

# Environmental intervention in a university canteen with focus on decision guidance: An evaluation study regarding food consumption, nutrient intake, perception, and satisfaction by canteen users

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## Abstract

**Background:** An environmental intervention with focus on *Decision Guidance* was implemented in a university canteen. It comprised the offer of a health promoting food option (HPFO), including a health promoting lunch option and health promoting snacks.

**Design and methods:** Possible changes of food consumption and nutrient intake of student canteen users (substudy A), perception of the HPFO by canteen users (substudy B.1), and possible changes of their satisfaction regarding the canteen (substudy B.2) at least 10 weeks after the start of the intervention were examined. Substudy A used a controlled pretest-posttest-design (paired sample). The students were assigned to intervention group (canteen visits  $\geq$  once/week,  $n=27$ ) or control group (canteen visits  $<$  once/week,  $n=39$ ). Substudy B.1 used a cross-sectional design, and substudy B.2 a pretest-posttest-design (paired sample). Only canteen users ( $\geq$ once/week) were included (substudy B.1  $n=89$ , substudy B.2  $n=30$ ).

**Results:** Food consumption and nutrient intake did not change ( $p > 0.05$ ) in the intervention group versus control group (substudy A). In substudy B.1 canteen users were aware of the HPFO, appreciated it highly, and were satisfied with it. In substudy B.2 canteen users were at posttest more satisfied regarding service and health value of offered lunches ( $p < 0.05$ ).

**Conclusions:** Although the HPFO was positively perceived, no effects on the daily diet were observed. The offered proportion of the HPFO should be increased.

## Keywords

Environmental intervention, decision guidance, food consumption, nutrient intake, university students, university canteen

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## Significance for public health

Changes in the food environment are a good way to promote favourable dietary behaviour across all social groups. The application of measures from the *Decision Guidance* category, for example, uses nudges and incentives to influence unconscious behaviour. Our study uses the example of a university canteen to evaluate to what extent food consumption, nutrient intake, the satisfaction with a health

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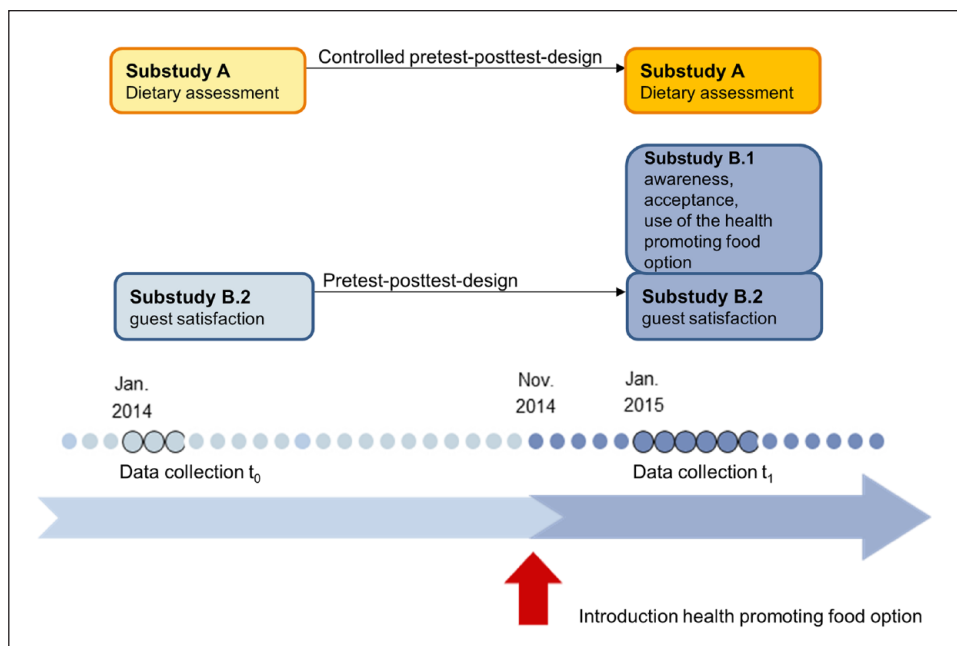
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**Figure 1.** Study design according to substudies.

promoting food option and satisfaction with the canteen can be influenced. Based on these results, further interventions in the food environment can be designed.

## Introduction

In the German population as well as in other western societies an unfavourable diet is common. It is associated with a high risk of diseases, disability, and premature mortality.<sup>1</sup> The German diet is generally characterised by a consumption of less vegetables and fruit and more meat than recommended.<sup>2</sup> As a result, the mean fibre intake is below and the fat intake above the German recommendations for nutrient intake.<sup>2</sup> Previous efforts for example, behavioural counselling and health education have not been sufficient enough to change the food consumption profoundly over the last years.<sup>2,3</sup> In addition, the success of these interventions depends on personal resources.<sup>4</sup> For example less-educated individuals consume vegetables to a lesser extent than those who are higher educated.<sup>5</sup> However, also well-educated groups, for example, university students, predominantly fail to meet the dietary recommendations.<sup>6-8</sup>

A current societal trend is an increase in eating out of home.<sup>9</sup> University students in western countries often eat lunch out of home.<sup>10,11</sup> Lunch accounts for approximately 25% of the daily energy intake.<sup>12</sup> Therefore, university canteens are particularly well suited for interventions. Interventions in such food environments have the advantage that they do not only work on the conscious behavioural level and support desirable decisions (*Decision Support*). Unconscious decisions can also be guided, for example, through nudges or incentives (*Decision*

*Guidance*). In addition, regulations in a setting can shape the offer and thus the choice (*Decision Restriction*). Based on the model outlined above according to Jürkenbeck et al.<sup>13</sup>, an intervention with a focus on *Decision Guidance* was carried out in a university canteen. The German Nutrition Society (DGE)'s Guidelines on Quality Standards (DGE-GQS)<sup>14</sup> served as a reference for the development of a HPFO.

After introducing the environmental intervention with focus on *Decision Guidance* in the university canteen at the University of Education in Schwäbisch Gmünd the aim of this study was to evaluate whether food consumption and nutrient intake of canteen users (intervention group; IG) changed compared to non-canteen users (control group; CG). It was the hypothesis that the consumption of vegetables, fruit and meat would improve in the IG compared to the CG. Also an improvement regarding the fat, and fibre intake was expected. Furthermore, the awareness, acceptance, and use of the health promoting food option were assessed cross-sectionally. The last research question addresses the possible changes of the satisfaction in canteen users while introducing the HPFO.

## Design and methods

### Overview of the study design

To evaluate the effectiveness of the environmental intervention with focus on *Decision Guidance* the implementation in the canteen at the University of Education in Schwäbisch Gmünd was accompanied by a controlled intervention study (see Figure 1).

**Table 1.** Measures implemented in the intervention study according to Jürkenbeck et al.<sup>13</sup>.

Concept according to Jürkenbeck et al. <sup>13</sup>		Measures of the intervention in the present study
Decision Restriction	Limited selection through product bans	-
	Limited selection through product reformulation and governmental product standards	<p>The health promoting lunch option was one reformulated menu according to the DGE-GQS.<sup>14</sup> The reformulation resulted in</p> <ul style="list-style-type: none"> <li>● a more favourable food composition (higher content of vegetables [<math>+58 \pm 73</math> g/menu, <math>p &lt; 0.01</math>], tendentially lower content of meat, sausage, meat products [<math>-10 \pm 22</math> g/menu, <math>p = 0.051</math>], lower content of fats and oils [<math>-13 \pm 16</math> g/menu, <math>p &lt; 0.01</math>]) of the menu<sup>15</sup></li> <li>● a more favourable energy content and nutrient profile (lower content of energy [<math>-162 \pm 144</math> kcal/menu, <math>p &lt; 0.001</math>], tendentially lower content of protein [<math>-3.3 \pm 7.2</math> g/menu, <math>p = 0.58</math>], lower content of fat [<math>-19.4 \pm 17.2</math> g/menu, <math>p &lt; 0.001</math>]; <math>-13.3 \pm 11.6</math> energy%, <math>p &lt; 0.001</math>], higher content of Protein [<math>+2.1 \pm 3.8</math> energy%, <math>p &lt; 0.005</math>], carbohydrates [<math>+10.6 \pm 9.5</math> energy%, <math>p &lt; 0.001</math>], fibre [<math>+2.9 \pm 3.8</math> g/menu, <math>p &lt; 0.01</math>]; <math>+6.2 \pm 4.7</math> g/1000 kcal, <math>p &lt; 0.001</math>) of the menu<sup>15,16</sup></li> </ul>
Decision Guidance	Guided selection through negative incentives	-
	Guided selection through positive incentives	<ul style="list-style-type: none"> <li>● If the guests selected the health-promoting lunch option as it was suggested by the university canteen, they got a discount of 20% of the menu price.</li> </ul>
	Guided selection through nudging	<ul style="list-style-type: none"> <li>● One health-promoting lunch option (=reformulated menu) was available daily (<i>availability</i>).</li> <li>● The health-promoting lunch option was particularly highlighted in a showcase and also on the daily menu (<i>presentation</i>).</li> <li>● The components comprising the health-promoting lunch option were all offered at one counter (<i>proximity</i>; usually the main components and side dishes were served at different counters).</li> <li>● The canteen staff at the counter pointed out how to compose the health-promoting lunch option from a selection of four main components and different side dishes (<i>prompting</i>).</li> <li>● Vegetable sticks and wholemeal sandwiches were available daily (<i>availability</i>).</li> <li>● Fruit was presented in a more attractive fruit bowl (<i>presentation</i>).</li> </ul>
Decision Support	Simplified choice	<ul style="list-style-type: none"> <li>● The components of the health-promoting lunch option were labelled with a STUDY&amp;FIT-Logo (<i>labelling</i>).</li> <li>● Fruit, vegetable sticks and wholemeal sandwiches were always labelled with a STUDY&amp;FIT-Logo (<i>labelling</i>).</li> </ul>
	Informed choice	<ul style="list-style-type: none"> <li>● Information material was provided about a healthy diet and the health-promoting lunch option (e.g. poster, leaflets, online information), including nutritional value.</li> </ul>
	Governmental unregulated choice	<ul style="list-style-type: none"> <li>● The rest of the food offer besides the labelled snacks and the health-promoting lunch option (three out of four main components and different side dishes), was not regulated</li> </ul>

The study was divided into two substudies: substudy A comprised a dietary assessment to measure food consumption and nutrient intake of the study cohort (i.e. canteen users and non-users) before and after the implementation of the environmental intervention. Substudy B focused on the awareness, acceptance and use of the HPFO by the canteen users and their satisfaction with the canteen in general.

### Intervention

As Table 1 shows, the university canteen implemented various measures, classified in the model of Jürkenbeck et al.<sup>13</sup>. One out of four self-combinable menus was reformulated according to the DGE-GQS and then offered as a health promoting lunch option (see Figure 2). In addition,

the HPFO included health-promoting snacks. The university canteen was awarded with the highest certification (PREMIUM-Certification) of the DGE for the implementation of the DGE-GQS.<sup>14</sup> Before the intervention the entire canteen offer was unregulated.

### Substudy A: design, assessment methods and participants

To measure the possible changes in food consumption and nutrient intake a dietary assessment was conducted in a controlled pretest-posttest-design with a paired sample. Data collection was preceded before (t0) and at least 10 weeks after (t1) the introduction of the HPFO. A validated 3-day estimated dietary record<sup>17</sup> was applied for dietary assessment. The nutrient calculation was based on the German

**Table 2.** Characteristics of participants at t0 according to study group.

	IG		CG		SD	p†
	n	% or mean	n	% or mean		
Gender						n.s.
Male	2	7.4	2	5.1		
Female	25	92.6	37	94.9		
Age, years	27	21.5	39	22.8	3.4	n.s.
BMI, kg/m <sup>2</sup>	27	22.8	38	21.3	2.8	*
Personal presence at the university, times/week‡	27	3.7	39	3.1	1.2	*
Canteen visits for lunch, times/week‡	27	1.8	39	0.2	0.2	***
Use of the health promoting lunch option, times/week‡	20	0.5§	30	0.1§	0.3	*
Use of the health promoting lunch option, per canteen visit, %‡	20	26.9§	28	17.6§	32.7	n.s.

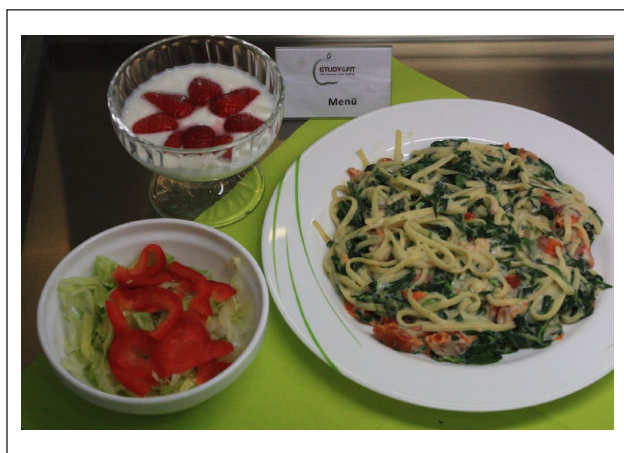
†Mann-Whitney *U*-tests were used for differences in participants' characteristics across IG and CG and Pearson's Chi<sup>2</sup>-Test for categorical variables.

‡At t1.

§This means the health promoting lunch option was chosen at approximately every fourth canteen visit, or every fortnight.

¶This means the health promoting lunch option was chosen for approximately every 10th visit to the canteen, that is, more rarely than once per semester due to the very infrequent visits to the canteen overall.

\**p* < 0.05. \*\*\**p* < 0.001.



**Figure 2.** Example of the health promoting lunch option consisting of one main component (linguine pan with spinach and cherry tomatoes) and side dishes (fresh salad, strawberry-yoghurt dessert).

Nutrient Database II.3. Outcomes of primary interest were the consumption of vegetables, fruit, and meat, as well as the intake of fat and fibre. Secondary outcomes were the consumption of further food groups, the energy, protein, and carbohydrate intake. The Healthy Eating Index of the German National Nutrition Survey II (HEI-NVS) was used<sup>18</sup> to break down the complex food consumption to one marker for nutritional quality.

In order to describe the study population gender, age, body weight, body height, the personal presence at the university, the use of the canteen for lunch and its health promoting lunch option were assessed by questionnaire (online and paper-pencil). The Body Mass Index (BMI) was derived from weight divided by height in metres-squared.

Initially, all students enrolled at the university (~2500) were contacted via e-mail, the learning management system, a flyer, during lectures, or face-to-face contact. A sample size of 33 participants was aimed using the tables of Bortz and Döring<sup>19</sup> for repeated measures analysis of variance (assumptions: statistical power of 80%,  $\alpha=0.05$ ,  $\delta=0.5$ , correlation of  $\bar{\rho}=0.50$  between the series of measurements). At t0 140 students took part in substudy A, at t1 85 students. Complete data sets in a paired sample are available for 66 students. Participants who ate a hot lunch in the canteen at least once/week were defined as the IG. Students who ate less than one hot lunch a week in the canteen were assigned to the CG.

At t0 and t1 66 students took part in the dietary assessment. In Table 2 the participants' characteristics at t0 according to study group are displayed. The table shows, that BMI, presence at the university, the canteen visits for lunch and the use of the health promoting lunch option were significantly higher in the IG compared to CG.

### Substudy B (B.1 and B2): design, assessment tools, and participants

Substudy B is divided into substudy B.1 and substudy B.2.

**Substudy B.1.** Substudy B.1 aimed to assess the awareness, acceptance, and use of the HPFO. It was a cross-sectional analysis after the introduction of the HPFO. Data collection took place at least 10 weeks after the introduction of the HPFO (t1, see Figure 1). The procedure was as described in substudy A. Enrolled students were included in the analysis, if they ate at least one hot lunch in the canteen per week (canteen user). A standardised questionnaire (online and paper-pencil) with a 7-point Likert scale was used to gather the information about the appreciation

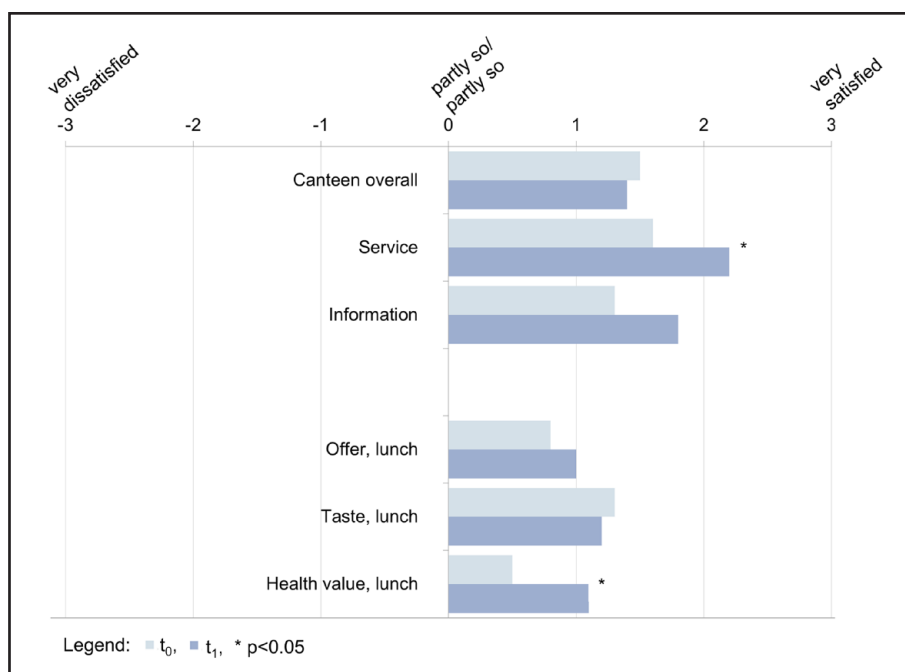
**Table 3.** Food consumption, HEI-NVS and energy and nutrient intake according to study group before (t0) and after (t1) introduction of the health promoting food option.

Variables	Group	n	t0		t1		p†
			Mean	SD	Mean	SD	
Food group and HEI-NVS							
Grain products, potatoes, g/day	IG	27	322	116	309	87	time: n.s.
	CG	39	315	163	292	142	group: n.s.
Vegetables, pulses, g/day	IG	27	224	146	246	140	time × group: n.s.
	CG	39	196	151	265	148	time: *
Fruit, g/day	IG	27	160	93	145	84	group: n.s.
	CG	39	178	146	191	125	time × group: n.s.
Milk, dairy products g/day	IG	27	206	100	218	119	time × group: n.s.
	CG	39	220	109	232	164	time: n.s.
Meat, sausage, meat products, g/day	IG	27	59	53	71	53	time × group: n.s.
	CG	39	71	66	53	54	time: n.s.
Fish, fish products, g/day	IG	27	15	34	15	38	group: n.s.
	CG	39	4	14	14	22	time × group: n.s.
Eggs, g/day	IG	27	12	17	14	25	time: n.s.
	CG	39	7	13	11	18	group: n.s.
Fats, oils, g/day	IG	27	10	5	11	8	time × group: n.s.
	CG	39	11	6	14	9	time: n.s.
Non-alcoholic beverages, g/day	IG	27	1758	611	1890	824	group: n.s.
	CG	39	1798	615	1742	523	time × group: n.s.
HEI-NVS, points	IG	27	79.9	8.5	81.2	7.3	time: n.s.
	CG	39	79.7	9.5	82.0	9.6	group: n.s.
Energy and nutrient intake							
Energy, kcal/day	IG	27	1741	482	1637	278	time × group: n.s.
	CG	39	1882	619	1762	492	time: n.s.
Protein, g/day	IG	27	65.1	20.1	68.1	17.7	group: n.s.
	CG	39	70.5	21.7	67.0	18.2	time × group: n.s.
Protein, energy%	IG	27	15.4	3.1	17.1	4.5	time: *
	CG	39	15.6	3.0	15.9	3.9	group: n.s.
Fat, g/day	IG	27	63.7	24.0	62.2	14.5	time × group: n.s.
	CG	39	63.8	23.5	64.1	24.2	time: n.s.
Fat, energy%	IG	27	31.9	5.0	33.6	6.2	time × group: n.s.
	CG	39	30.1	5.9	32.0	7.0	time: *
Carbohydrates, g/day	IG	27	215.4	55.9	195.4	53.7	group: n.s.
	CG	39	248.4	95.8	219.0	75.7	time × group: n.s.
Carbohydrates, energy%	IG	27	50.7	5.5	48.2	8.1	time: **
	CG	39	53.2	8.1	50.2	8.4	group: n.s.
Fibre g/day	IG	27	20.9	7.7	19.8	4.4	time × group: n.s.
	CG	39	23.4	11.4	23.6	9.3	time: n.s.
Fibre g/1000 kcal	IG	27	12.1	3.6	12.3	2.8	time × group: n.s.
	CG	39	12.8	5.5	13.6	4.9	time: n.s.

HEI-NVS: Healthy Eating Index of the German National Nutrition Survey II.

†Repeated measures ANOVA.

\*p &lt; 0.05. \*\*p &lt; 0.01.



**Figure 3.** Satisfaction of the canteen users before (t<sub>0</sub>) and after (t<sub>1</sub>) introduction of the health promoting food option.

(-3 very bad, . . . 0=partly so/partly so, . . . 3=very good), and the influence on the choice of dishes (-3=no, never, . . . 0=sometimes, . . . 3=yes, always). To characterise the study population gender, age, the personal presence at the university, the use of the canteen for lunch, and its health promoting lunch option were also assessed.

One hundred ninety-three students took part at substudy B.1 and filled out the questionnaire, 89 participants (77.5% female,  $23.5 \pm 4.3$  years) met the inclusion criteria. They were  $3.7 \pm 0.9$  times/week present at the university and ate a hot meal  $2.0 \pm 1.0$  times/week in the canteen.

**Substudy B.2.** Substudy B.2 examined the satisfaction with the canteen in general by the canteen users. It used a pre-test-posttest-design with a paired sample. According to Bortz and Döring<sup>19</sup> a sample size of 33 participants was aimed (assumptions: statistical power of 80%,  $\alpha=0.05$ ,  $\delta=0.5$ , correlation of  $\bar{\rho}=0.50$  between the series of measurements). Data collection took place according to sub-study A (t<sub>0</sub> and t<sub>1</sub>, see Figure 1). For the analyses data of enrolled students were included, if they ate at least one hot lunch in the canteen per week (canteen user). Satisfaction with the canteen in general was assessed by a standardised questionnaire (online and paper pencil) on a 7-point Likert scale (-3=very dissatisfied, . . . 0=partly so/partly so, . . . 3=very satisfied). The same characteristics as in substudy B.1 were assessed to describe the study population.

At t<sub>0</sub> 417 students completed the questionnaire, at t<sub>1</sub> 193 students. Complete data sets are available for 30 students (86.7% female,  $23.5 \pm 6.3$  years), who met the criteria described above (canteen user, paired sample). On average,

they were present at the university  $3.8 \pm 0.9$  times/week and visited the canteen  $2.0 \pm 1.1$  times/week for lunch.

### Statistical analysis

Statistical analyses were performed using SPSS statistics version 24 (IBM Corp., Chicago, IL, USA). Between-group comparisons were tested using Mann-Whitney *U*-tests for continuous variables and Pearson's Chi<sup>2</sup>-tests for categorical variables. To detect possible changes from t<sub>0</sub> to t<sub>1</sub> an analysis of variance (ANOVA) with repeated measures was conducted. In Substudy A the intervention status (IG vs CG) was applied as a covariable. Results are considered statistically significant when *p*-values are <0.05.

### Ethical considerations

This study was conducted according to the guidelines of the Declaration of Helsinki. It was approved by the Ethics Committee of the University of Education Schwäbisch Gmünd (2016 September 27). The analysed data included only participants who gave their written informed consent.

## Results

### Substudy A: Food consumption and nutrient intake

Table 3 shows the food consumption and nutrient intake according to study group and time. In the course of time no significant changes occurred, which were attributable to

the intervention. In both study groups the vegetable consumption increased significantly. In addition, both study groups showed a significant decrease of carbohydrate intake and a shift to a higher fat and protein intake.

### ***Substudy B1: Awareness, acceptance, use of the health promoting option***

About 75.3% of the participants in substudy B.1 were aware of the logo which labelled the HPFO. In general, introducing a HPFO was highly appreciated (mean:  $2.2 \pm 1.1$ ). To a lesser extent the canteen users were satisfied with the HPFO (mean:  $1.3 \pm 1.3$ ). On average the health promoting lunch option was bought  $0.8 \pm 0.9$  times/week, which represents HPFO every third ( $34.8 \pm 34.1$ ) of all meals bought in the canteen. The influence of the labelled HPFO on meal choice of canteen users was classified as 'rarely' ( $-0.8 \pm 1.9$ ).

### ***Substudy B2: Satisfaction of the canteen users***

Figure 3 shows the satisfaction at t0 and t1. After the introduction of the HPFO (t1) the canteen users were significantly more satisfied with the service of the canteen and the health value of the lunch offered compared t0.

## **Discussion**

### ***Frame and comparative studies***

Environmental interventions in canteens with focus on *Decision Guidance*, particularly with an actual increase in the availability of health promoting options, are rare. Our study shows that a HPFO is appreciated by the guests. Furthermore, canteen users were after its introduction (t1) more satisfied with the health value of the lunch offered than before (t0). Although the HPFO was known and highly appreciated no effects on the daily food consumption and nutrient intake were observed.

These results are unexpected, because the reformulation led to considerable improvements of the food composition and the nutritional value of the menus.<sup>15,16</sup> Moreover, the health promoting lunch option was regularly chosen by our participants. The canteen also recorded an increase in the number of vegetable components sold per main component, as well as an increase in the number of fruit and fruit sold per main component.<sup>20</sup>

However, some cafeteria users criticised that the health promoting lunch option was relatively large or included too many components. The fixed menu composition associated with receiving the 20% discount was also criticised (data not shown).<sup>15</sup>

As shown in our<sup>20</sup> and other studies,<sup>21–23</sup> a positive incentive is a good way to increase sales of desirable foods. A 20% discount is also a desirable level,<sup>24</sup> but discounting

a bundle of foods seems to be less effective.<sup>25</sup> So there was unlikely to be any effect on consumption in our study.

Another decision guidance strategy used, nudging particularly with an actual increase in the availability of health promoting options, has the potential to change the choice of canteen users.<sup>26,27</sup> Further intervention studies that focused on the dietary intake at the canteen found contradictory results. Whereas in some studies the fruit<sup>28</sup> and vegetable consumption<sup>29,30</sup> could partly be increased, others failed to show clear effects.<sup>31,32</sup> In three<sup>29,31,33</sup> out of four<sup>32</sup> studies the fat intake on-site declined by availability-interventions.

To fully evaluate the impact of nudging-interventions, possible compensatory behaviours, for example, omitting the vegetable consumption in other eating situations outside the canteen, should be taken into account. Nudging-interventions that increased the availability of desirable foods in canteens and assessed the intake over the whole day provided contradictory results.<sup>32,34–37</sup> Possibly, too many occasions for compensatory behaviour existed. Additionally, in our study, only one of four main components was reformulated. Therefore, in our study there were many occasions to make a conventional choice as well. Perhaps this is the main reason why the intervention was not effective with regard to food and nutrient intake.

### ***Strengths and limitations***

Our study is one of the few studies on decision guidance in canteens, particularly on the availability of health-promoting options. In addition, it assessed the impact on total daily consumption and the application of the DGE-GQS made the intervention transparent and replicable. A further strength of our study was the controlled pretest-posttest-design of substudy A. A downside of this study design is the relatively small study population, as a certain proportion of participants dropped out from t0 to t1 for example because they graduated. In addition, participants in the present study consumed less hot meals in the canteen than the average German student.<sup>11</sup> In combination with the rather low proportion of reformulated menus, this could be the reason that no effect of the intervention on food and nutrient intake could be demonstrated.

Furthermore, the validated dietary record is a strength of this study. Despite a certain extent of underreporting, dietary records are often used as a gold standard method for measuring food consumption and nutrient intake.<sup>38,39</sup> Even though the applied 3-day estimated dietary record might have contributed to a lesser precision of the measurements, it was an effective way to collect the dietary data in a constant quality.

Finally, the assessment of awareness, acceptance, use of the HPFO, and guest satisfaction is an additional advantage. The results of substudy B complete the view on the intervention and encourage practitioners in canteens to apply the criteria of the DGE-GQS.

## Conclusion

The HPFO was highly appreciated, but did not result in any changes in food consumption. However, the lunch offer of the canteen was only partly reformulated – three out of four main components were not regulated. It can be assumed that if a larger part or the entire lunch offer were reformulated, this would lead to considerable changes in dietary behaviour.

Against the background of the above mentioned unfavourable diet of students in general, as well as in the whole population, an exclusive health promoting offer is recommended from a health promotion point of view. At least a higher proportion of health promoting menu components in university canteens is desirable. Whether the effects on consumption would be more substantial needs to be examined in further studies.

Furthermore, the intervention in the university setting is promising, because of the future social responsibility of university students. As future leaders they are involved in shaping more or less healthy environments – a strategy to change dietary habits more equally over all social groups.

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## Author contributions

MS: involved in study design, oversaw data collection, responsible for data analysis, and primary contributor of manuscript content. CN: oversaw data collection, contributed edits to manuscript. AC: involved in study design, contributed edits to manuscript. PL: involved in study design, supervised data analysis, contributed content and edits to manuscript, and primary contributor of manuscript content. All authors contributed to manuscript revision, read and approved the final draft.

## Declaration of conflicting interests

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## Ethics statement

This study was in accordance with the declaration of Helsinki and approved by the Ethics Committee of the University of Education Schwäbisch Gmünd (2016 September 27). The participants provided their written informed consent to participate in this study.

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## Availability of data and materials

The data used to support the findings of this study are available from the corresponding author on reasonable request.

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