions that may easily be scaled when identified, as well as inspire new 'eating at home' habits. Still, only few robust, generic and effective nudges aimed at healthy and sustainable food choices have been identified, a majority of which are of very weak quality.[14] Some prominent studies in the field have even been retracted recently. For these reasons, the time has come to identify, if possible, and test the effect of simple, generic and easily replicable and scalable nudges for influencing healthy and sustainable food choices.

The current study investigates such a nudge through three randomized controlled field experiments testing a vegetarian lunch-default as a normative signal as part of electronic conference registration forms. From a methodological perspective the intervention is generic, offers high external and ecological validity as well as conditions for running experiments with high internal validity, natural collection of background variables and easy replicability. From a theoretical perspective 'changes in defaults' are known to be a particularly robust and effective strategy for influencing choices.[15,16] At its most simple a default is an option from a choice set that enters into force by default, unless the person choosing actively chooses an alternative option. There are several conditions, under which defaults influence choices: due to inattention; as signals given epistemic uncertainty; as normative signals given preferences for conformity and due to the reduction of friction making the default option the easy one.[17,18] The assumption of this study is that a vegetarian lunch-default may serve as a normative signal about what behaviour is regarded as preferable by the conference organizers, as well as what behaviour to expect from other participants at the conference.[19]

Methods

Design and procedure

The study investigated the effect of a simple, generic and easily scalable intervention attempting to nudge people to make a healthy and sustainable food choice (vegetarian option) in favour of a standard meat option, merely by describing the vegetarian option as the default choice in the electronic conference registration form sent out prior to the conference. This was carried out by running three randomized controlled field experiments at conferences selected by convenience, as they were conferences where one of the authors had been invited to give talks. The conferences took place on the following dates with the described topics and participants:

Experiment A

Citizens expectations about and behaviour relative to the national health services, September 1, 2017, Copenhagen, Denmark. Participants (e-mail recipients = 170; respondents = 108): politicians, decision makers, organizations, and staff representatives within public health.

Experiment B

Consumer behaviour in a Digitalized world, December 4, 2018, Copenhagen, Denmark. Participants (e-mail recipients = 174; respondents = 112): public policy and decision makers within consumer regulation.

Experiment C

Danish Association of Masters and PhDs member-conference, 17 January 2019, Copenhagen, Denmark. Participants (e-mail recipients = 130; respondents = 110): members of the association.

Prior to each conference A, B and C, participants received an e-mail with registration questions (name, title, organization and food preferences for lunch) 3, 7 and 28 days, respectively. Registration was made by pressing a link in the e-mail leading to the form. For Conference A, Excel was used to randomize conference participants into two groups which were then sent each their link for registering through the survey software Enalyzer. For Conference B and C, the e-mail survey software 'SurveyGizmo' was used to randomize participants into groups.

At all three conferences the forms were identical in all relevant aspects for the two groups, with the exception of the question regarding food preferences for lunch (original in Annex A):

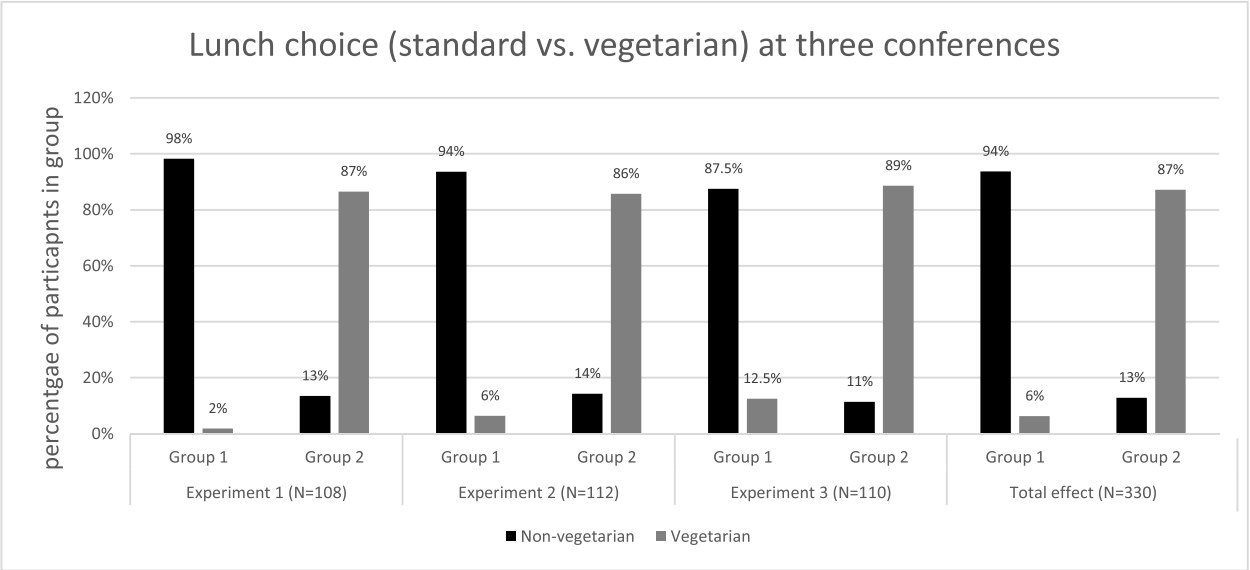

Fig. 1 Lunch choice (standard versus vegetarian) at three conferences.

Group 1: *At the conference a non-vegetarian buffet will be served for lunch. Please state here if you would like to have a vegetarian dish prepared for you:* _____.

Group 2: *At the conference a vegetarian buffet will be served for lunch. Please state here if you would like to have a non-vegetarian dish prepared for you:*_____.

The main independent variable for all three experiments was a default vs. a non-default option (non-vegetarian dish/vegetarian dish). The main dependent variable was the number of people choosing each option. Experiment B and C also collected data on gender, and Experiment C collected data at the conference on the acceptability of the intervention. Fisher's Exact Tests were conducted to test the significance of experimental results.

Results

Experiment A

In Experiment A, 170 conference participants were emailed the registration form and 108 responded (Group 1 = 56, Group 2 = 52). In Group 1, 2% chose the vegetarian option, while in Group 2, 87% chose the vegetarian option (see Fig. 1). Thus, changing the default option had a significant effect ($P < 0.001$).

Experiment B

In Experiment B, 174 conference participants were emailed the registration form and 112 responded (Group 1 = 63, Group 2 = 49). In Group 1, 6% chose the vegetarian option, while in Group 2, 86% chose the vegetarian option (see Fig. 1). Thus, changing the default option again had a significant effect ($P < 0.001$).

Data on gender were also collected in Experiment B.[1] Of the 112 respondents, 58 were women, 45 were men and 9 were left out of the analysis as no name had been provided. In Group 1, 6% of women chose the vegetarian option, while in Group 2, 96% chose the vegetarian option. In Group 1, 8% of men chose the vegetarian option, while in Group 2, 68% chose the vegetarian option.

Keeping in mind the small sample size, there was no significant difference between the tendency for men and women to deviate from the default when the default was non-vegetarian ($P = 1.000$). However, when the default was vegetarian, men had a significantly higher tendency to deviate from the default and choose non-vegetarian than women ($P = 0.032$).

Experiment C

In Experiment C, 130 conference participants were emailed the registration form and 110 responded (Group 1 = 40, Group 2 = 70). In group 1, 12.5% chose the vegetarian option, while in Group 2, 89% chose the vegetarian option (see Fig. 1). Thus, changing the default option again had a significant effect ($P < 0.001$).

Data on gender were also collected in Experiment C based on the respondents' names.[2] Contrary to Experiment B,

1 In experiment B the gender of participants was verified by the organizer The Danish Competition and Consumer Authorities, as the authors were not allowed to contact participants themselves on this issue due to GDPR.

2 For experiment C the gender of participants was determined based on their names. In Denmark gender can be determined on the basis of a person's name as it is defined by law

Experiment C had a strong overweight of women. Of the 110 respondents, 97 were women (Group 1 = 38; Group 2 = 59) and 13 were men (Group 1 = 2, Group 2 = 11). In Group 1, 13% of women chose the vegetarian option, while in Group 2, 95% chose the vegetarian option. In Group 1, 0% of men chose the vegetarian option, while in Group 2, 55% chose the vegetarian option.

Keeping in mind the extremely small sample of men, there was no significant difference between the tendency for men and women to deviate from the default when the default was non-vegetarian ($P = 1.000$). However, when the default was vegetarian, men had a significant higher tendency to deviate from the default than women ($P = 0.002$).

Finally, Experiment C also collected data on the acceptability of the nudge. At the conference, participants were informed in an individual questionnaire about the experiment, its result and that they had been a part of it. They were then asked whether they approved of the nudge or not by answering either 'I approve of changing the default option to a vegetarian buffet' or 'I do not approve of changing the default option to a vegetarian buffet'.

A total of 102 participants were present at the conference (78 had responded to the registration form; 24 were newcomers). The overall approval rate was 85% (8% did not approve and 7% did not answer). Of the 78 that had been exposed to the nudge, 90% approved, 9% did not approve and 1% did not answer. The approval rate was 94% in Group 1 and 87% in Group 2. However, the difference is not statistically significant ($P = 0.693$).

Discussion

Main findings of this study

The study consisted of three randomized controlled field experiments aimed at investigating the effect of nudging people to make more healthy and sustainable food choices, merely by describing the vegetarian option as the default choice in electronic conference registration forms sent out prior to the conference. Two of the experiments also collected data on gender, and one inquired into the acceptability of the nudge as perceived by the participants.

In line with theoretical predictions, simply changing the default consistently and significantly influenced conference participants' food choices. Overall, the three experiments included 330 people (Group 1 = 159; Group 2 = 171). In Group 1, 6% chose the vegetarian option, while in Group 2, 87% chose the vegetarian option (see Fig. 1).

Albeit less strongly, while there is no special tendency relative to gender to deviate from a non-vegetarian default option ($P = 1.000$), men had a significantly higher tendency than women to deviate from a vegetarian default option and choose non-vegetarian ($P < 0.001$). Taking Experiment B and C together, a total of 155 women (Group 1 = 71, Group 2 = 84) and 58 men (Group 1 = 28, Group 2 = 30) participated. In Group 1, 10% of women chose the vegetarian option, while in Group 2, 95% chose the vegetarian option. In Group 1, 7% of men chose the vegetarian option, while in Group 2, 63% chose the vegetarian option.

Finally, it may be concluded that participants generally approved of the nudge. In a 2016 study,[20] Reich and Sunstein test the acceptability of a range of nudges and policy regulations in six European countries, including Denmark. In the category of default nudges, the average approval rate is 54.8% (46.1% for Denmark). The study also tests the acceptability of requiring one meat-free day in public canteens, where the average approval rate is 52.9% (30.1% for Denmark). According to this result, one could expect a lower approval rate for a nudge that changes the default option to a vegetarian buffet at conferences. Our finding of a 90% approval rate does not support this.

What is already known on this topic

Changing people's food choices from meat-rich diets to vegetarian alternatives is increasingly being recognized as an important step, not only relative to personal health, but also relative to combatting global climate change. A growing body of research suggests that behaviours involving irrational components, as in the case of food choices, may be influenced by strategies referred to as 'nudges'. Still, this body of research has had some difficulties in producing strong studies identifying nudges that are both robust, generic and effective interventions aimed at healthy and sustainable food choices.

What this study adds

The study contributes to the literature on three points. Firstly, it successfully identifies that merely presenting the vegetarian option as the default choice in conference registration forms is an effective, robust and generic nudge intervention that significantly influences more healthy and sustainable food choices. This is important, as such settings are known to

what names males and females may acquire. Of the conference participants, all of whom were Danish, 102 participants had names that are exclusively reserved for a particular gender. The eight remaining had names, which in principle are allowed for both genders, e.g. 'Anne' and 'Maria'. The names of the eight persons were compared to the public database from 'Ankestyrelsen' containing names and gender for all Danish citizens to estimate the likelihood of the individual participant being of a particular gender. For instance, there are 45.522 people in Denmark named 'Anne', of which six are male. From this it was estimated that the likely of a participant 'Anne' being female was 99.987% and so on. The gender of the eight participants was determined with the following certainties: 99.987, 99.987, 99.987, 99.955, 99.954, 99.990, 99.990 and 99.990%.

inspire new 'eating at home' habits as well as offering themselves as settings where generic interventions may easily be scaled when first identified.

Secondly, the study identifies a significant moderator in terms of gender. Men are observed to have a significant tendency to opt out of the default option when this is vegetarian. This suggests a particular focus for future iterations of the study presented here.

Thirdly, the study provides evidence on the perceived acceptability of the specific nudge tested. The result contributes to the wider project of studying the perceived acceptability of nudging in general as well as of particular nudges. It also provides evidence to stakeholders when they face uncertainty about the likely reaction of conference participants if they consider changing the default of their registration forms.

Limitations of this study

A limitation of the current study is that it covers three experiments with a total of only 330 food choices. Although the size of the three conferences is standard, more research is needed before generalizing the results to encompass all types of conferences and similar settings. The external validity could benefit from increasing the number of conferences, the variance of participants and the total number of food choices studied. This especially holds when it comes to the moderator of gender and the acceptability of the intervention tested.

Another limitation to the external validity of the study is that all three conferences took place in Denmark and had almost exclusively Danish participants. Further, all three conferences were held in the national capital Copenhagen and mainly involved highly educated people. More research should be carried out before generalizing the findings to other potential groups. Especially, research is encouraged into testing the intervention outside of a Danish context and relative to other educational levels, as well as improving data collection on a variety of background variables to gain more detail about potential individual and social variances.

Still, the current study identifies how describing the vegetarian option as the default in the electronic conference registration form sent out prior to a conference has a robust and significant effect on healthy and sustainable food choices in a widespread eating-out-of-home setting.

Authors' contributions

All authors of the paper qualify for authorship; have agreed upon joint decision about the order of authorship; have participated sufficiently in the work to take public responsibility for the content; have been involved in drafting and revising the article and have read and approved the final version of the manuscript.

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Annex A

The original question (translated into English) asked in the questionnaire: