

# Small changes in choice architecture in self-service cafeterias

## Do they nudge consumers towards healthier food choices?

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### Abstract

The aim of nudging is to casually influence people to choose more beneficial behaviors of their own free will. In the context of mass catering, “nudging” by improving the availability, visibility, and accessibility of healthy meals could help shift people towards healthier food choices. A study was conducted in a university cafeteria and in a school cafeteria to investigate whether simple nudges really do encourage healthier food and drink choices among diners. Using a pre-test/post-test design, this study investigated, among other things, whether nudging increased the proportion of vegan or vegetarian mains, of fruit as a dessert, of wholegrain snacks, and of water as a drink in the short-, medium-, and long-term. Simple nudges in the university cafeteria led to marked changes in behavior in the desired direction among both students and staff in all three post-test phases. The school cafeteria results were less consistent. Overall, the study showed that nudging is a promising approach and a useful addition to traditional interventions, and it should therefore be pursued further.

**Keywords:** nudging, choice architecture, school and university cafeteria, lunchroom, healthy choice, dietary behaviors

sion-making (known as nudging or choice architecture) helps steer dietary behavior in the desired direction, primarily by addressing automatism [1–5].

In the mass catering setting, nudging aims to help diners make healthier meal choices without forcing anything on them and without restricting the selection of meals on offer. There are a number of nudges that would be suitable for achieving this aim, including making the area surrounding the healthier meals look more attractive, offering an additional benefit when healthy meals are selected, highlighting the healthy choices and giving them priority in displays, presenting them in a more attractive way, making them more available, visible, and accessible, and supporting healthy choices in an unintrusive way through stimuli with targeted cues and recommendations [6]. Such tweaks to the psychological, social, and physical environment can usually be implemented in the food dispensary area, where there is a desire for diners to make healthier or more sustainable food choices, with little effort and using simple measures. There is no need for the measures to be noticed, they affect the choices of many diners at once, they are not aimed at any individual diners, and should usually be implemented without affecting turnover and without restricting freedom of choice [6–8]. In-depth details on how nudging works as an intervention in the mass catering setting are provided in source number [9] in the references below.

### Introduction

Interventional approaches to influencing dietary behavior range from soft instruments used to support good decision-making, such as providing information and labeling, to hard instruments used to steer decision-making, such as economic measures or restricting the available choices. Both measures involving the provision of information and economic measures mainly target conscious decisions and can therefore only have a limited effect on dietary behavior, which is strongly determined by habit and is therefore difficult to change [1]. The newer approach of “softly” guiding deci-

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There are now several reviews [10–15] and two meta-analyses [16, 17] of pooled data on the effectiveness of nudging in the mass catering setting. The reviews show mostly positive, but not always consistent results for various mass catering settings.

Based on positive experiences and results with nudging in various settings and with various populations of diners [18–20], this model project financed by the health insurer Techniker Krankenkasse that forms part of the joint project “Ernährungsverhalten in Bayern und seine Folgekosten” [Dietary behavior in Bavaria



Fig. 1: Food dispensing area at a university cafeteria in Martinsried, Germany: U-shaped line with salad counter in the middle (following the introduction of nudging measures)

| Martinsried university cafeteria run by Studentenwerk München (Munich Students' Union)  | School cafeteria at the Christoph-Probst-Gymnasium (high school)  |
|---|---|
| <b>“healthy choice” aim: increasing the proportion of vegan/vegetarian mains</b>  |   |
| <ul style="list-style-type: none"> <li>listing in the highest position on the menu with a green background</li> <li>attractive highlighting of the dispensing module in green with a smiley</li> </ul>  | <ul style="list-style-type: none"> <li>re-design of the menu sign with green highlighting</li> <li>attractive highlighting of the dispensing area in green</li> <li>dispensing on plates with green edging</li> </ul>   |
| <b>“healthy choice” aim: increasing the proportion of wholegrain baked goods</b>  |   |
| <ul style="list-style-type: none"> <li>attractive highlighting of the dispensing area in green with a smiley</li> </ul>   | <ul style="list-style-type: none"> <li>relocation</li> <li>highlighting in green</li> <li>restricting the view of non-wholegrain baked goods</li> <li>attractive image as a cue</li> </ul>  |
| <b>“healthy choice” aim: increasing the proportion of water</b>   |   |
| <ul style="list-style-type: none"> <li>placing water bottles in several places, including in eye-catching green containers</li> <li>relocation of water in drinks refrigerators to eye level</li> </ul> | <ul style="list-style-type: none"> <li>provision of attractive water cups</li> <li>water droplet sticker on the floor as a signpost</li> <li>attractive design of the water dispenser</li> <li>making the water dispenser easier to use</li> <li>relocating the water within the drinks refrigerator and at the checkout for better visibility</li> </ul> |
| <b>“healthy choice” aim: increasing the proportion of salad at the buffet or as a side dish</b>   |   |
| <ul style="list-style-type: none"> <li>attractive highlighting of the salad bar in green with a smiley</li> </ul>   | <ul style="list-style-type: none"> <li>attractive highlighting in green with an image as a cue</li> <li>relocation of pre-portioned salads</li> <li>making the salad bar easier to use by relocating the salad bowls</li> <li>using green salad bowls</li> </ul>  |
| <b>“healthy choice” aim: increasing the choice of fruit as a dessert</b>  |   |
| <ul style="list-style-type: none"> <li>pre-portioned fruit salad in to-go cups</li> <li>presentation in attractive green fruit bowls at the checkout, in front of the sweets</li> </ul>                 | <ul style="list-style-type: none"> <li>highlighting in green</li> <li>presentation of pieces of fruit on attractive green trays</li> <li>additional presentation of pieces of fruit on attractive shelves next to the cutlery dispenser</li> </ul>  |
| <b>“healthy choice” aim: reducing the proportion of sweets</b>  |   |
| <ul style="list-style-type: none"> <li>presentation behind the fruit in attractive green fruit bowls at the checkout</li> </ul>   | <ul style="list-style-type: none"> <li>restricting the view of the sweets</li> </ul>  |
| <b>all “healthy choice” aims mentioned above</b>  |   |
| <ul style="list-style-type: none"> <li>amusing sayings on monitors, posters, and postcards to take away</li> </ul>  | <ul style="list-style-type: none"> <li>amusing sayings on postcards</li> <li>attractive images as a cue</li> </ul>  |

Tab. 1: Nudging measures implemented at the university cafeteria in Martinsried and at the school cafeteria at Christoph-Probst-Gymnasium in Gilching according to “healthy choice” target variables



Fig. 2: Nudging measures at the university cafeteria  
a) dispensing module for vegan/vegetarian main with green highlighting  
b) placing water bottles in several places, including in eye-catching green containers, and a poster providing a cue  
c) pieces of fruit in green fruit bowls are placed in front of the sweets at the checkout

and its subsequent costs] has now investigated whether nudging alone without any accompanying information or any parallel interventions can improve choice towards healthier choices in a university cafeteria and in a school cafeteria in the short-, medium-, and long-term.

## Methodology

### Selection of cafeterias and study design

Based on practical considerations and cooperation with the providers/caterers, two cafeterias were found that met the pre-defined criteria: no plans to carry out renovations to the food dispensary or make major changes to the food and drink menu during the project period, an electronic payment and billing system, sufficiently large numbers of diners, and a convenient location reachable by Munich regional short-range public transport.

The Martinsried university cafeteria is run by Studentenwerk München [Munich Students' Union] on Campus Martinsried, and during the teaching period it serves around 1,000 lunches per day. The food-dispensing set-up is shown in ♦ Figure 1.

The selected school cafeteria belongs to the Christoph-Probst-Gymnasium in Gilching, an academic high school with a focus on science and

technology, which has over 1,300 pupils and provides optional afternoon schooling (many schools in Germany only provide morning lessons). This cafeteria is run by the catering company IL CIELO, Weßling. However, since both of the selected cafeterias only had one dispensing line, it was not possible to simultaneously compare the dispensing lines that included the interventional changes against unchanged dispensing lines as a control, which meant that the study had to be conducted using a pre-test/post-test design. It was not possible to find cafeterias with a comparable size, location, and diner demographic to use as controls.

### Defining the “healthy choice” aims

Based on generally recognized recommendations for a healthy and sustainable diet (e.g. 10 guidelines of the German Nutrition Society (DGE) for a wholesome diet), and taking into account the known deviations from food-based dietary guidelines among children and adolescents [21] and among adults [22], the study attempted to move the following components of healthy eating in the desired direction at both cafeterias:

- increasing the proportion of vegan or vegetarian mains relative to all mains (in the school cafeteria, vegetarian mains were provided, but no vegan mains),

- increasing the proportion of wholegrain baked goods,
- increasing the proportion of water relative to all drinks,
- increasing the proportion of diners who chose salad from the buffet or as a side dish,
- increasing the proportion of diners who chose cut fruit or pieces of fruit as a dessert,
- reducing the proportion of sweets relative to the product group “miscellaneous items”.

The nudging measures used to achieve these aims were established in close cooperation with Studentenwerk München and with those responsible for the cafeteria at Gymnasium Gilching (school management, caterer, educational authorities), taking account of the baseline situation in each case.

### Data collection and recording

Prior to the introduction of the various nudging measures, the baseline situation in the unaltered food dispensaries (= data collection phase 1) was recorded over a 4-week period from 07 November to 02 December 2016. The measures were introduced just before the Christmas break. To determine the short-term effects, sales data was recorded immediately after the Christmas break (= data collection phase 2), i.e. in the period from 09 January to 03 February 2017. The data required



Fig. 3: Nudging measures at the school cafeteria

- a) redesign of the dispensing area with relocation of various items, green highlighting, and an attractive image of wholegrain baked goods, plus restriction of the view of non-wholegrain baked goods using opaque sticker strips
- b) attractive green highlighting of the salad bar with an image of a salad as a cue, improved ease of use of the salad bar through relocation and the use of green salad bowls
- c) attractive design of the drinking water dispenser and improved ease of use through the provision of attractive water cups directly at the water dispenser and a tray rail to hold the tray while pouring

to determine the medium-term effects was recorded five months after the introduction of the measures (= data collection phase 3), at the university cafeteria, this was the period from 08 May 2017 to 02 June 2017, at the school cafeteria, this was until 24 May 2017 and from 26 June to 30 June 2017. Finally, the data required to determine the long-term effects was recorded eleven months after the introduction of the measures (= data collection phase 4) in the period from 06 November to 01 December 2017. The measures remained in place continuously from 09 January to 01 December 2017. The point of sale system at the Studentenwerk München cafeteria recorded all meal components and all items separately, so no alterations were required in order to record the

data. At the end of each data collection phase, Studentenwerk München provided (in compliance with the relevant data protection legislation) the following daily and cumulative variables for the three cafeteria user groups (students, staff and guests) separately: number of cafeteria users, number of card charges for each individual main course, for all side dishes including pieces of fruit and side salads, for the salad buffet, for all desserts and fruit cups, for all drinks, and for each of the miscellaneous items falling under cakes, snacks, or sweets. Each of the individual items was allocated to the five “healthy choice” target variables mentioned above.

The point of sale system at the Gilching school cafeteria did not record all meal components and items separately, so

some alterations to the system and some additional documentation measures were required in order to record the data. The school cafeteria sent a daily list with the number of billed items (for the number of subscription meals by type [without or with salad and/or dessert], the spontaneously purchased mains, side salads and desserts, salad dishes, snacks, sweets, and drinks bottles). The kitchen team also counted and manually documented the number of portions served of the three mains offered each day, as well as the number of desserts served and the number of subscribers having salad or dessert. In addition, the number of water cups dispensed (for use with the drinking water dispenser) and the number of non-pupils dining at the lunch service was recorded separately and manually.

At the school cafeteria, data recording was restricted to the Monday to Thursday period: Friday was excluded because far fewer diners use the cafeteria on this day and the range of food on offer is therefore reduced accordingly. At all times, it was possible to quickly ask the kitchen team and the caterer about any incomplete documentation or implausible entries, such as unexpectedly high or low sales figures, discrepancies between the data from the kitchen and the data from the point of sale system, etc.

| Diner group | Data collection phase | Days of data collection | Food card transactions | Mains  | Beverages |
|-------------|-----------------------|-------------------------|------------------------|--------|-----------|
| Students    | 1                     | 20                      | 24,822                 | 21,324 | 3,133     |
|             | 2                     | 20                      | 22,324                 | 19,155 | 2,921     |
|             | 3                     | 19                      | 22,653                 | 19,995 | 3,459     |
|             | 4                     | 20                      | 25,112                 | 21,835 | 3,119     |
| Staff       | 1                     | 20                      | 3,364                  | 2,601  | 462       |
|             | 2                     | 20                      | 3,428                  | 2,716  | 484       |
|             | 3                     | 19                      | 3,243                  | 2,653  | 591       |
|             | 4                     | 20                      | 3,450                  | 3,046  | 608       |

Tab. 2: Martinsried university cafeteria: number of cafeteria users and figures for selected bought items by diner group and data collection phase

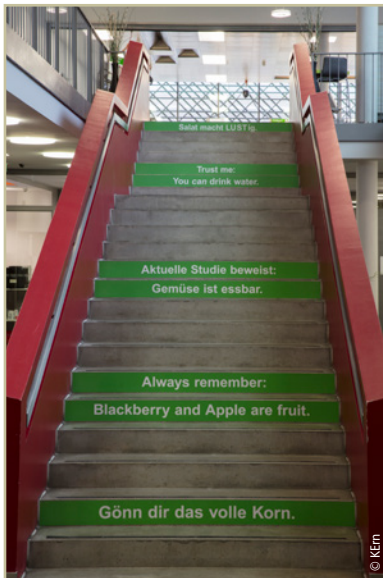


Fig. 4: Banner stickers on the stairs leading up to the Martinsried university cafeteria, which had to be removed for architectural copyright reasons

The data was then allocated to the target variables, and the few remaining implausible entries were not taken into account in the analysis. For the target variables of salad, wholegrain snacks, and water, in each case, only two of the three post-test phases could be taken into account in the analysis. In the case of salad, the short-term change was considered not sufficiently valid due to occasional inconsistencies in the pricing and in pricing communication. The data for the long-term comparison of wholegrain snacks is not sufficiently valid for a comparison due to a reduced range of products available and due to the presence of various competing products. The medium-term change in the proportion of water also appears to be insufficiently valid due to the occasional breakdown of the water dispenser as a result of damage.

### Statistical analysis

Since the number of diners did not stay the same across all data collection phases, the crude frequency of the target variables were inappro-

priate and instead proportions with appropriate reference values had to be calculated. For the proportion of vegan/vegetarian mains, as reference value the sum of all mains was used, and in the case of salad and fruit, the number of cafeteria users. The proportion of water was calculated in relation to the sum of all cold drinks that were selected. The proportion of wholegrain snacks was calculated in relation to the sum of all snacks, and the proportion of sweets was calculated in relation to the sum of all miscellaneous items. The change in the target variables was defined as the difference between the proportions in the three post-test phases compared to the proportion in the pre-test phase. To compare the proportions chi-square tests were carried out. Statistical analyses were performed using the SAS for Windows, Release 9.4 (SAS institute, Cary, NC).

## Results

### Nudging measures implemented

The authors took turns in active participating observations of the food services on all weekdays both before and during data collection phase 1. As a result of this observation, and with the close cooperation of Studentenwerk München and those responsible for the cafeteria at Gymnasium Gilching (school management, caterer, educational authorities), but without any involvement of the diners, the authors were able to compile a catalog of suggested measures. It was possible to implement almost all of these. They are listed in ♦ Table 1. ♦ Figures 2a–c and 3a–c show some examples of the nudges that were implemented. The following measures could not be implemented at the Martinsried university cafeteria for safety rea-

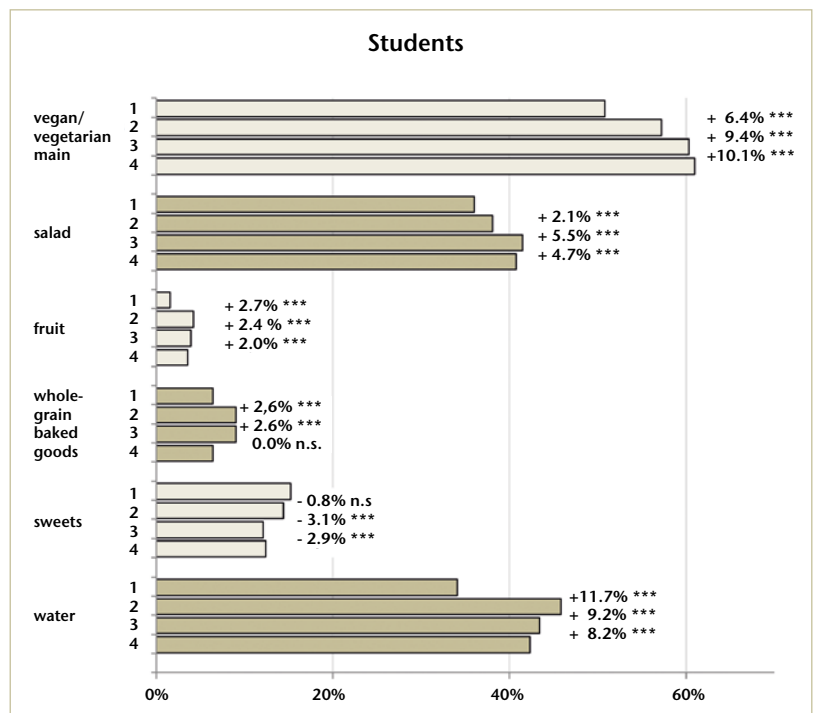


Fig. 5: Students: selection of healthy meals and drinks before (1) introduction of the nudging measures, and in the short- (2), medium- (3), and long-term (4) thereafter

The figure shows the proportion of students choosing salad and fruit, the proportion of vegan or vegetarian mains in reference to all mains, the proportion of water in reference to all drinks, the proportion of wholegrain snacks in reference to all snacks, and the proportion of sweets in reference to all miscellaneous items, and their changes compared to (1).

\* p ≤ 0.05; \*\* p ≤ 0.01; \*\*\* p ≤ 0.001

sons and for structural reasons: Displaying a sample plate in a display case, additionally offering wholegrain baked goods on top of the hood of the salad bar, and additionally offering water bottles on top of the hood of the dessert bar. For reasons of architectural copyright, no appealing food photos were allowed to be put up as a cue in the dining area, and the banner stickers on the stairs leading up to the cafeteria (♦ Figure 4) had to be removed after the short-term effects had been recorded. In the Gilching school cafeteria, it was not possible to relocate the cash desk at the break counter for technical reasons, and it was not possible to replace works of art made by pupils with appealing food photos in the dining hall.

Financially speaking, the cost of the nudges that were implemented was within the range that could be financed using project funds, and the nudges could be implemented with little effort. The material costs for the implementation of all nudging measures in the university cafeteria were in the order of €5,000, and in the school cafeteria, they were in the order of €10,000. The additional working time required for the continuous implementation of the nudging measures (e.g. preparing dishes on green trays, restocking the water, etc.) was estimated by both kitchen teams at a maximum of 0.25 hours per day.

### Changes in food and drink choices: “healthy choices”

Each day, the university cafeteria was used by over 1,100 students and over 168 members of staff on average. Details on the number of billing items selected are provided in ♦ Table 2. Long-term improvements in the choice of healthy food and drink of up to 10% were observed among both students and staff (♦ Figures 5 and 6).

Among students, the proportion of vegan or vegetarian mains increased continuously despite the comparatively high initial proportion of just over 50% at the beginning: by +6.4% in the short-term ( $p \leq 0.001$ ), by +9.4% in the medium-term ( $p \leq 0.001$ ), and by +10.1% in the long-term ( $p \leq 0.001$ ).

The proportion of students who chose salad as a side dish increased by 2.1% ( $p \leq 0.001$ ) in the short-term, by 5.5% ( $p \leq 0.001$ ) in the medium-term, and by 4.7% ( $p \leq 0.001$ ) in the long-term compared to the baseline value.

A desired effect was also found in terms of the selection of fresh fruit for dessert. The proportion of students who chose fruit increased by 2.7% ( $p \leq 0.001$ ) in the short-term, by 2.4% ( $p \leq 0.001$ ) in the medi-

um-term, and by 2.0% ( $p \leq 0.001$ ) in the long-term compared to the baseline value.

In the case of wholegrain snacks, a short and medium-term effect of +2.6% ( $p \leq 0.001$ ) was observed, but in the long-term, the baseline level was reached.

An effect leading in the desired direction was also observed in the case of sweets. The proportion of sweets among student diners decreased by -0.8% in the short-term ( $p = 0.24$ ), by -3.1% in the medium-term ( $p \leq 0.001$ ) and by -2.9% in the long-term ( $p \leq 0.001$ ), although the proportion of ice cream increased by 8.3% in the medium-term, i.e. in the early summer months ( $p \leq 0.001$ ).

The proportion of water in reference to all selected drinks increased in the short-term by 11.7% ( $p \leq 0.001$ ), in the medium-term by 9.2% ( $p \leq 0.001$ ) and in the long-term by 8.2% ( $p \leq 0.001$ ).

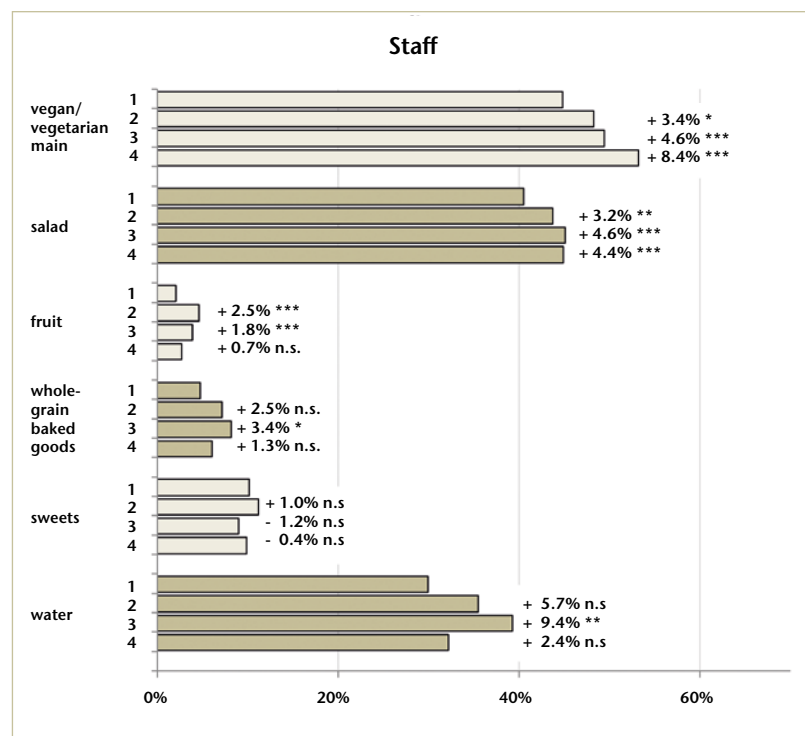


Fig. 6: Staff: selection of healthy meals and drinks before (1) introduction of the nudging measures, and in the short- (2), medium- (3), and long-term (4) thereafter

The figure shows the proportion of staff choosing salad and fruit, the proportion of vegan or vegetarian mains in reference to all mains, the proportion of water in reference to all drinks, the proportion of wholegrain snacks in reference to all snacks, and the proportion of sweets in reference to all miscellaneous items, and their changes compared to (1).

\*  $p \leq 0.05$ ; \*\*  $p \leq 0.01$ ; \*\*\*  $p \leq 0.001$

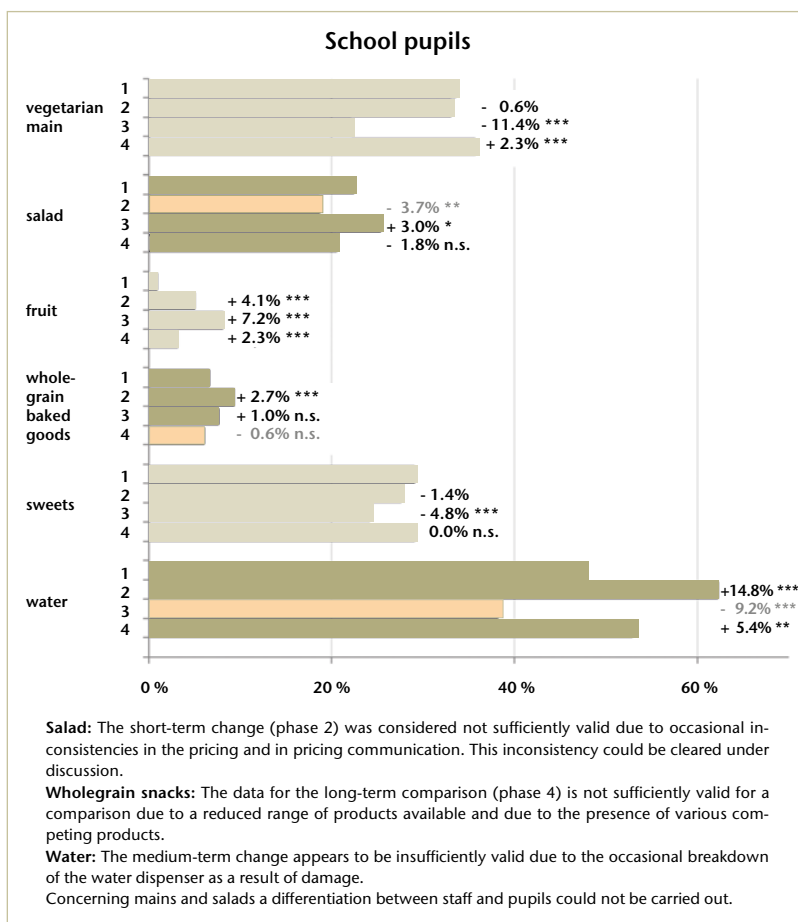


Fig. 7: School pupils: selection of healthy meals and drinks before (1) introduction of the nudging measures, and in the short- (2), medium- (3), and long-term (4) thereafter

The figure shows the proportion of school pupils choosing salad and fruit, the proportion of vegetarian mains in reference to all mains, the proportion of water in reference to all drinks, the proportion of wholegrain snacks in reference to all snacks, and the proportion of sweets in reference to all miscellaneous items, and their changes compared to (1).  
 \* p ≤ 0.05; \*\* p ≤ 0.01; \*\*\* p ≤ 0.001

Among staff, the proportion of vegan and vegetarian mains also increased continuously, from +3.4% (p = 0.052) in the short-term to +4.6% (p ≤ 0.001) in the medium-term to +8.4% (p ≤ 0.001) in the long-term. The proportion of staff who chose salad as a side dish increased by 3.2% (p ≤ 0.001) in the short-term, by 4.6% (p ≤ 0.001) in the medium-term, and by 4.4% (p ≤ 0.001) in the long-term compared to the baseline value. A desired effect was also found in terms of the selection of fresh fruit for dessert. The proportion of staff who chose fruit increased by 2.5%

(p ≤ 0.001) in the short-term, by 1.8% (p ≤ 0.001) in the medium-term, and by +0.7% (p = 0.069) in the long-term compared to the baseline value.

In the case of wholegrain snacks, a short-term effect of +2.5% (p = 0.072), and a medium-term effect of +3.4% (p = 0.016) were found, but in the long-term almost returned to the baseline level +1.3%; p = 0.30). In the case of sweets, no effect was observed. The proportion of sweets among staff diners increased in the short-term by +1.0% (p = 0.48), decreased in the medium-term by -1.2% (p = 0.37), and decreased in the long-term by -0.4% (p = 0.85). Among staff, the proportion of water in reference to all selected drinks increased in the short-term by 5.7% (p = 0.063), in the medium-term by 9.4% (p = 0.002) and in the long-term by 2.4% (p = 0.41). In the school cafeteria, there was an inconsistent pattern of change overall, but as a whole, the change was mostly also in the desired direction. After 1 year, the proportion of vegetarian mains increased by +2.3% (p ≤ 0.001), and the proportion of water in reference to all selected drinks increased by +5.4% (p ≤ 0.001). An effect leading in the desired direction was also found in terms of the selection of fresh fruit. The proportion of school pupils who chose fruit increased by +4.1% (p ≤ 0.001) in the short-term, by +7.2% (p ≤ 0.001) in the medium-term, and by +2.3% (p = 0.069) in the long-term compared to the baseline value.

However, in the case of wholegrain snacks, and in the case of sweets, only short-term and medium-term desirable effects were observed. In addition, the proportion of school pupils who chose salad as a side dish initially in-

| Data collection phase | Days of data collection | Number of mains | Of which teaching staff | Beverages          |
|-----------------------|-------------------------|-----------------|-------------------------|--------------------|
| 1                     | 16                      | 2,090           | 250                     | 1,689              |
| 2                     | 16                      | 2,130           | 199                     | 1,968              |
| 3                     | 15                      | 1,513           | 237                     | 1,848              |
| 4                     | 15                      | 2,180           | 287                     | 1,709 <sup>a</sup> |

Tab. 3: Gilching school cafeteria: total number of lunches distributed and number distributed to teaching staff, as well as number of drinks distributed (sales in bottles plus water cups) in each data collection phase  
<sup>a</sup> Data from only 14 days could be analyzed, because once the counting of the cups was apparently forgotten

creased by +3.0% ( $p = 0.032$ ), but after a year it decreased by -1.8% ( $p = 0.130$ ), ♦ Figure 7. ♦ Table 3 provides a breakdown of the demographic structure of the dining population in each data collection phase.

## Discussion

To our knowledge, this is the first study in the German-speaking world to investigate the effects of nudging measures alone in promoting “healthy choices” in the setting of a university cafeteria and a school cafeteria over a period of almost one year. We intentionally avoided providing diners with any accompanying information, or anything similar. However, there are now some indications that under certain conditions, nudges can be effective even when the target population is informed about the underlying mechanism [23].

The scale of the improvements achieved in our study is in line with the results of previous reviews [10–15] and meta-analyses [16, 17]. A meta-analysis that included the results of 42 studies (20 laboratory experiments, 7 studies in cafeterias, and the remaining 15 studies in widely varying nutritional environments) on the influence of nudging measures on the eating habits of adults [16] showed that nudging changed the outcome variables of frequency of selection of healthy options or reduced total energy intake in the desired direction on average by 15.3% [95% confidence interval: 7.58–23.0]. Another meta-analysis of studies aimed at using nudging to increase the uptake of fruit and vegetables [17] showed a significant overall mean effect size ( $d = 0.30$  [95% confidence interval: 0.18–0.44]). In our study, the choice of fruit doubled or tripled, which corresponds to an effect size of 0.38–0.61.

## Limitations

A brief account of the limitations of the study and the practical experience gained is provided here. A practice-oriented discussion is published in [24]. At the Martinsried university cafeteria, the kitchen management and the kitchen team were highly motivated and always very cooperative. They implemented the nudging measures every day independently and in a self-motivated manner. Only a few measures had some minor operational obstacles. Studentenwerk München tolerated some minor, short-term fluctuations in turnover. Data collection went well – there were no problems and it was done exclusively using the electronic point of sale system, which recorded all items with no ambiguity. The results from the school cafeteria provided further confirmation that school catering is embedded in a difficult environment with several problem areas (e.g. numerous stakeholders with various interests and standpoints, communication problems, low or fluctuating choice of meals by pupils with consequent effects on cost-efficiency, etc.), and that this occurs for various reasons (e.g. extremely small organizational structures with individual solutions for each school). Despite the great interest and commitment shown by the caterer, relatively speaking, more problems arose in this setting during the model project. For example, for reasons of cost-effectiveness, there were frequent short-term changes in the structure and arrangement of the range of products (e.g. introduction of toasties, expansion of the range of warm snacks and low-cost Leberkäsesemmeln [a kind of sausage meat product]), which likely tended to lead to underestimation of the improvements achieved through nudging. During the project period, there were some staff changes. Data collection via the electronic point of sale system (which had to be al-

tered for the study), supplemented with manual counting and documentation by the point of sale staff, provided less valid data. In the medium-term data collection period, the fact that afternoon classes were canceled more frequently for the school’s own organizational reasons (with the result that fewer cafeteria users were recorded), presented an additional problem that prompted us to interrupt data collection.

## Conclusion

Overall, despite less pronounced improvements in the school cafeteria, in principle, in both of the mass catering settings investigated in this model project – the university cafeteria and the school cafeteria – nudging measures appear to be able to promote healthy food choices among the various groups of diners. Although there are a few voices that criticize the approach, our opinion is that nudging is useful as an additional measure to be used alongside the other interventional approaches to modifying dietary behavior that can also be used in the setting of mass catering (information and labeling, rewards, or guidance of decision-making through pricing), providing a further promising approach to “soft” decision guidance.

The results made it clear that recommendations for nudging measures must be made based on the specific setting and situation. Therefore, for the practical implementation of nudging interventions, it may be advisable to select objective-specific and context-specific measures from a catalog of successfully tested measures, or perhaps to develop new ones, adapt them to the relevant circumstances, and of course check their effectiveness with regard to the desired aim.

In order to spread awareness of the nudging approach to intervention, the following two brochures were developed as part of this model pro-



ject *Smarter Lunchrooms – nudging made easy: practical recommendations for action for the university cafeteria* and *Smarter Lunchrooms – nudging made easy: practical recommendations for action for the school cafeteria*. They are available for download here: → [www.kern.bayern.de/wissenschaft/168220/index.php](http://www.kern.bayern.de/wissenschaft/168220/index.php). More model projects should be carried out in the future, especially in the school setting.

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#### Conflict of Interest

The authors declare no conflict of interest.

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