Predicting Consumer's Nudge Approval for Three Menu Nudges to Guide Individuals Towards Vegetarian Dishes

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Abstract

Most people eat meat when eating out-of-home. Previous studies showed that appealing dish descriptions, recommendations, and visual enhancements are effective in guiding people's food choices and that restaurant owners are positive about using them. For nudges to be effective in real life, the approval regarding them is important as well. As earlier studies showed that nudge approval rates differ a lot, we looked at nudge approval and its predictors (i.e., actual effectiveness and perceived effectiveness) for the three menu nudges. Participants did a menu choice task and answered questions regarding nudge approval, intention to return, and perceived nudge effectiveness. We found a positive relation between the actual and perceived effectiveness of the nudges. Furthermore, the regression analysis showed that perceived effectiveness predicts higher nudge approval, while the actual effectiveness of the nudges did not predict higher or lower approval. Besides, higher age predicted slightly less nudge approval. Furthermore, individuals who studied at secondary vocational education approved less of the nudges than those who studied at university education. Lastly, we saw that appealing dish descriptions and chef's recommendations, but not visual enhancements, resulted in significantly more vegetarian choices. Nudge approval and intention to return were high for all the nudges. So, individuals seem to accept nudges that are intended to influence their behaviour towards less meat consumption, which is among other things healthier and more sustainable.

Keywords: nudge approval, menu nudge, appealing dish description, chef's recommendation, visual enhancement, sustainability, menu choice task

Introduction

Meat consumption has negative consequences for both the environment and people's health. Meat production namely uses a lot of environmental resources (i.e., land and freshwater), produces greenhouse gas emissions, and has negative effects on biodiversity and animal welfare. Next, consuming less meat is beneficial for someone's health. Eating red and especially processed meat is related to diabetes, different kinds of cancer, and cardiovascular diseases (Wolk, 2016). Therefore, different authorities advise a reduction of meat consumption (Kromhout et al., 2016; Naylor et al., 2005; Ranganathan et al., 2016; Rijksoverheid, 2019).

Even though these benefits of eating less meat, 20.2% of The Dutch eat meat every day. Only 4.7% of the Dutch adults does not consume meat (Centraal Bureau voor de Statistiek, 2021). To change people's behaviour, one could use a nudge. A nudge is "any aspect of the choice architecture that alters people's behavior in a predictable way (1) without forbidding any options or (2) significantly changing their economic incentives" (Thaler & Sunstein, 2008, p.6). It is a subtle behaviour change technique that alters people's behaviour by making minor changes in their environment. Most nudges work by affecting people's automatic information processing system, therefore not relying on people's conscious decision-making. (Kawa et al., 2022; Thaler & Sunstein, 2008). Compared to other policy actions, nudging is effective while preserving autonomy (Griffiths & West, 2015). Next, people are more supportive for nudge policies compared to top-down regulation (John et al., 2022). So, nudging is a preferred method to help people reduce their meat intake.

Our study focuses on nudges in an out-of-home-eating setting, as people tend to consume meat more frequently when eating out than when eating at home (Biermann & Rau, 2020). Moreover, nudges have been proven effective in promoting sustainable out-of-home-eating behaviour (Campbell-Arvai et al., 2014; Langen et al., 2022). For this study, we look at menu nudges, which are small changes to the way menu options are presented. We selected nudges that are effective and that restaurant owners are willing to implement. In this way, we could test consumers' approval of nudges that are most likely to be used. Earlier research showed that Dutch restaurant owners are most favourable towards using chef's recommendations, appealing dish descriptions, and visual enhancements (Regio Foodvalley, 2022). The chef's recommendation nudge implies adding a text such as "chef's favourite" to a menu item. This increases the odds of non-vegetarian diners opting for a vegetarian dish by 108% (Bacon & Krpan, 2018). For the appealing dish description nudge, a dish description that increases sensory appeal is used. Changing the description of a vegetarian dish from basic

to appealing increases the amount of vegetarian food taken in a buffet-style cafeteria setting by 7% (Gavireli et al., 2022). Lastly, the visual enhancement nudge implies that you make sure that the dish stands out. Making the vegetarian dish more salient leads to an increase of 6% in sold vegetarian dishes (Kurz, 2018). A meta-analysis comparing different healthy eating nudges over different settings found an effect size of d = .32 for hedonic enhancements, under which appealing descriptions fall. Chef's recommendations would also fall under hedonic enhancements, as they also make the dish more appealing. Visual enhancements were found to be effective to a lesser extent (d = .13; Cadario & Chandon, 2020). Thus, we selected three effective menu nudges that are accepted by restaurant owners.

In this study, we will test consumers approval of these three nudges. Consumers' nudge approval implies that consumers think that the nudge is a good and acceptable strategy. The degree to which consumers approve and support a nudge is relevant for the long-term success of it (Chowdhury, 2021). Additionally, a lack of approval makes the implementation difficult (Proctor et al., 2011). A potential explanation for the failure of nudges is that individuals could perceive the nudge as an unacceptable manipulation (Haim, 2018). The fact that restaurant owners approve on using nudges does not automatically mean that restaurant guest will also agree on using them. Besides, earlier studies showed that the degree to which individuals approve of nudge differs a lot, namely between 20 and 90% (Yan & Yates, 2019). So, it is relevant to know in what degree consumers approve the three menu nudges.

The degree in which consumers approve nudges can be predicted. Previous studies have looked at factors regarding the target behaviour and characteristics of the ones being nudged. For example, individuals are more supportive of nudges that align with their own goals and political views (Sunstein, 2016). And research suggests that people with a more individualistic worldview tend to be less accepting of nudges compared to those with a more communitarian worldview (Hagman et al., 2015). In our study, we will however look at other predictors. The target behaviour is namely the same for the three nudges and if you implement a menu nudge, all restaurant guests will be exposed to the nudge, not only the ones with an individualistic worldview.

In our study we will look at actual and perceived effectiveness. Actual effectiveness is the degree in which participants choose more often for the dish they have been nudged towards. Perceived effectiveness is the degree in which individuals think that a nudge is effective in guiding people's behaviour. Different studies showed that higher perceived effectiveness of a nudge predicts higher acceptance of that nudge (Bang et al., 2020; Cadario & Chandon, 2019; Hall et al., 2018; Petrescu et al., 2016). This suggests that individuals

accept being influenced. However, people's perceptions of which nudges are most effective are not always accurate. Previous research namely showed a small negative correlation between the actual and perceived effectiveness of healthy eating nudges (Cadario & Chandon, 2019). Therefore, we expect to find a negative effect from actual effectiveness on nudge approval, which is in accordance with what Cadario and Chandon (2019) found. Also, in general, public acceptance is lower for more effective interventions targeting health and/or sustainability (Marteau, 2017).

Our research is based on a previous study by Cadario and Chandon (2019), who found that consumers' acceptance of nudges in relation to healthy eating differed between nudges and that this approval was dependent on actual and perceived effectiveness. We will look at the same predictors as they did, but with a different study design. A first difference is that participants in our study will be nudged, while participants in the study of Cadario and Chandon (2019) only read a description of the nudges before being asked about nudge approval. Cadario and Chandon (2019) themselves stated that reading a brief description of the nudge might result in different results than actually being nudged. Secondly, our nudges will be explained as sustainable, instead of healthy. Previous research showed that nudges that focus on private welfare (e.g., health) are favoured over nudges that focus on social welfare (e.g., sustainability; Hagman et al., 2015). A last important difference is that we look specifically at menu nudges for restaurants, while Cadario and Chandon (2019) included supermarkets, cafeterias, and chain restaurants.

As an addition, we will look at people's intention to return. Previous studies have stated the importance of looking at consumer's intention to return and have looked at predictors of people's intention to come back to a restaurant (e.g., price, cleanness, food characteristics; Gupta et al., 2007). But the combination of nudging and intention to return has not yet been tested in an out-of-home eating setting. Therefore, we will test the degree in which consumers have the intention to return as an explorative question.

The main objective of the study is identifying the effects of actual and perceived effectiveness of three menu nudges (i.e., appealing description, visual enhancement, and chef's recommendation) on consumer's approval regarding these nudges after being nudged towards choosing a vegetarian dish. We have established the following three hypotheses:

H1: There is negative relation between the perceived effectiveness and the actual effectiveness of the three nudges.

H2: Higher perceived nudge effectiveness predicts higher nudge approval.

H3: Lower actual nudge effectiveness predicts higher nudge approval.

Methods

Design

To investigate the degree of and relations between perceived effectiveness, actual effectiveness, and approval for the three menu nudges, we used a between-subject experimental design with four conditions: appealing description, visual enhancement, chef's recommendation, and control. The Ethical Review Board of the Faculty of Social and Behavioural Sciences of Utrecht University gave permission for this research (23-0044).

Participants

We did power analyses in G*Power (version 3.1.9.7) whereby we used a significance level of $\alpha = .05$, a power of $\beta = .80$, and medium effect sizes to find the minimum sample size needed. We required 82 participants to find significant results for the correlations, 180 for one ANOVA, and 212 for the other ANOVAs. The regression analysis required a minimum of 98 participants. Thus, we needed at least 212 participants. However, the same data was also used for other studies which needed more participants. Therefore, we collected more participants.

633 individuals started our survey. But 34 individuals were either pescatarian, vegetarian, or vegan, and could for this reason not continue the questionnaire. Hence, only 599 participants continued our survey. We removed one outlier (unrealistic demographics), three people that stated to eat zero days meat in a general week and 34 people that did not finish the menu choice task. Thus, we ended with a sample of 561 participants for the analyses. Out of these, there were 141 participants in the control condition, 138 in the appealing description condition, 139 in the recommendation condition, and 143 in the visual enhancement condition.

The sample consisted mostly of women (70.4%). The average age was 33.8 years (*SD* = 15.04; range 18-81). Most participants had completed or were currently studying at university education (45.5%), followed by higher vocational education (28.9%), secondary vocational education (17.1%) and secondary education (8.6%). On average, participants eat 4.5 days a week meat (*SD* = 1.72; range 1-7).

Measures

Menu choice task

The menu choice task consisted of five menus with each four dishes, which were variations of the same kind of dish (e.g., four kinds of pasta). One of the four dishes was a vegetarian dish. The prices for the different dishes were the same. We altered the position of the vegetarian dish between the five trials. Participants saw one menu at a time and were asked "Which dish would you choose if you were eating out?" Participants saw only the

menus corresponding to the condition they were in. In the appealing dish condition, the vegetarian dish was described more appealing by the addition of a taste word. In the chef's recommendation condition, we added the text "chef's favourite" above the vegetarian dish. In the visual enhancement condition, a box was placed around the vegetarian dish. In the control condition, no nudge was used. An example of the menus, including the nudges, is shown in figure 1. The menu choice task as used by Claessens et al., (2023) was used as starting point to design the menu choice task of this study.

Actual effectiveness

The actual effectiveness of the nudges was measured by how often participants chose the vegetarian dish on the menu. We calculated a proportion score, showing how often participants chose a vegetarian dish out of the five times. This score would range from 0 to 1, where higher numbers would imply that someone choose more often for a vegetarian dish.

Consumer acceptance, intention to return, and perceived effectiveness

To measure consumer acceptance, intention to return, and perceived effectiveness, participants were later shown a menu without a nudge and one with the nudge according to the condition they were in. Participants in the control condition did not answer these questions. In this way, participants only shared their attitudes regarding the nudge they were just exposed to. The menus were accompanied with an information text describing the shown change and its purpose (see Appendix A). Participants answered on five-point Likert-scales the degree in which they agreed with three statements. The Likert-scales ranged from totally disagree to totally agree. For consumers nudge approval the statement "I approve of this strategy" was used. To measure intention to return, we used "I would return to this restaurant (now that I know it uses this strategy)." We used the following statement to measure the perceived effectiveness "This strategy is effective and will therefore ensure that more people will opt for the vegetarian dish (the vegetable burger)."

Procedure

We used Qualtrics to develop and distribute the questionnaire. To recruit participants, we shared the link to the online experiment with our social network using different social media platforms (e.g., WhatsApp, Facebook). Besides, we used the Sona of Utrecht University to recruit bachelor psychology students. Participants were told that they were participating in a study about eating in a restaurant that would take around 5 till 10 minutes. All participants gave informed consent (see Appendix B).

The questionnaire began by asking if people were vegan, vegetarian, or pescatarian. If people choose 'yes' they were sent to the end of the survey. The questionnaire continued with

demographic questions, a ‘menu choice task’, and measurements about nudge approval, perceived nudge effectiveness, and intention to return. At the end, people were debriefed about the purpose of the study (see Appendix C). On average, it took six minutes to finish the whole experiment.

Analysis

To test our first hypothesis, we calculated Pearson correlations between actual and perceived effectiveness using IBM SPSS Statistics (version 26). To test our second and third hypothesis, we did a linear multiple regression analysis to find if actual and/or perceived effectiveness would predict consumers’ nudge approval, while controlling for age, gender, educational level, average days eating meat and condition. Two outliers with z-scores extremer than (-)3 were deleted. We looked at the p-values of both actual nudge effectiveness and perceived nudge effectiveness to test whether these predictors were significant on a level of $\alpha = .05$.

As explorative analyses, we conducted several ANOVAs. We did three ANOVAs to check if the three nudges differed regarding consumer’s approval, intention to return, and perceived effectiveness. We used a Tukey post-hoc test to find which conditions differed significantly in the case that the ANOVA was significant. We also did an ANOVA to check whether participants in the nudge conditions significantly choose a vegetarian dish more often than participants in the control condition. We used the proportions scores as dependent variable. As post-hoc test we compared the control condition with the nudges separately (Tukey). Regarding the statistical assumptions, we found that the assumption of homogeneity of variance was violated when comparing actual effectiveness, nudge approval, and intention to return between the conditions as the Levene Statistic was significant. Due to our comparable sample sizes per condition, the ANOVAs are robust against violations of homogeneity of variance. We did however compare significance levels from the ANOVA with the significance levels from Welch and Brown-Forsythe. After checking for outliers, we decided to delete scores that were more extreme than the third quartile + 1.5*interquartile or first quartile – 1.5*interquartile for actual effectiveness (n=19). For perceived effectiveness, nudge approval, and intention to return we did the analyses with all scores and without extreme outliers (third quartile + 3*interquartile or first quartile – 3*interquartile for actual effectiveness). For nudge approval al scores different from 4 (“agree”) were considered extreme outliers in the appealing dish description (n=52). There were no extreme outliers for both perceived effectiveness and intention to return.

Figure 1

Example of One of the Five Menus as Used in the Four Different Conditions

Appealing dish description

Chef's favourite

Visual enhancement

Control

Note. The original menus were in Dutch.

Results

Descriptives

Means, standard deviations, and Pearson correlations for the whole sample are shown in Table 1 (descriptives for the separate nudges are shown in Appendix D). As shown in table 1, in general, participants approve the nudges (M = 3.71; SD = 0.97), intent to return (M = 3.38; SD = 0.91), and think the nudges are slightly effective (M = 3.25; SD = 0.96). On average, participants chose once (out of five times) a vegetarian dish (M = 0.19; SD = 0.22).

Nudge approval is positively related to perceiving that nudge as being effective (r = .43, p < .001) and having an intention to come back to the imagined restaurant using that nudge strategy (r = .57, p <.001). Especially people who are younger (r = -.17, p = .001), who are more educated (r = .19, p <.001) and/or people who generally eat fewer days meat in a week (r = -.21, p < .001) show higher approval of the nudges. We also found that individuals who eat more days meat in a general week, were less likely to choose a vegetarian dish in our menu choice task (r = -.43, p < .001).

Table 1

Summary of the Means, Standard Deviations, and Pearson Correlations.

Variables	*M*	*SD*	1	2	3	4	5	6	7	8
1. Approval[a]	3.71	0.97	-							
2. Return[a]	3.38	0.91	.57**	-						
3. Per Eff[a]	3.25	0.96	.43**	.28**	-					
4. Act Eff[b]	0.19	0.22	.15**	.20**	.21**	-				
5. Gender[c]	-	-	.08	.10*	.18**	.20**	-			
6. Age	33.77	15.04	-.17**	-.26**	-.06	.01	-.08	-		
7. Education[d]	-	-	.19**	.23**	.11*	.10*	<.01	-.40**	-	
8. Days meat	4.52	1.72	-.21**	-.29**	-.24*	-.43**	-.16**	.10*	-.24**	-

Notes. N = 382 – 561. Per Eff = perceived effectiveness; Act Eff = actual effectiveness; Days meat = days eaten meat in a general week.

[a] Measured on a five-point Likert scale.

[b] Proportion score ranging from 0 to 1.

[c] 1 = Male; 2 = Female; 3 = Non-binary and other.

[d] 1 = Primary education; 2 = Secondary education; 3 = Secondary vocational education; 4 = Higher vocational education; 5 = University.

*p<.05 **p<.01.

Randomization check

We did a randomization check using one-way ANOVAs to check if the conditions differed on a demographic. This was not the case for gender (p = .396), age (p = .287), education (p = .637), and days eating meat in an average week (p = .679). So, it seems like the demographics were indeed randomly divided between the four conditions.

Hypotheses testing

Positive relationship between perceived and actual effectiveness

Contradicting our first hypothesis, we found a positive relationship between perceived and actual effectiveness (r = .21, p < .001). This relation is also significant if we look at only the recommendation nudge (r = .29, p = .001) and the visual enhancement nudge (r = -.23, p = .007), but not for the appealing dish nudge (r =.07, p = .445).

Predictors of nudge approval

To test our other two hypotheses, we conducted a linear regression analysis. As predictors, we included condition, actual effectiveness, perceived effectiveness, and the demographics gender, age, education level and days eating meat in a general week. We excluded the two outliers. The results of the regression analysis are shown in table 2. The model explained 25% of the variance in nudge approval, $F(10, 369) = 12.341$, p < .001. Confirming our second hypothesis, we found that perceived effectiveness was a significant predictor of higher nudge approval, B = 0.41, SE = 0.05, β = .41, p < .001. So, when perceived effectiveness increases with one point, the nudge approval will increase with .41 points. Contradicting our third hypothesis we found a non-significant positive effect from actual effectiveness on nudge approval, B = 0.13, SE = 0.22, β = .03, p = .545. The control variable age turned out to be a significant predictor of nudge approval as well, B = -0.01, SE < 0.01, β = -.13, p = .025. When someone's age increases with one year their nudge approval decreases with 0.01 point. Besides, individuals who followed secondary vocational education compared to individuals who followed university education approved the nudges with .30 point less, B = -0.30, SE = 0.14, β = .12, p = .033. Thus, perceived effectiveness is a positive predictor of nudge approval, while actual effectiveness has no significant influence.

Explorative Analyses

Next to testing our hypotheses, we did explorative analyses to check if there are any differences between the conditions regarding actual effectiveness, perceived effectiveness, nudge approval, and intention to return.

Differences in actual nudge effectiveness

After deleting the 19 outliers, we did an ANOVA to check if the nudges were effective

Table 2

Summary of the Linear Regression Analysis With Nudge Approval as Dependent Variable

Predictor	***B***	***SE***	**β**	***p***
Perceived effectiveness	0.41*	0.05	.41	<.001
Actual effectiveness	0.13	0.22	.03	.545
Condition				
Chef's recommendation (vs. Appealing description)	-0.04	0.11	-.02	.712
Visual enhancements (vs. Appealing description)	-0.09	0.11	-.04	.400
Individual characteristics				
Age	-0.01*	<0.01	-.11	.025
Male	-0.09	0.01	-.05	.344
Secondary education (vs. University)	-0.03	0.17	-0.01	.850
Secondary vocational education (vs. University)	-0.30*	0.14	-.12	.033
Higher vocational education (vs. University)	-0.19	0.11	-.09	.097
Days meat	-0.03	0.03	-.05	.340

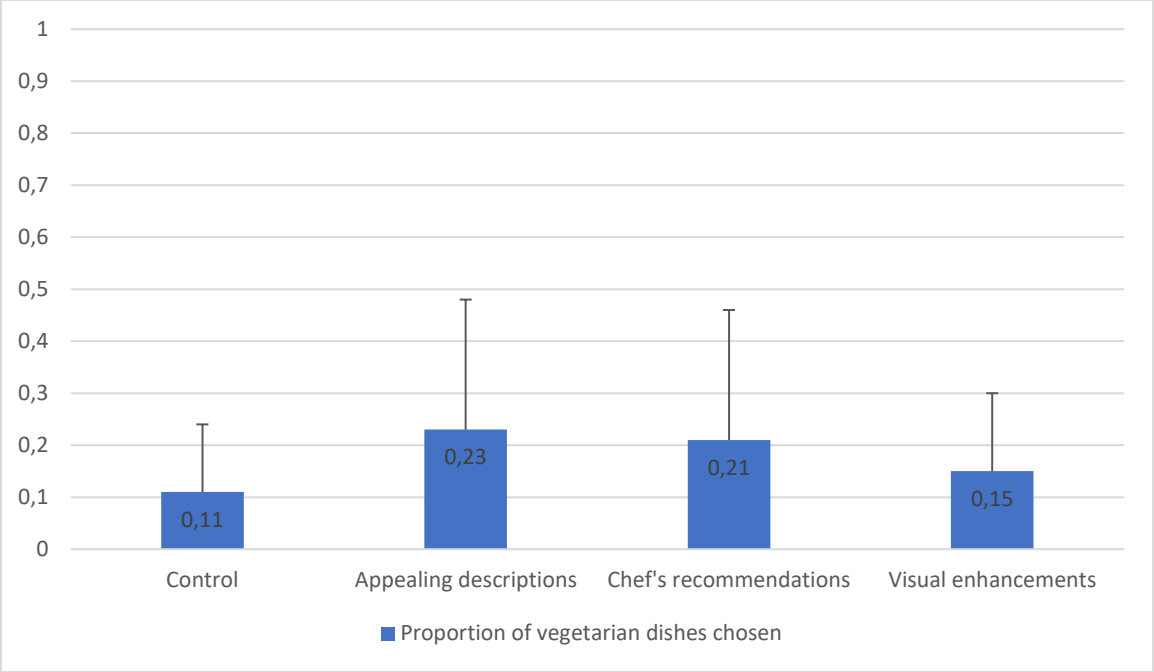
Notes. N = 380. Days meat = days eaten meat in a general week

*p<.01.

and/or differed in their effectivity to nudge people towards a vegetarian dish. We found that the conditions indeed differed significantly in how often participants chose a vegetarian dish, $F(3, 537) = 10.57$, $p < .001$. But the Levene's test showed that the assumption for homogeneity of variances was violated, thus we looked at the Welch and Brown-Forsythe test, which were also significant, $F(3, 292.484) = 12.20$, $p < .001$; $F(3, 436.122) = 10.75$, $p < .001$, respectively. So, we continued with the Tukey post-hoc tests. They showed that both the appealing dish condition ($M = .23$, $SD = .25$) and the recommendation condition ($M = .21$, $SD = .25$) differed significantly from the control condition ($M = .11$, $SD = .13$). Besides, we found that the visual enhancement nudge ($M = .15$, $SD = .15$) was significantly less effective than the appealing dish nudge ($M = .23$, $SD = .25$). Thus, both the appealing dish description nudge and the recommendation nudge are effective nudges. In contrast, the visual enhancement nudge did not lower people's meat choices and was significantly less effective than the recommendation nudge. The proportion scores showing how often participants chose a vegetarian dish in the different conditions is shown in figure 2.

Figure 2

Proportion of Vegetarian Dishes Chosen in the Four Conditions



Differences in nudge approval

The ANOVA with all scores to test whether people's approval rates of the three nudges differed was not significant, $F(2, 379) = 1.86$, $p = .156$. As the Levene's test was significant, and we thus had violated the assumption of homogeneity of variance, we looked at the Welch and Brown-Forsythe tests. They gave the same results, Welch (2, 250.095) = 2.14, $p = .120$; Brown-Forsythe (2, 366.371) = 1.87, $p = .156$.

The ANOVA to compare people's approval rates of the nudges without the 52 outliers was however significant, $F(2,327) = 4.36$, $p = .014$. The Levene's test was again significant, implying that the assumption of homogeneity was violated. We could however not conduct the Welch and Brown-Forsythe test as the variance of the appealing condition was zero. The Tukey post-hoc test showed that the appealing dish description nudge ($M = 4.00$, $SD = 0.00$) received significantly higher approval then the chef's recommendation nudge ($M = 3.68$, $SD = 1.05$) and the visual enhancement nudge ($M = 3.62$, $SD = 1.00$). The findings should however be interpreted with caution.

No differences in intention to return

The ANOVA to test whether people's intention to come back to a restaurant differed for which nudge that restaurant was said to use was non-significant, $F(2, 379) = 1.93$, $p = .414$. Again, the assumption of homogeneity of variance was violated. Therefore, we conducted non-parametric tests, which led us to the same conclusion, Welch $F(2, 248.292) =$

0.90, p = .407; Brown-Forsythe $F(2, 359.004) = 0.89$, p = .413. So, people's intention to return did not significantly differ between the three nudge conditions.

Differences in perceived nudge effectiveness

To test whether people's perceptions of the effectiveness of the nudges differed, we conducted another ANOVA, which was significant, $F(2, 381) = 3.78$, p = .024. A Tukey post-hoc test showed that the appealing description nudge was perceived as being more effective (M = 3.42; SD = 0.87) than the visual enhancement nudge (M = 3.09, SD = 0.98). No other differences were found.

Discussion

In this study, we investigated nudge approval for three nudges and looked at different factors that could predict more nudge approval. We started by looking at the relation between the actual and perceived effectiveness of the nudges. In contrast to our first hypothesis, we found a positive relation. This implies that participants are able to estimate the effectiveness of the nudges. This is different than what Cadario and Chandon (2019) found. An explanation might be that in our study participants were first nudged and then asked about the effectivity, whereas participants of the study of Cadario and Chandon (2019) were not nudged. Consequently, participants in our study could use their experience when indicating the effectiveness. As a result, participants in our study might have been better at estimating the effectiveness of the nudges. An earlier study also showed that perceived effectiveness for self is higher when someone has experienced the nudge (Bang et al., 2020). So, the relation between actual and perceived effectiveness might only be positive when participants have been nudged themselves.

We found evidence for our second hypothesis as perceived effectiveness predicted higher nudge approval. This is in accordance with other studies about nudge approval (Bang et al., 2020; Cadario & Chandon, 2019; Hall et al., 2018; Petrescu et al., 2016). Previous research showed that just informing people about the effectiveness of a nudge has less of an effect on nudge approval than self-perceived effectiveness (Sunstein, 2016). Therefore, choosing a nudge that is in itself perceived as effective by consumers is relevant. Our study showed that appealing descriptions were perceived as more effective than visual enhancements.

In contrast, we did not find that lower actual effectiveness of nudges predicts higher nudge approval and thus rejected our third hypothesis. This in an encouraging finding, as it implies that one can implement nudges that both reduce meat-intake and are well-accepted by

consumers. However, it contradicts the findings of Cadario and Chandon (2019). This could be explained by the fact that they found a negative relation between actual and perceived effectiveness while we found a positive one. Past studies also showed that consumers' attitudes are more influenced by what they think they know than what is actually true (Djupegot & Hansen, 2019). So, the actual nudge effectiveness does not predict approval, while the perceived nudge effectiveness did. Nonetheless, other predictors of nudge approval should also be considered (e.g., education).

Our study showed that the approval rates of appealing dish descriptions, chef's recommendations, and visual enhancements were high. After deleting outliers, we saw that the approval is highest for the appealing dish descriptions nudge. Participants intention to return was a bit lower and did not differ between the nudge conditions. We could however not compare the intention to return of the nudge conditions with the control condition as we did not measure it in the control condition. Therefore, we do not know whether using nudges to guide individuals towards a vegetarian dish in general has an influence on intention to return. Hence, we advise to measure intention to return also for the control condition in future studies. Nevertheless, we still conclude that implementing any of the menu nudges could result in public approval and restaurant guests returning.

Lastly, our study showed that appealing dish descriptions and chef's recommendations resulted in significantly more vegetarian dish selections. Visual enhancements did however not significantly influence people's dish choices in our study. Based on the meta-analysis of Cadario and Chandon (2020) one would expect that all three nudges would be effective, and that visual enhancements would be least effective. The inability to show an effect in this study might be explained by how we designed our menu cards. Visual enhancement might not be needed when there are only four dishes to choose between. Next, visual enhancements only attract attention, they do not give information about the dish itself. In contrast, chef's recommendations attract both attention and provide information. Namely the dish is, for some reason, recommended by the chef. Appealing dish descriptions provide information by making the dish itself look tastier and more appealing. Thus, solely drawing attention to a vegetarian dish might not be enough to effectively influence people's behaviour. People may need extra information which positively influences their expectations about the dish.

Implications

When implementing a new nudge, that nudge should at least be proven to be effective. We found that both appealing dish descriptions and chef's recommendations were effective and thus resulted in less meat choices. Secondly, nudges should be accepted by the ones

implementing them. Previous research showed that all three nudges were accepted by restaurant owners (Regio Foodvalley, 2022). Thirdly, the nudge should be approved by the ones being nudged, as this will ease the implication process (Proctor et al., 2011). We showed that nudge approval is high for all three nudges. Although, our results suggest that appealing dish descriptions are most approved. Based on these results, we would recommend using appealing dish descriptions when one wants to lower the meat consumption of restaurant guest. Based on our findings, it is however not clear what the nudge approval rates would be if the nudges were used in a different setting or for a different goal. The acceptability of a nudge depends namely also on other factors which were constant in our study (e.g., target behaviour, nationality; Van Gestel et al., 2021; Loibl et al., 2018). So, we can only say that in a Dutch setting appealing dish descriptions used to nudge restaurant guest towards a vegetarian dish are effective and approved, and therefore favourable.

Limitations and recommendations for future research

Our study has however several limitations that one should keep in mind when looking at the results. Firstly, filling in a questionnaire on your own is a totally different experience than choosing a dish in a restaurant. In a restaurant setting, individuals are likely to base their choice on other factors as well (e.g., what others are ordering, price). However, our experiment setup might resemble online food ordering, which is becoming increasingly prevalent. Secondly, nudge approval, perceived effectiveness, and intention to return could be measured in a different way in future studies. For example, by using multiple 7-point Likert scale items. One would then have data that is more linear. Next, perceived effectiveness could additionally be measured by asking participants which percentage of restaurant guest they think would choose for the vegetarian dish. Lastly, we already mentioned that intention to return should also be measured in the control condition to see if sustainable nudges in general make an impact on people's intention to return to a restaurant.

Conclusion

In summary, perceived effectiveness, but not actual effectiveness, predicts nudge approval for appealing descriptions, chef's recommendations, and visual enhancements when used to guide individuals towards choosing a vegetarian dish. Besides, we showed that actual and perceived effectiveness were positively related to each other. We also found that nudge approval was high for the three menu nudges. Especially appealing dish descriptions received high levels of approval. However, only appealing dish descriptions and chef's recommendations resulted in more vegetarian dish selections. Therefore, we recommend using appealing dish descriptions to guide individuals towards more sustainable food choices

in an out-of-home-eating setting. So, our study provides relevant information for policymakers and restaurant owners on which nudges one should implement and shows again that perceived effectiveness is an important factor regarding nudge approval.

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Appendix A – Explanation of the nudge to the participants

A Dutch version of the following text has been used to explain the nudge to participants after they had been nudge. (Translated with ChatGBT; OpenAI, 2023)

Above, you can see two variations of one of the menu cards from which you previously selected a dish. As you can see, *the description of the top dish has been adjusted/ the text "chef's favourite" has been added to the top dish/ a border has been placed around the top dish* on the second menu card.
With this strategy, the restaurant aims to encourage more people to choose the vegetarian dish (the vegetable burger). In this way, this restaurant helps you make a more sustainable choice.

Appendix B – Informed consent

The original informed consent was in Dutch. The following translation is generated by ChatGPT (OpenAI, 2023).

Good day,

For our Master's thesis, which we are writing as part of the "Social, Health, and Organisational Psychology" program at the University of Utrecht, we are conducting research on food choices in a restaurant setting. The focus is on dish preferences, dish expectations, and acceptance of behavioral influence. We will measure this through an online experiment and a series of questions. You will be asked to choose a dish from a menu card several times. Afterwards, there will be a number of closed-ended questions. Participation in this study will take approximately 5 to 10 minutes in total. To participate in this research, you must be at least 18 years old and a resident of the Netherlands. You cannot take part in this study if you follow a vegetarian (no meat or fish), vegan (no animal products at all), or pescatarian (no meat) diet. You may now close the survey if this applies to you.

This research has been approved by the Ethics Review Board of the Faculty of Social & Behavioral Sciences at the University of Utrecht (under number 23-0044). Before choosing to participate in this study, we want to inform you that participation is entirely voluntary. At any time during the study, you can withdraw for any reason. Additionally, this research is completely anonymous. The data you provide cannot be traced back to you in any way. The collected data will be stored for 10 years in an anonymized format, accessible only to the researchers.

If you have any questions, comments, or complaints, please contact one of the researchers listed below.

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Thank you in advance!

By clicking the "I give consent" button, you indicate that you have read the above information and give your consent to participate in this study and the use of your responses. We would like to emphasize once again that you can change your mind at any time during the study and decide to end your participation.

Appendix C - Debriefing

A Dutch version of the following text has been used to debrief all participants at the end of the survey (translated by ChatGPT; OpenAI, 2023)

The questionnaire has been fully completed. Thank you for your participation in this study!

For any questions or comments, please contact the researchers:
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Debriefing
The aim of this study was to investigate whether nudges have an effect on the food choices people make in a restaurant setting. Nudges, in this case, refer to changes in the menu that can influence certain choices. During the experiment, if you indicated that you were not a vegetarian or pescatarian, you were assigned to one of the four experimental conditions. One of these conditions, the control condition, did not include any nudge. In this case, you were shown a standard menu. The other three conditions all featured a nudge in the menu. These included an attractive description of one of the dishes, the designation of one dish as the "chef's favorite," or a frame around one of the dishes. The goal was to encourage people to choose vegetarian dishes more frequently, as these dishes are more sustainable than meat-containing dishes. Additionally, vegetarian eating can also have health benefits.

We were unable to inform you about the exact purpose of this study in advance, as it could have influenced your choices during the experiment.

Appendix D – Descriptives for the three nudge strategies separate

Table D1

Summary of the Means, Standard Deviations, and Pearson Correlations for the appealing dish nudge.

Variables	*M*	*SD*	1	2	3	4
1. Approval	3.85	0.83	-			
2. Return	3.44	0.75	.37**	-		
3. Per Eff	3.42	0.87	.40**	.21*	-	
4. Act Eff	0.23	.25	.09	.20*	.07	-

Notes. N=125. Per Eff = perceived effectiveness; Act Eff = actual effectiveness. The first three variables are measured on a five-points Likert scale. Actual effectiveness is a proportion score with scores between 0 and 1.

*p<.05 **p<.01.

Table D2

Summary of the Means, Standard Deviations, and Pearson Correlations for the recommendation nudge.

Variables	*M*	*SD*	1	2	3	4
1. Approval	3.68	1.05	-			
2. Return	3.42	1.01	.68**	-		
3. Per Eff	3.25	0.99	.41**	.30**	-	
4. Act Eff	0.21	.25	.18	.25**	.29**	-

Notes. N=124. Per Eff = perceived effectiveness; Act Eff = actual effectiveness. The first three variables are measured on a five-points Likert scale. Actual effectiveness is a proportion score with scores between 0 and 1.

**p<.01.

Table D3

Summary of the Means, Standard Deviations, and Pearson Correlations for the visual enhancement nudge.

Variables	*M*	*SD*	1	2	3	4
1. Approval	3.62	1.01	-			
2. Return	3.30	0.96	.59**	-		
3. Per Eff	3.09	0.98	.45**	.30**	-	
4. Act Eff	0.18	.20	.16	.14	.23**	-

Notes. N=133. Per Eff = perceived effectiveness; Act Eff = actual effectiveness. The first three variables are measured on a five-points Likert scale. Actual effectiveness is a proportion score with scores between 0 and 1.

**p<.01.