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Fish versus Meat – Nudging the Healthier Choice of Food in Hotel Lunch Buffets

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ABSTRACT

Background One of the objectives of the Norwegian National Action Plan for Healthy Diets (2017-2021) is to increase the intake of fish. The aim of this study was to encourage hotel guests to choose more fish and less meat by altering the choice architecture of hotel lunch buffets with the use of placement and labeling nudges.

Methods An experimental study was conducted with three conditions: meat before fish (A), fish before meat (B), and fish before meat including a sign with the text "Eat Smart" placed on the fish dish (C). Conference guests at three hotels were observed during lunch. The number of entrées taken, and the average portion size, was measured.

Results The percentage of guests selecting meat decreased in both condition B (48.5%) and condition C (56.1%) compared to condition A (60.3%). The percentage of guests selecting fish increased in both condition B (27.9%) and condition C (34.9%) compared to condition A (23.8%). However, the average amount of fish consumed per guest decreased in condition B (154 grams) and C (159 grams) compared to condition A (238 grams). The effect of the two nudges varied between the hotels.

Conclusions Rearranging food order and using signs can nudge conference attendees toward healthier choices. Differences between the hotels might be due to the different designs of the buffets. It is therefore crucial to include the microenvironment when doing interventions.

Background

The World Health Organization (WHO) claims that 80 % of heart attacks, 90 % of cases of type 2 diabetes, and more than 30 % of cancer cases could be prevented with dietary changes and exercise [1]. To cope with these challenges, one of the Norwegian health authorities' recommendations is to eat more fish and less red meat [2]. In recent years the fish consumption in Norway has fallen sharply [3]. The reasons for the decrease in fish consumption is multifaceted: prices, trends and concern regarding farmed fish are among the variables that might influence the intake. One of the objectives of the Norwegian National Action Plan for Healthy Diets (2017-2021) is to increase the intake of fish and seafood by 20 % before the end of 2021. To increase the consumption of fish it is recommended to eat fish for dinner two to three times a week. Additionally, it is recommended to use more fish and fish products for breakfast and lunch to accompany bread.

A recent WHO report [4] suggests that changing the food environment is a promising preventive solution. In recent years, there has been increasing interest in how changes in context can stimulate consumers to make healthier choices. Although most people value their health, they still make choices every day that undermine it. Immediate and/or certain reward is more valued than less certain and delayed rewards [5]. The chocolate bar glimpsed at the cashier and the sweets and desserts at a lunch buffet are both opportunities for immediate satisfaction that can result in weight gain. Such temptations are everywhere, and one way to change a person's unhealthy behavior is to alter the environmental cues to prompt healthier choices. One approach to do this is to utilize nudging. Nudging is defined by Thaler and Sunstein [6] as "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" (p. 6). The use of nudging implies structuring the choice architecture to stimulate people towards more optimal outcomes without relying on any rational reasoning process [7]. The idea is based on behavioral science research showing that many decisions are made fast, intuitively and instinctively [8]. Poelman [9] completed a study showing that individuals with lower BMI (< 25 kg/m2) make use of behavioral strategies to avoid buying and eating unhealthy foods or over eating. This is an indicator that slim people already deploy nudge-like methods for themselves in food-related situations [10].

Previous studies show that rearranging the food order [11], plate size [12], menu-order [13], availability [14], and a wide range of other environmental factors can influence choice behavior [15]. While the effect of a nudge may appear small - eating a few less bites at each meal or engaging in 15 additional minutes of physical activity each day [16] - the accumulated effect of well-implemented nudges can make a noticeable difference over time. The aim of this study was to encourage hotel guests to choose to eat more of the healthier fish options and less meat.

The research questions are twofold:

1. Will the order of food matter when encouraging people to make a healthier food choice?
   - If people see fish first, will they choose fish more frequently?
   - Will a sign on the fish dish encourage people to choose fish more frequently?
2. Will the order of food affect the amount consumed?
   - If people see fish first, would they consume more fish?
   - Will a sign on the fish dish encourage people to consume more fish?

Method

Participants and Research Setting

Conference guests at three hotels belonging to the same chain in Oslo, Norway, participated in this

Buffet at hotel 1. Foto: Knut Ivar Karevold

Buffet at hotel 3. Foto: Knut Ivar Karevold

field experiment. The three hotels were one airport hotel (hotel 1), one city hotel (hotel 2), and one suburban hotel (hotel 3). All guests (3825 guests at hotel 1, 3710 guests at hotel 2, and 2167 guests at hotel 3) attending the hotels lunch buffets on Monday through Friday from April to June in 2015, corresponding to a total of 47 days, were observed.

Procedure

Study Design. The intervention included two nudges: placement and sign. During the placement intervention, the fish dish was moved to the first position in the buffet. The labeling intervention involved a small sign suggesting to "Eat Smart" on the fish dishes (Picture 1). There were three conditions: In condition A, the meat was placed first; in condition B, the fish was placed first; in condition C, the fish was placed first and the "Eat Smart" sign was placed next to the fish. Each condition was set up for one month in each hotel. The order of the conditions was counterbalanced across the hotels to ensure that guests had not been influenced by seasonal effects and confounding factors.

Buffet at hotel 2. Foto: Knut Ivar Karevold

The order was: hotel 1: A, B, C; hotel 2: C, A, B; hotel 3: B, C, A.

Measures. In hotel 1 (Picture 2), the buffet was placed in the center of the room with dishes displayed on open trays, allowing guests to approach and see the food options from all directions. In hotel 2 (Picture 3), the dishes were placed in open trays on a buffet that could only be approached from one direction and the guests queued up in a line. In hotel 3 (Picture 4), the dishes were placed under lids on a buffet that could only be approached in a line from one direction, and the guests had to open each lid to see and take the dishes.

Using a pen, trained observers recorded the number of guests taken meat and fish on an observation form developed for this experiment. Tallying was used to record the number of servings, and the tally was counted and recorded at the end of each day. There was one observer per buffet, and the observers were placed as discretely as possible in a corner of the buffets. It was close enough to record, but far enough not to interfere with the guests. An inter-observer agreement test was conducted during one 90-min meal in the first week of observation, showing an inter-rater reliability of 92%. The total weight in grams of all fish and meat entrées available on each buffet was registered before and after lunch to calculate the total amount consumed. The total serving amount was then divided by the total number of guests to compute the average amount consumed per guest.

Data Analysis. At each hotel the percentage of guests who selected fish and meat was calculated. In addition, the amounts consumed of the two dishes were calculated in grams per guest per day at each hotel. SPSS® version 24 was used for the statistical calculations. To control for the differences in the total number of participants, we replicated the average consumptions and average selection percentages in corresponding to total participants at each hotel and each observed day. The statistical significance of difference between conditions was tested using ANOVA F-test.

Results

During the study, the average percentage of guests selecting fish was 29 %, while 54 % selected meat across all conditions at the three hotels. The average amounts of fish consumed per guest varied from 111 to 253 grams, while the average amounts of meat per guest varied from 71 to 317 grams, over the three conditions.

In hotel 1 there was a 21.8 % decrease in guests selecting meat when condition B was implemented versus condition A (34.3 % vs. 56.1 %, $p < 0.01$), while the percentage of guests selecting fish increased by 1.6 % (31.2 % vs. 29.6 %, $p < 0.01$). However, the effect disappeared when the "Eat Smart" sign was added in condition C where the percentage of guests selecting meat went back to 54 % ($p < 0.01$). See Table I for the percentage of guests selecting fish and meat. In addition, hotel 1 experienced an increase in the average amount of meat consumption when condition B was implemented compared to condition A; from 173 to 317 grams ($F(1, 995) = 860.943$, $p < 0.01$). Hotel 1 experienced a small decline in the average amount of fish consumption from condition A through condition C (253 vs. 182 vs. 165 grams; $F(2, 1{,}451) = 89.749$, $p < 0.01$), as presented in Table II.

Hotel 2 experienced a significant increase in selections of fish when condition B was implemented

Table I *Proportions of guests who selected fish and meat entrées at hotel lunch buffets.*

	CONDITION			F TEST			
	A Mean (SD)	B Mean (SD)	C Mean (SD)	A vs. B[a] (p-value)	B vs. C[a] (p-value)	A vs. C[a] (p-value)	ABC[b] (p-value)
Hotel 1							
Fish Entrée %	29.6 (13.8)	31.2 (11.9)	49.7 (19.2)	8.397 (0.01)	977.766 (<0.001)	741.517 (<0.001)	688.577 (<0.001)
Meat Entrée %	56.1 (16.1)	34.3 (11.7)	54.0 (29.0)	1431.114 (<0.001)	576.121 (<0.001)	3.976 (0.05)	433.145 (<0.001)
Hotel 2							
Fish Entrée %	19.4 (8.2)	28.3 (6.0)	28.2 (8.4)	717.392 (<0.001)	0.189 (0.66)	781.056 (<0.001)	514.592 (<0.001)
Meat Entrée %	69.2 (14.4)	56.2 (8.8)	53.2 (11.4)	538.518 (<0.001)	46.377 (<0.001)	1101.226 (<0.001)	655.056 (<0.001)
Hotel 3							
Fish Entrée %	23.9 (8.2)	21.7 (8.6)	20.7 (7.0)	24.086 (<0.001)	6.446 (0.01)	60.625 (<0.001)	28.141 (<0.001)
Meat Entrée %	48.5 (13.0)	65.6 (18.8)	66.7 (21.3)	369.96 (<0.001)	1.196 (0.27)	334.687 (<0.001)	198.478 (<0.001)
All Three Hotels							
Fish Entrée %	23.8 (11.3)	27.9 (10.5)	34.9 (17.9)	206.821 (<0.001)	369.809 (<0.001)	809.672 (<0.001)	522.01 (<0.001)
Meat Entrée %	60.3 (17.0)	48.5 (19.1)	56.1 (22.2)	612.992 (<0.001)	233.314 (<0.001)	68.025 (<0.001)	269.858 (<0.001)

Note. Condition A, the meat entrée was placed first; condition B, the fish entrée was placed first; condition C, the fish entrée was placed first with a "Eat Smart" sign placed next to the fish. SD: Standard Deviation.

[a] These data were analyzed with one-way ANOVA to examine the effect of placements and signage on the average proportion of guests who selected meat entrée and fish entrée between each pair of conditions: A vs. B, B vs. C, and A vs C.

[b] The one-way ANOVA was conducted to examine the effect of placements and signage on the average proportion of guests who selected meat entrées and fish entrées among all three conditions.

compared to when condition A was implemented (28.3 % vs. 19.4 %; $p < 0.01$). However, in hotel 2, there was no significant change in the percentage of guests selecting fish when condition C was set up compared to condition B (28.3 % vs. 28.2 %; $p > 0.05$). Hotel 2 experienced a decrease in the percentage of guests selecting meat in both condition B (56.2 %) and condition C (53.2 %) compared to condition A (69.2 %), as presented in Table I. In addition, hotel 2 experienced a decline of more than 20 % in the average amount of fish consumption (-41 grams) from condition A (182 grams) to condition C (141 grams) ($F(1, 700) = 20.180$, $p < 0.01$). In hotel 2, the average amount of meat consumed was low compared to the other two hotels, but the average grams consumed increased slightly throughout all three conditions (95 vs. 109 vs. 124 grams; $F(2, 2{,}189) = 101.157$, $p < 0.01$).

In hotel 3, the percentage of guests selecting meat increased in both condition B (65.4 %) and condition C (63.8 %) compared to condition A (48.5 %). Furthermore, compared to condition A, when the percentage of guests selecting fish was 23.9 %, there was a small decline in fish selection in both condition B (21.7 %) and condition C (20.7 %), as presented in Table I. Condition B led to a decrease in average consumption of fish, while in condition C the average consumption increased closer to the baseline level. The average consumption of fish was 205, 122, and 164 grams in condition A, B, and C, respectively ($F(2, 472) = 91.569$, $p < 0.01$) while the average consumption of meat was 160, 199, and 71 grams in the condition A, B, and C respectively ($F(2, 1{,}302) = 320.508$, $p < 0.01$).

In all three hotels, the percentage of guests selecting meat decreased in both condition B (48.5 %) and condition C (56.1 %) compared to condition A (60.3 %). Furth-

Table II *Average consumption of fish and meat entrées at hotel lunch buffets.*

	CONDITION			F-TEST			
	A Mean (SD)	B Mean (SD)	C Mean (SD)	A vs. B[a] (p-value)	B vs. C[a] (p-value)	A vs. C[a] (p-value)	ABC[b] (p-value)
Hotel 1							
Fish Entrée (gram)	253.03 (138.91)	182.52 (108.46)	165.45 (48.97)	56.989 (<0.001)	13.728 (<0.001)	217.982 (<0.001)	89.749 (<0.001)
Meat Entrée (gram)	172.8 (67.39)	317.3 (86.94)	210.12 (50.84)	860.943 (<0.001)	771.584 (<0.001)	126.762 (<0.001)	633.266 (<0.001)
Hotel 2							
Fish Entrée (gram)	182.05 (170.84)	110.97 (27.07)	140.88 (71.29)	40.179 (<0.001)	39.005 (<0.001)	20.18 (<0.001)	30.215 (<0.001)
Meat Entrée (gram)	94.61 (15.33)	109.26 (37.7)	123.9 (59.45)	97.659 (<0.001)	23.612 (<0.001)	190.75 (<0.001)	101.157 (<0.001)
Hotel 3							
Fish Entrée (gram)	204.96 (53.18)	121.86 (48.02)	164.33 (62.2)	213.59 (<0.001)	49.352 (<0.001)	36.322 (<0.001)	91.569 (<0.001)
Meat Entrée (gram)	160.31 (60.94)	198.91 (116.65)	71.2 (26.17)	27.305 (<0.001)	555.84 (<0.001)	790.373 (<0.001)	320.508 (<0.001)
All Three Hotels							
Fish Entrée (gram)	238.47 (168.8)	153.56 (101.01)	159.43 (62.93)	555.951 (<0.001)	8.843 (<0.001)	712.742 (<0.001)	509.998 (<0.001)
Meat Entrée (gram)	131.53 (57.4)	234.77 (127.2)	151.59 (80.25)	1505.61 (<0.001)	1113.358 (<0.001)	124.327 (<0.001)	1051.36 (<0.001)

Note. Condition A, the meat entrée was placed first; condition B, the fish entrée was placed first; condition C, the fish entrée was placed first with a "Eat Smart" sign placed next to the fish. SD: Standard Deviation.

[a] These data were analyzed with one-way ANOVA to examine the effect of placements and signage on the average consumption among guests who selected meat entrée and fish entrée between each pair of conditions: A vs. B, B vs. C, and A vs C.

[b] The one-way ANOVA was conducted to examine the effect of placements and signage on the average consumption among guests who selected meat entrée and fish entrée among all three conditions.

ermore, compared to condition A when the percentage of guests selecting fish was 23.8 %, there was an increase in both condition B (27.9 %) and condition C (34.9 %) as presented in Table I. Condition B led to a decrease in average consumption of fish; similarly, in condition C, consumption decreased compared to the baseline level. The average consumption of fish was 238, 153, and 159 grams in condition A, B, and C respectively ($F(2, 9699) = 509.998$, $p < 0.01$) while the average consumption of meat was 132, 235, and 151 grams in condition A, B, and C respectively ($F(2, 9699) = 1051.360$, $p < 0.01$).

Discussion

Main findings of this study

This study investigated the effects of two well-known and well-tested nudges [17] – placement and labeling – on food choices in three conference lunch buffets. The results show that the effects of the intervention varied between the three sites. In hotel 1, placing fish first did not increase the number of guests who chose fish, but adding the sign led to a significant increase in the number of selections. In hotel 2, placing the fish first did increase the number of guests who selected fish, but adding the sign had no additional effect. In hotel 3, neither food order nor labeling influenced the number of choices. At first glance, this may seem like a random pattern. To further understand how the guests might have been influenced, the microenvironment, buffet layout and design, and guest behavior were all analyzed.

In hotel 1, where food order depended on perspective and the direction of approach, there were no ordering effects on number of guest choices. Here the labels influenced more guests to take fish, suggesting that the sign had a focusing-effect drawing more guests towards the labeled alternative. In

hotel 2, where the dishes were placed in open trays on a buffet that could only be approached from one direction, there was a clear order effect. Adding the sign did not increase serving frequency beyond the ordering effect. In hotel 3, where the dishes were placed under lids, neither the food order nor the label influenced the number of guests who took fish.

This suggests that the micro-design of the buffets influenced the guests' choices. In buffets where dishes are equally visible from all perspectives (like hotel 1), no ordering effects can be expected, but simple signs might catch the guests' attention and influence more guests to take labeled dishes. In buffets where guests queue up and all dishes are easily visible (hotel 2), more guests try the first option, but adding a sign on the first option does not increase the frequency of choices. In buffets where guests queue up, but the dishes are not visible (hotel 3), causing guests to judge each option individually, neither placement nor labeling seems to influence how many guests select the healthier option.

The effects on portion sizes showed a different pattern than the frequency of fish choices. In hotel 1, the portion sizes decreased when fish was placed first and became even smaller when the sign was added. In hotels 2 and 3, the portion sizes also decreased when fish was first, but increased somewhat when the fish was labeled. Thus, in all three hotels portions decreased when fish was placed first, suggesting that more guests sampled less of the first fish options. In Nordic countries, meat is typically the most popular dish at conference lunches. The results suggest that placing the less dominant fish option first can stimulate guests to try a smaller amount of this alternative, while still leaving space for their most preferred meat dish. Further, adding a label might prompt some guests to increase portion size somewhat. The labels influence portion size only in the hotels where the guests form lines, suggesting that signs can interact with placement when people determine how much food they believe they need.

This study aimed at nudging the number of healthier choices and portion sizes of healthier fish options. As a consequence of the intervention, changes in the meat options were also implemented; the meat dishes were moved from the first to second position. Based on the discussion of microenvironments above, we observed no ordering-effects on meat choices in hotel 1 where guests could approach the buffet from all directions. In hotel 2 with a line of guests that could see all options, significantly fewer guests selected meat when this was placed as the second choice, while in hotel 3 the number of guests who selected meat increased significantly when meat was placed in the second position and hidden under a lid. In hotel 1 and 3, the meat portions varied independently of where the meat was placed, while in hotel 2 we observed the same sampling effect for meat in first position as for fish in first position. In hotel 2 with the open buffet and a clear queue of guests, more guests tried the first dish, but took less of it, for both fish and meat in the first position.

What is already known?

Knowledge and traditional ways of dieting do not appear to influence the large changes that are needed to get a slimmer, healthier population. Many nudges appeal to the unconscious chooser, and the effect is persistent since no active choice is being made. Examples of this are smaller plates that lead to smaller meals [18] and that the most available option is picked more often [19]. Previous studies show that nudge interventions in restaurants show variable effects. A recent review of the literature [20] found that 45-60 % of these studies reported significant effects while 17-22 % of the studies reported variable effects depending on design of the interventions and target groups. In general, and independent of consumption context, this review showed that placing could sway food choices in 80-100 % of such interventions, while 25-61 % of the studies of signs and labels showed that these influenced significant changes in choice. Thus, the effects of restaurant nudges are not unanimous and further studies are needed to determine their effects.

What this study adds

The results from the present study suggest that micro-design of lunch buffets influence how well-known and well-studied nudges influence guest choices. The effects of food order can vary depending on how guests are guided to form queues, and whether the available options are visible when the guests line up. When guests are influenced by food order, the additional effects of signage seem to be limited. When guests do not form lines and can approach the alternative dishes from several different directions, signs and labels might influence more guests to select the healthiest options. Guests seem to take smaller samples of the first option, particularly when they can visually observe the forthcoming alternati-

ves later in the buffet, perhaps taking less to ensure sufficient variety in their meal.

Limitations of this study

The present study was an experimental study with three conditions in three locations with a counterbalanced order at the three sites. The study used two complementary dependent variables, number of guest choices and average portion sizes. A limitation of the study was that it did not control for any third variables that might have influenced the choices, such as the attractiveness and taste of the healthy options and how the "Eat Smart" label was interpreted. In addition, no data about the characteristics of the guests – such as age, gender, health and nutritional habits – that might have influenced the outcomes are known.

Conclusions

This intervention was consistent with Norwegian health authorities' recommendations to eat more fish and less red meat [2]. The results suggest that variations in the physical design of restaurants can influence how frequently healthier options are sampled. Consistent with previous research, placement might have a relatively stronger effect than labeling. This study suggests several research questions that can be investigated in future intervention studies, for example how first foods might be sampled in smaller portions when the other alternatives are visually available, and how ordering-effects and signage effects are reduced when the options are hidden and perhaps judged individually. The present study can be considered a smaller scale testing and replication of interventions that previous studies suggest can be effective, where the added value is a more detailed understanding of how local conditions and variations of restaurant design can influence the effectiveness of nudges.

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