# Healthy eating at work

Stimulating healthy food choices in the worksite cafeteria through nudging and social marketing strategies

Elizabeth Velema

## Food choices

A food choice may seem a conscious act: you want something tasty, maybe healthy or ready-to-eat and preferably not too expensive. However, a lot of food choices are made quick and automatically, without well deliberated considerations what to choose, for example choices made in the worksite cafeteria. Besides the availability of food itself, food choices are influenced by many individual factors like habits, food preferences, and (sub)culture. In addition to those elements, environmental factors like the way food is displayed, the following order in which you pass by the food products, laying in front or at the back, being available in abundance or being scarce, are also steering food choices. Thus, also when having lunch at work, peoples' food choices are influenced by the environment of the worksite cafeteria.
Many employees use the worksite cafeteria numerous times during their lives, which has a significant impact on their food intake. It is therefore essential to investigate how worksite cafeterias can support healthier food choices and can contribute to the prevention of overweight.
The studies outlined in this thesis describe the development and evaluation of the intervention called **The healthy worksite cafeteria**. The aim of the intervention is to encourage Dutch employees to purchase healthier lunch items as an effect of nudging and social marketing strategies.

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# Chapter 1
# General introduction

## Food choices

*A food choice* may seem a conscious act; you want something tasty, maybe healthy or ready-to-eat and preferably not too expensive, because you can only spend your money once and, in addition, satisfy your hunger also just once. Some food choices are indeed conscious practices. However, a lot of food choices are made quick and automatically, without well deliberated considerations what to choose, for example choices made in the worksite cafeteria. Besides the availability of food itself (is there a salad bar?), food choices are fairly influenced by many individual factors like habits (i.e. always taking soup), food preferences, and (sub)culture. In addition to those elements, environmental factors like the way food is displayed, the following order in which you pass by the food products, laying in front or at the back of a counter, being available in abundance or being scarce are also steering food choices. More and more is understood that these factors unconsciously influence food choices and therefore affect associated overweight rates. Thus, also when having lunch at work, peoples' food choices are influenced by the environment of the worksite cafeteria. Many employees use the work cafeteria numerous times during their lives, which has a significant impact on their food intake. It is therefore essential to investigate how worksite cafeterias can support healthier food choices and can contribute to the prevention of overweight.
The studies outlined in this thesis describe the development and evaluation of the intervention called *The healthy worksite cafeteria*. The aim of the intervention was to encourage Dutch employees to purchase healthier lunch items as an effect of nudging and social marketing strategies. In this general introduction I will introduce some issues regarding food choice, existing interventions and strategies to improve eating behaviour in point-of-purchase settings, and more specifically in worksite cafeterias. Furthermore, I will provide the general aim and outline of this thesis.



### What we should eat versus what we eat

The World Health Organisation (WHO) states: *'A healthy diet helps to protect against malnutrition in all its forms, as well as noncommunicable diseases (NCDs), including type 2 diabetes, heart disease, stroke and cancer.'* A healthy diet consists of vegetables, fruit, legumes (e.g. lentils and beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat and brown rice). Besides recommendations of what we should eat, we should limit the total energy intake from free sugars and fat and the intake of salt.[1] The most recent Dutch National Food Consumption Survey (2012-2016) shows that if Dutch adults would eat more fruits, vegetables and plant based proteins and less red and processed meat products, less salt, less sugar sweetened beverages and overall less calories they can lower their health risks.[2,3] That would be beneficial, because overweight and diet-related NCDs increased over the past decades.[4] In 2018, 50.2% of Dutch adults were overweight.[5] Overweight and obesity in itself also increase the risk of all-causes of death, high blood pressure, type 2 diabetes, coronary heart disease, stroke

and some types of cancer.[6,7] In addition to the negative impact of obesity on quality of life of individuals and public health in general, obesity also has economic effects. In the Netherlands, about a quarter of the medical costs are attributable to overweight-related diseases.[8,9] In addition to medical costs, there are also societal costs associated with obesity. For example, a review on the effects of overweight and obesity on productivity loss revealed substantial short-term and long-term indirect costs. Especially absenteeism and presentism (working while sick) contribute to high indirect costs.[10]
All in all, improving dietary intake of Dutch adults is of the utmost importance.

### Settings in which we make food choices: the worksite cafeteria

The diet of the Dutch population may become healthier by improving the nutrient content and by lowering the number of kilocalories (kcal). Intervening in eating behaviour can be done at places where we make food choices regularly; in the supermarket, at home, at the train station or in other out of home settings, like in the worksite cafeteria. In the supermarket, for example, interventions can use the habit or impulse of responding to price offers by executing price offer interventions.[11,12]
In addition to the supermarket, the worksite cafeteria also is a highly suitable location for targeting both conscious and habitual or impulsive food choices. The Netherlands has a working population of almost 9 million people [13] of which about 45% have lunch daily at the worksite cafeteria.[14,15] It provides the opportunity to reach people more than once and over a longer period of time as they visit the worksite cafeteria regularly. In addition, interventions in worksites could potentially reach a large part of the adult population in a natural social context, including many who not intend to change their eating behaviour.[16,17] Finally, although a Dutch lunch usually consists of a sandwich, either from home or from the worksite cafeteria, snacks such as deep fried snacks and puff pastry snacks are more consumed by Dutch people compared to other Europeans [18] and are also offered and consumed during lunch break at work. Those snacks have a relatively high amount of saturated fat and are high in calories and therefore their intake should be limited. In short, the worksite cafeteria seems a suitable place to intervene in food choice behaviour.

### Interventions to affect food choice in the worksite cafeteria

Globally, studies in worksite cafeterias to improve food choices used different strategies, such as increasing the availability of healthy foods like fruits and vegetables and products low in energy density [19,20], offering smaller serving sizes [21], providing nutrition information on menus [22], placing a sign with the message 'Pick me! I am low-calorie' on a low-fat product [23], or showing a nutrition logo on healthy products.[17]
Also in the Netherlands, worksite cafeterias have been used as a setting for interventions aimed to improve eating behaviour.[24-29] Despite the slightly different eating culture at work in the Netherlands, these interventions use similar strategies (both based on pro-

viding information as well as interrupting habitual choice behaviour) and show similar mixed results. Not all strategies evaluated were effective in improving eating behaviour, for example placing a nutrition logo on healthier food items in the worksite cafeteria did not show a nutritionally meaningful intervention effect for the sales of healthier items.[29] However, adding a small portion size of a hot meal to the displayed range (that inclined customers to switch to a smaller portion of their regular meal) was an effective strategy.[27] Furthermore, like the examples previously mentioned, often single strategies were studied in isolation, whereas multiple strategies conducted at the same time could possibly have a larger effect. For example, the effect of the single strategy of adding a small portion size could potentially have a larger effect if this smaller meal is offered at the start of the buffet, as people tend to choose the food items they encounter first more often.[30,31] Furthermore, in some cases environmental interventions in Dutch worksite cafeterias contained both effective and ineffective outcomes.[24] Placing informational sheets alongside food products to visualise healthier food choices (i.e., the caloric value of foods was translated into the duration to perform a certain (occupational) activity to burn these calories) was modestly effective in changing behavioural determinants (social support, self-efficacy and attitude) towards eating less fat. It was however ineffective in decreasing actual fat intake, or improving fruit and vegetable consumption of office workers. Altogether, both experiments in foreign and in Dutch worksite cafeterias offer opportunities to develop a possibly more effective intervention for Dutch worksite cafeterias. Simultaneously conducting strategies that trigger automatic, habitual behaviour seems a promising approach.

**Behavioural theories and food choice in worksite cafeterias**

For the development of an intervention in Dutch worksite cafeterias, some insight in theory of food choice behaviour is useful. The past decades, research in the field of psychology and behavioural economics showed that a lot of food choices are made quite automatically through subconscious processes. Figure 1 presents an overview of behavioural theories, presenting the development in the ideas regarding the degree of rationality in choice behaviour, including the dual process theory of the Elaboration likelihood model (ELM). The ELM explains two major routes of how we process stimuli: the central and the peripheral route. Nobel prize winner Daniel Kahneman provided further interpretation of the ELM by differentiating the two routes more. Kahneman called the peripheral route 'intuition' (system 1) and the central route 'reasoning' (system 2).[32] People make most of the decisions concerning food fast and automatically, via system 1 [33], relying on general impressions and heuristics (mental shortcuts) or habits. An example of an heuristic is: 'the higher priced product probably is higher in quality', or a habit can occur like 'always taking a fried snack on Friday'. But also the environment influences food choices. For example, choosing the option first displayed at the buffet.[30,31] The environmental research model for weight gain prevention (the EnRG

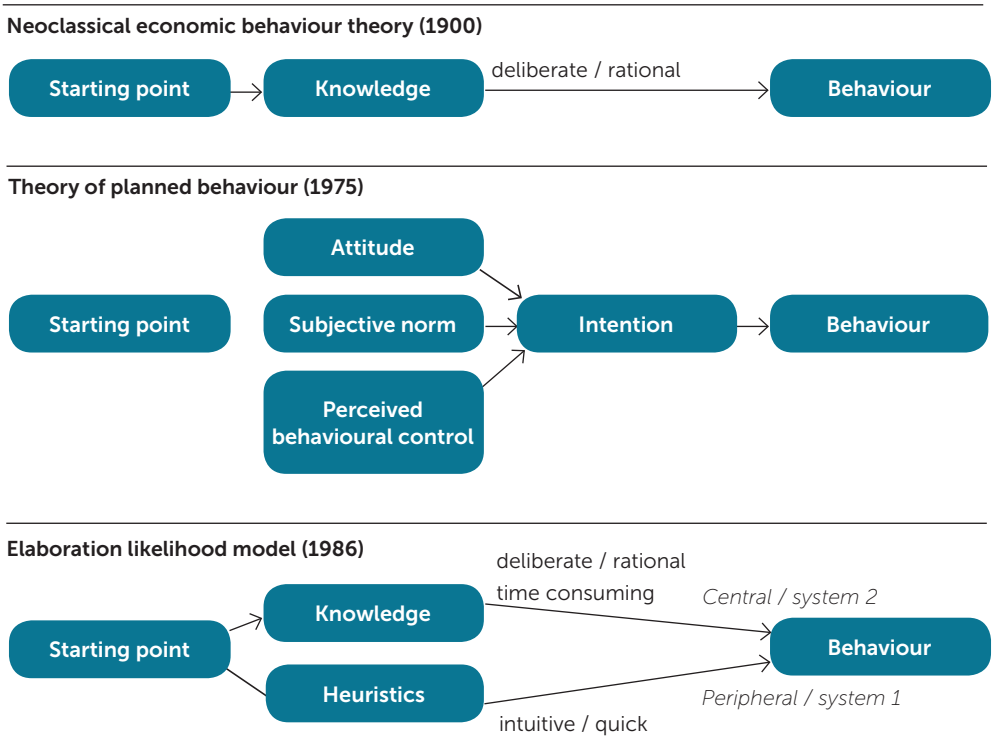


**Figure 1. Schematic overview of behavioural theories.**
Showing the development over time of the views regarding the degree of rationality in choice behaviour. From the *Neoclassical economic behaviour theory* [35] to the *Theory of planned behaviour* [36] and the *Elaboration likelihood model* (ELM) [32] it was recognized that behaviour depends on multiple determinants and is not completely rational.

framework) of Kremers *et al.* (2006) [34] shows the environmental factors (physical, socio-cultural, political and economic) in relation to other factors, such as cognitive mediators as attitude, affecting weight gain.
Knowing this, supporting people to eat healthier with the counteraction of an environment supporting the opposite is ineffective. In addition to all types of education and training, it would be beneficial if the food environment would support healthier choices by for example changing the food offer and how it is presented. It is therefore obvious to develop and implement an environmental intervention to stimulate healthier food choices in the worksite cafeteria.

## Nudging and social marketing

### The emergence of nudging

In the last paragraph, I mentioned that the physical environment should be used to trigger a certain food choice. A response to the knowledge of the influence of the physical environment on behaviour is called nudging. Nudging is described in 2008 by Richard Thaler and Cass Sunstein in their book *Nudge: Improving decisions in health, wealth and happiness*.[37] Nudges are small environmental encouragements to initiate the desired behaviour, without forbidding other behaviours, making it a form of so-called libertarian paternalism or soft paternalism. Soft paternalism is the idea that private and public stakeholders can affect behaviour without violating freedom of choice, hence it is by most people seen as legitimate for them to do so. Nudges, also classified as choice architecture, can be used to encourage people to show healthier eating behaviour. An example of a nudge in the worksite cafeteria is to place fruit next to the cash desk triggering an impulsive purchase.

### The emergence of social marketing

In accordance with nudging, social marketing also is a relatively new approach with the equal aim to (voluntarily) change behaviour. The overall aim of social marketing is to improve individual welfare and society, such as improving public health, not to benefit the organisation who uses social marketing. The theory of social marketing originated from commercial marketing and the goal to motivate people towards certain behaviour, in the case of commercial marketing; buying the targeted product. Marketing creates a feeling of really need wanting a certain product. Social marketing uses these techniques, reflected in eight key elements, to change behaviour of consumers for a social overall goal, for example, eating healthier in the worksite cafeteria to improve health.[38-40] Figure 2 shows the eight benchmarks of social marketing applied to the development of an intervention aimed at changing food choice behaviour in the worksite cafeteria. The benchmark criteria are a set of integrated concepts. For example, involving the target audience when developing an intervention is a consequence of the benchmarks **behaviour**, **customer orientation**, **insight**, **exchange** and **competition** and is a key element of social marketing. These insights in **exchange** should for example be illustrated in the price element. The original emphasis on product, place, price and promotion, the 4 P's of commercial marketing are reflected in the **method mix**.[41]

### Social marketing in worksite cafeterias is promising

Knowing what moves and motivates the target group is important to evoke behaviour change.[40] Related to the worksite cafeteria for example, it is important to know which factors trigger the purchase of relatively unhealthy food items to use these triggers to nudge customers towards healthier purchases. In the beginning of the emergence of

**Aim: behaviour change**

### Behaviour
The intervention is focused on influencing specific behaviours, not just knowledge, attitudes and beliefs. And it should have clear, specific, measurable and time-bound behavioural goals.
***Example:***
*An increase in purchase behaviour of fruit or healthy salads in the worksite cafeteria during lunchtime.*

### Theory
Uses behavioural theories to understand target behaviour and to develop the intervention.
***Example:***
*Using the insights of the automatic versus conscious ways of purchase behaviour in the worksite cafeteria.*

**Method: focus on target audience**

### Customer orientation
Focuses on the target audience. Fully understands their lives, behaviour and issues, using a mix of data sources and research methods. But also gaining key stakeholder understanding.
***Example:***
*Interviewing catering and facility managers regarding the daily ins and outs of worksite cafeterias.*

### Insight
Identifies 'actionable insights' – pieces of understanding that lead intervention development. This could be for example knowing emotional of physical barriers to execute the desired behaviour.
***Example:***
*If the employees have one, very short lunch break and the worksite cafeteria has long waiting lines, this barrier could be overcome by introducing healthy foods in small breaks at the worksite, being more applicable and therefore more effective.*

### Exchange
Considers costs and benefits of adopting and maintaining a new behaviour; maximises the benefits and minimises the costs to create an attractive offer.
***Example:***
*The new behaviour of choosing salad instead of fries will only last if the taste, the price, the convenience and the feeling when having salad, is better than when having fries.*

### Competition
Seeks to understand what competes for the audience's time, attention, and drivers to behave in a particular way.
***Example:***
*The new behaviour of choosing a salad instead of fries will only last if the salad is seen as a reward when rewarding for hard work is a driver.*

**Intervention strategies**

### Segmentation
Avoids a 'one size fits all' approach: identifies audience 'segments', which have common characteristics, then tailors interventions appropriately.
***Example:***
*Tailoring an intervention aimed at men, to choose healthier snacks.*

### Method mix
Uses a mix of methods to bring about behaviour change. The original emphasis on product, place, price and promotion, the 4 P's from commercial marketing are reflected in the method mix.

***Product:*** large share of healthy products, like salads

***Place:*** healthy products offered at prominent places

***Price:*** healthy products attractively priced

***Promotion:*** healthy products attractively promoted

**Figure 2. Social Marketing Benchmark Criteria.** As adapted by French et al. (2006) [40] based on the six benchmark criteria of Andreasen (2002) [41], applied to the development of an intervention to change food choice behaviour in the worksite cafeteria.[39-41]

social marketing, a review of three systematic reviews suggested there is 'strong evidence' for the effectiveness of social marketing to change diet behaviour.[42] Since then, more worksite health promotion interventions were developed using social marketing. Carins *et al.* (2014) identified 16 interventions using social marketing to encourage healthy eating behaviour between 2000 and 2012. These included however also interventions aimed at children and increasing fruit and vegetable intake was in half of the interventions the health goal.[43] The use of social marketing to develop interventions to change food choice behaviour in worksite cafeterias is quite new; up till 2006 Gordon only found one study.[42] Sawada *et al.* (2019) found three studies in their review about social marketing including financial incentive programs at worksites, that all three only used the price-element of social marketing.[44] We can conclude a gap exists in research concerning the use of social marketing to develop an intervention aimed at healthier eating behaviour in worksite cafeterias. The use of nudging strategies alongside social marketing strategies in such an intervention seems to fit well. Both have the aim to change behaviour and involving the target group (the social marketing approach) enables the development of even more effective nudges, because they match the behaviour of the target group.

**More methodological high quality nudging studies in worksite cafeterias needed**

In contrast to the absence of interventions using social marketing in worksite cafeterias, the effect of interventions including nudging strategies has frequently been studied in worksite cafeterias in recent years. [19,27,29,45-49] For example, single strategies such as the following order of a buffet [30] or the effect of introducing a small portion of a hot meal [27] or enlarging the availability of healthy snacks at the checkout counter [47]. These are examples of environmental cues that can provoke behaviour. They can respond to our feeling of what is normal to do, known as norm communication. But they can also have effect by being the option most effortless or just attractive or fun to do. A lot of these experiments were executed in a controlled setting or just single strategies were examined. As a result, effects do not necessarily apply to a real life situation. In the case of the study showing the effect of the buffet order, food items were not priced individually. What if the first items were very expensive? Would the effect of the buffet order disappear? An what happens with the effect if you visit this buffet daily? Would you get 'immune' for the order effect? These aspects underpin the need for simultaneously executing nudging strategies in a real life setting. Furthermore, using elements of social marketing such as involving the target audience and other stakeholders in intervention development would increase the chance of being successful in changing behaviour.
In addition to the opportunity to improve the content of a worksite cafetaria intervention to enhance eating behaviour, there is also room for improvement of the quality and reporting of the studies.[50] To illustrate, there is a lack of well-designed studies including randomised conditions or well-matched comparison groups. Sub-optimal study de-

signs, for example quasi-experimental studies and uncontrolled intervention studies, make it hard to attribute any reported effects directly to the intervention. Also, objective measures of dietary change are needed.[50-52]
Collecting self-reported intake or self-reported purchase data could lead to recall bias [53,54], whereas sales data does not. Despite these shortcomings in the before mentioned studies, the worksite cafeteria remains a promising setting to endorse healthy food choices. It advocates for the development and evaluation of an intervention with multiple simultaneously executed nudging and social marketing strategies. Furthermore, a robust study design is a prerequisite, preferably a randomised controlled trial in a real life setting, including objective measures and sufficient intervention duration.

### Aim of this thesis

The aim of this thesis was to develop the intervention *The healthy worksite cafeteria* with nudging and social marketing strategies and to evaluate its effectiveness on objectively measured purchase behaviour of Dutch employees.
*The healthy worksite cafeteria* which, during the experiment was called *The worksite cafeteria 2.0*, being more neutral in the sense of revealing its goal, had the aim to encourage Dutch employees to purchase healthier lunch items.

### Outline of this thesis

In the studies described in this thesis, we used different methodologies to study the target group and to develop the intervention. Chapter 2 describes a qualitative focus group study with the target group, Dutch employees, that gains insights in what moves and motivates them. This is very relevant in order to develop an intervention with a fair chance of making purchase behaviour healthier. Chapter 3 describes the study in which we interviewed 14 experts to get insights into the feasibility of possible intervention strategies and how to increase the effectiveness of the intervention. The intervention development and study design is described in chapter 4. To evaluate the effectiveness of the intervention *The healthy worksite cafeteria* on purchase behaviour, we performed a randomised controlled trial (RCT) of 12 weeks in 30 worksite cafeterias. In this study, described in chapter 5, we collected objective (sales) data of employees' food purchases. In chapter 6 we describe a cross-sectional study to gain insights in the associations of vitality with personal and behavioural characteristics of the target group by means of self-reported questionnaire data (figure 3). This thesis ends with chapter 7 with a General discussion, wherein I discuss the main findings and the methodological strengths and limitations of the study. I relate the findings of this thesis to current knowledge of effectiveness of nudging and discuss ethical aspects. Finally, I propose recommendations for further research, policy and practice.

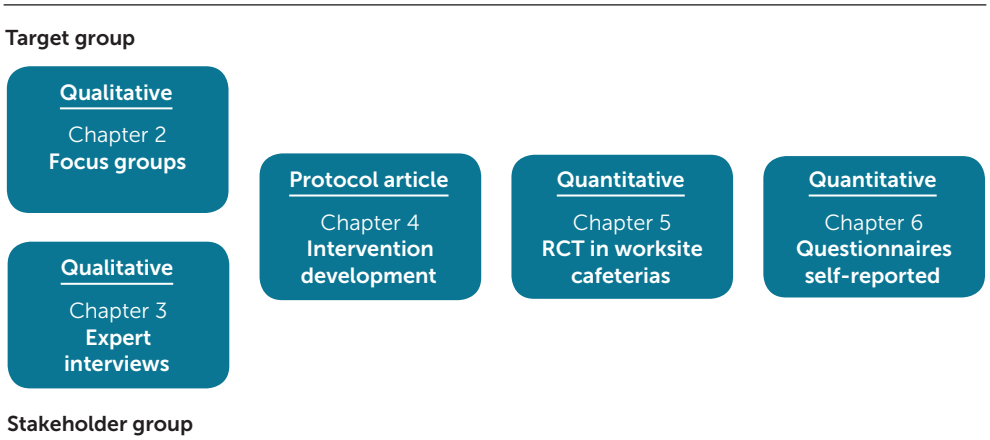


**Figure 3. Outline of thesis: Healthy eating at work.**
The studies described in this theses: two qualitative studies exploring the target group and experts' opinion as input for intervention development (chapters 2 and 3), the intervention development and protocol of an RCT in worksite cafeterias (chapter 4), the results of an RCT in 30 worksite cafeterias (chapter 5). A cross-sectional study about vitality of the target group of Dutch employees (chapter 6).

## References


1. WHO, Healthy diet. 2018.
2. *Dutch National Food Consumption Survey 2012-2016.* 2018, National Institute for Public Health and the Environment: Bilthoven.
3. Ocké, M.C., *et al.*, *What is on our plate?* 2017, National Institute for Public Health and the Environment: Bilthoven.
4. Nivel, *Nivel Zorgregistraties eerste lijn*, Nivel, Editor. 2018: Utrecht.
5. Statistics Netherlands, *Health Monitor Adults and Elderly*, 2018, Statistics Netherlands, The Hague.
6. NHLBI, *Managing Overweight and Obesity in Adults: Systematic Evidence Review From the Obesity Expert Panel*. 2013, National Hearth, Lung and Blood Institute: Bethesda.
7. Bhaskaran, K., *et al., Body-mass index and risk of 22 specific cancers: a population-based cohort study of 5.24 million UK adults.* Lancet, 2014. 384(9945): p. 755-65.
8. Lette, M., *et al., Health care costs attributable to overweight calculated in a standardized way for three European countries.* Eur J Health Econ, 2016. 17(1): p. 61-9.
9. Tremmel, M., *et al., Economic Burden of Obesity: A Systematic Literature Review.* Int J Environ Res Public Health, 2017. 14(4).
10. Goettler, A., A. Grosse, and D. Sonntag, *Productivity loss due to overweight and obesity: a systematic review of indirect costs.* BMJ Open, 2017. 7(10).
11. Waterlander, W.E., *et al., Price discounts significantly enhance fruit and vegetable purchases when combined with nutrition education: a randomized controlled supermarket trial.* American Journal of Clinical Nutrition, 2013. 97(4): p. 886-895.
12. Powell, L.M., *et al., Price promotions for food and beverage products in a nationwide sample of food stores.* Prev Med, 2016. 86: p. 106-13.
13. Statistics Netherlands, *Employed labor force and unemployment.* 2018, Statistics Netherlands, The Hague.
14. TNS-NIPO, *Liefde gaat door de maag.* 2012.
15. Werkhoven van, S., *Bedrijfsrestaurants: gaan ze verdwijnen?* 2017.
16. Kahn-Marshall, J.L. and M.P. Gallant, *Making Healthy Behaviors the Easy Choice for Employees: A Review of the Literature on Environmental and Policy Changes in Worksite Health Promotion.* Health Education & Behavior, 2012. 39(6): p. 752-776.
17. Lassen, A.D., *et al., Effectiveness of offering healthy labelled meals in improving the nutritional quality of lunch meals eaten in a worksite canteen*. Appetite, 2014. 75: p. 128-34.
18. EFSA, *EFSA Comprehensive European Food Consuption Database in Exposure Assessment.* 2011, European Food Safety Authority: Parma.
19. Bandoni, D.H., F. Sarno, and P.C. Jaime, I*mpact of an intervention on the availability and consumption of fruits and vegetables in the workplace.* Public Health Nutr, 2011. 14(6): p. 975-81.
20. Lowe, M.R., *et al., An intervention study targeting energy and nutrient intake in worksite cafeterias.* Eat Behav, 2010. 11(3): p. 144-51.
21. Schwartz, J., *et al.*, *Inviting consumers to downsize fast-food portions significantly reduces calorie consumption.* Health Aff (Millwood), 2012. 31(2): p. 399-407.
22. Webb, K.L., *et al., Menu Labeling Responsive to Consumer Concerns and Shows Promise for Changing Patron Purchases.* Journal of Hunger & Environmental Nutrition, 2011. 6(2): p. 166-178.
23. Wilson, A.L., S. Bogomolova, and J.D. Buckley, *Lack of efficacy of a salience nudge for substituting selection of lower-calorie for higher-calorie milk in the work place.* Nutrients, 2015. 7(6): p. 4336-44.
24. Engbers, L.H., *et al., The effects of a controlled worksite environmental intervention on determinants of dietary behavior and self-reported fruit, vegetable and fat intake.* BMC Public Health, 2006. 6: p. 253.
25. Steenhuis, I.H.M., P. Van Assema, and K. Glanz, *Strengthening environmental and educational nutrition programmes in worksite cafeterias and supermarkets in the Netherlands.* Health Promotion International, 2001. 16(1): p. 21-33.
26. Steenhuis, I., *et al., The impact of educational and environmental interventions in Dutch worksite cafeterias.* Health Promot Int, 2004. 19(3): p. 335-43.
27. Vermeer, W.M., *et al., Small portion sizes in worksite cafeterias: do they help consumers to reduce their food intake?* Int J Obes (Lond), 2011. 35(9): p. 1200-7.
28. Engbers, L.H., M.N.M. van Poppel, and W. van Mechelen, *Modest effects of a controlled worksite environmental intervention on cardiovascular risk in office workers.* Preventive Medicine, 2007. 44(4): p. 356-362.
29. Vyth, E.L., *et al., Influence of placement of a nutrition logo on cafeteria menu items on lunchtime food*

*Choices at Dutch work sites.* J Am Diet Assoc, 2011. 111(1): p. 131-6.
30. Wansink, B. and A.S. Hanks, *Slim by design: serving healthy foods first in buffet lines improves overall meal selection.* PLoS One, 2013. 8(10): p. e77055.
31. Bucher, T., *et al., Nudging consumers towards healthier choices: a systematic review of positional influences on food choice.* Br J Nutr, 2016. 115(12): p. 2252-63.
32. Kahneman, D., *A perspective on judgment and choice - Mapping bounded rationality.* American Psychologist, 2003. 58(9): p. 697-720.
33. Dijksterhuis, A., *et al., The unconscious consumer: Effects of environment on consumer behavior.* Journal of Consumer Psychology, 2005. 15(3): p. 193-202.
34. Kremers, S.P., *et al., Environmental influences on energy balance-related behaviors: a dual-process view.* Int J Behav Nutr Phys Act, 2006. 3: p. 9.
35. Weintraub, E.R. *Neoclassical Economics.*
36. A. Fishbein, M. and I. Ajzen, *Belief, attitude, intention and behaviour: An introduction to theory and research.* Vol. 27. 1975.
37. Thaler, R.H. and C.R. Sunstein, *Nudge: Improving decisions about health, wealth and happiness.* 2008: New Haven: Yale University Press.
38. Kotler, P. and G. Zaltman, *Social marketing: an approach to planned social change.* J Mark, 1971. 35(3): p. 3-12.
39. Andreasen, A.R., *Social marketing in the 21st century.* 2006, Thousand Oaks, CA [etc.]: SAGE.
40. French, J. and C. Blair-Stevens, *Social marketing national benchmark criteria. 2006,* UK National Social Marketing Centre: London.
41. Andreasen, A.R., *Marketing social marketing in the social change marketplace.* Journal of Public Policy & Marketing, 2002. 21(1): p. 3-13.
42. Gordon, R., *et al., The effectiveness of social marketing interventions for health improvement: what's the evidence?* Public Health, 2006. 120(12): p. 1133-9.
43. Carins, J.E. and S.R. Rundle-Thiele, *Eating for the better: a social marketing review (2000-2012).* Public Health Nutr, 2014. 17(7): p. 1628-39.
44. Sawada, K., *et al., Social marketing including financial incentive programs at worksite cafeterias for preventing obesity: a systematic review.* Syst Rev, 2019. 8(1): p. 66.
45. Geaney, F., *et al., The effect of complex workplace dietary interventions on employees' dietary intakes, nutrition knowledge and health status: a cluster controlled trial.* Preventive Medicine, 2016. 89: p. 76-83.
46. Thorndike, A.N., *et al., A 2-phase labeling and choice architecture intervention to improve healthy food and beverage choices.* Am J Public Health, 2012. 102(3): p. 527-33.
47. Kleef van, E., K. Otten, and H. Trijp van, *Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices.* BMC Public Health, 2012. 12(1072).
48. Levy, D.E., *et al., Food choices of minority and low-income employees: a cafeteria intervention.* Am J Prev Med, 2012. 43(3): p. 240-8.
49. Rozin, P., *et al., Nudge to nobesity I: Minor changes in accessibility decrease food intake.* Judgment and Decision Making, 2011. 6(4): p. 323-332.
50. Mhurchu, C.N., L.M. Aston, and S.A. Jebb, *Effects of worksite health promotion interventions on employee diets: a systematic review.* BMC Public Health, 2010. 10.
51. Hendren, S. and J. Logomarsino, *Impact of worksite cafeteria interventions on fruit and vegetable consumption in adults A systematic review.* International Journal of Workplace Health Management, 2017. 10(2): p. 134-152.
52. Geaney, F., *et al., The effectiveness of workplace dietary modification interventions: a systematic review.* Prev Med, 2013. 57(5): p. 438-47.
53. Prentice, R.L., *et al., Evaluation and comparison of food records, recalls, and frequencies for energy and protein assessment by using recovery biomarkers.* Am J Epidemiol, 2011. 174(5): p. 591-603.
54. Subar, A.F., *et al., Addressing current criticism regarding the value of self-report dietary data.* The Journal of nutrition, 2015. 145(12): p. 2639-2645.

Chapter 2

# ‘I’ve worked so hard, I deserve a snack in the worksite cafeteria’: a focus group study

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*Appetite, 2019. 133: p297-304*

**Abstract**

This study obtained insight in motivation regarding food choices of Dutch employees, especially when visiting the worksite cafeteria. We also aimed to know why employees visit the worksite cafeteria. These insights are useful for intervention development to encourage healthier purchases in worksite cafeterias.

We conducted seven focus groups among 45 employees of seven Dutch companies. The topics were

1. factors in food selection in general;
2. motives for visiting the worksite cafeteria;
3. factors in food selection in the worksite cafeteria;
4. perceptions of healthiness of products in the worksite cafeteria and
5. solutions brought up by the employees to encourage healthier eating.

Thematic analyses were conducted with MAXQDA software.

Qualitative analyses revealed that this group of Dutch employees mentioned 'healthiness', 'price' and 'taste' as most important factor in food selection. These employees generally visit the worksite cafeteria to have a break from their work setting. Healthiness played a less important role in visiting or making food choices in the worksite cafeteria. Reasons for buying unhealthy food items were being tempted and the feeling to 'deserve' it. In order to choose healthier foods employees suggested a bigger offer of healthy food options, providing knowledge, changing prices and prominent placing of healthy foods.

This focus group study shows that drivers of food selection can differ in motives for visiting the worksite cafeteria and when choosing food there. Health is important for food choice in general, but less important in the worksite cafeteria. The results of this study could be used in the development of strategies that aim to change people's food choice behaviour.

**Keywords**

Social marketing, worksite cafeteria, purchasing behaviour, overweight, focus group.

## Introduction

The increasing prevalence of overweight and obesity [1] is a major international public health problem. Also in the Netherlands overweight rates of 50.2 % in adults [2] underscore the need for action.

Unhealthy eating behaviour, a cause of this burden, is determined by personal-level factors, like nutrition knowledge, motivations or intentions.[3,4] However, also environmental determinants, like *what*, *how* and *where* food is offered play a major role in the actual eating behaviour.[5-7] These determinants have influence – and probably most impact – in food environments one visits regularly like supermarkets, on the way to work, or in the worksite cafeteria. The latter is a real life setting visited by employees regularly or even daily, making it worthwhile to intervene here.[8]

In recent years, the worksite cafeteria is therefore more often used as a setting to study the influence of the environment on eating behaviour. These studies show promising effects on eating behaviour, like increased fruit and vegetable consumption, increased sales of healthy options and reduction in calories purchased.[9-13] However, aforementioned reviews note the need for additional research with better and consistent methodology. To illustrate, in the included studies risk of bias was high or unknown, reporting of interventions was suboptimal and most of the data were self-reported.[9-13] However, these studies also listed effective strategies to change eating behaviour. For example, Hendren *et al.* (2017) concluded that price-point subsidies, point-of-purchase materials, and menu modification can have a positive impact of fruit and vegetable consumption.[4] All in all, more than half show significant changes in eating behaviour. These effects could possibly be increased. Having insights in the drivers of the target group may increase the success rate of changing the food choice behaviour. Although there is substantial knowledge on food decision making [14-17], we do not know what drives employees to go the worksite cafeteria, since it is also common to bring one's own lunch to work. Also factors for food choice specifically in the worksite cafeteria are unknown. Insights in the drivers of the behaviour of the target group could be obtained by incorporating them, which is an important aspect of social marketing.

Social marketing is a relatively new approach in public health, with behaviour change as the ultimate goal.[18] Social marketing targets specific audiences with marketing strategies to improve personal health and quality of life, for instance by evoking healthier eating. Next to reveal how to encourage the desirable behaviour, getting insights in how to change the concurrent behaviour (i.e. choosing relatively unhealthy food items at lunch) is an important aspect of social marketing.[19,20]

Effective social marketing is operated when the elements of the theory of benchmark criteria of social marketing are used. These criteria include aims to change people's actual behaviour (**behaviour**), focuses on the audience (**customer orientation**), uses behavioural theories to understand behaviour and inform the intervention (**theory**), identifies 'actionable **insights**' (what will influence the targeted behaviour) that will

lead intervention development (**insight**), considers benefits and 'costs' of adopting and maintaining a new behaviour (**exchange**), seeks to understand what behaviour competes for the audience's time, attention and to behave a particular way (**competition**), avoids a 'one size fits all' approach (**segmentation**) and uses a mix of methods to bring about behaviour change (**methods mix**).[21,22] A part of the pragmatic framework of social marketing is to understand how and why individuals make lifestyle choices. This is reflected in the benchmark **customer orientation**, but also in the benchmarks **insight**, **exchange** and **competition**. In other words: social marketing lays emphasis on knowing the target audience in optimizing interventions. Where segmentation of the target group has added value but can only be incorporated if the group is heterogeneous enough and if it is worth targeting a small segment.
Given the above, incorporating the target audience (i.e. employees visiting the worksite cafeteria) when developing such intervention might be beneficial. To our knowledge no such studies have been published before for the worksite cafeteria specifically. Therefore, the aim of this study is to obtain insights in the factors that move and motivate employees in general and regarding food choices, especially on purchasing food in the worksite cafeteria. This can be used to detect ways of how to concur with unhealthy food choice behaviour. Furthermore, we aim to know why employees visit the worksite cafeteria and to obtain specific strategies suggested by employees that could be used in a worksite cafeteria intervention.

## Methods

We conducted seven focus groups with employees of seven companies in the Netherlands. Focus groups are essential for understanding setting specific explanations and filling gaps in knowledge.[23] In focus group interviews, unlike individual interviews, the dimension of the interactions among the participants is added.[24] The participants can communicate with each other and are encouraged to exchange ideas and comments on each other's points of view.[25] Furthermore, – as described as one of the benchmarks of social marketing – focus groups can provide a deep understanding in what moves and motivates the target group and how to influence the targeted behaviour.[26]



### Participants

This study was done as one of the first phases of a larger project with the aim to develop and evaluate a worksite cafeteria intervention.[27,28] This larger project was a cooperation between Veneca (Trade Association for Dutch catering companies), five contract catering companies being a member of Veneca, the Netherlands Nutrition Centre and the Vrije Universiteit Amsterdam. To recruit participants the cooperating contract catering companies approached their clients (the companies they cater for). These clients approached their employees to join in the focus group. Inclusion criteria for employees were visiting the worksite cafeteria at least once a week and being aged 18

years or older. Employees were asked by the facility manager to talk about having lunch at work and received a gift voucher for participation. Each focus group took place at the company during office hours and consisted of 6-8 employees.

### Description of the focus groups

The focus groups were carried out according regular procedures.[29] All focus groups were audio-recorded (Olympus VN-5500PC) and conducted with the same two researchers; one interviewer and one observatory taking notes, checking if the interviewer overlooked someone who may wanted to interrupt and asking extended questions when necessary. The atmosphere in the group was described immediately after the focus group by both researchers who discussed until agreement on the description and interpretation was reached. At the start of the focus group participants were told that the aim of the interview was to gather insights about motivations of people when making food choices and in particular when making food choices in the worksite cafeteria. They were not aware of the aim of the larger project of developing an intervention to encourage healthy eating. They may have presumed that the purpose was to collect possible improvements for the worksite cafeteria. They were not familiar with the research team. The focus groups followed a semi-structured format and took approximately 60 to 90 minutes.

### Focus group topics

By following the benchmark of identifying 'actionable insights' of the target audience, the purpose of the focus groups was to gain insight into employees' motivations of visiting the worksite cafeteria and factors being of influence in making food choices as well in general and specifically in the worksite cafeteria. Also **exchange** and **competition** are important benchmarks to reveal those factors, therefore these were checked in the focus groups. Besides reasons for purchasing food products from the worksite cafeteria also reasons for taking food from home were examined. We started with a general question about important aspects in life, to get accustomed to the interaction of the focus group. All focus groups consisted out of five main topics described in table 1. The key components of social marketing strategies are called the '4 P's'. The 4 P's are incorporated in the benchmark of using a mix of methods. The first P stands for Product, including the 'actual product' (the target behaviour – purchasing healthy food products) and the 'core product' (the benefits of eating healthy that are attractive to the target population and may convince them to act upon it). Place refers to the place where the target audience performs the purchasing behaviour. Next to that it also refers to the placements of products within the restaurant and the presence of other places to eat in the surrounding of the workplace. Price stands for the real and perceived costs or barriers to engaging the target behaviour of the employees' perspective and strategies to lower these costs. Perceived costs are for example how hard is to refrain from taking

a snack. These costs would be lower if a very attractive healthier snack is available. Obviously also literally lowering the price of a product would be effective in evoking purchase behaviour. As fourth Promotion includes designing and communicating persuasive messages to the target audience.[30] When talking about concrete examples of changes in the worksite cafeteria concerning these 4 P's participants were asked how they would respond to such change or innovation.

**Table 1. List of topics.**

| | |
|---|---|
| 1. | Factors in food selection in general |
| 2. | Motives for visiting the worksite cafeteria |
| 3. | Factors in food selection in the worksite cafeteria |
| 4. | Perceptions of healthy and less healthy products in the worksite cafeteria in relation to the 4 P's in the marketing mix: 'Product', 'Place', 'Price' and 'Promotion' |
| 5. | Solutions to encourage purchase of healthy products in the worksite cafeteria |

In all parts extended questions were asked about factors like taste, convenience, price, social environment and health, if these factors were not mentioned spontaneously. These factors were derived from a previously conducted study with experts (in preparation). In this expert-interview study a group of 14 experts representing a) Contract catering industry, b) Academic research, c) Facility management, d) Health management of employees, were asked about barriers and facilitators influencing the feasibility and the continued implementation of an intervention in the worksite cafeteria to evoke healthier purchases.

### Data analysis

Full transcripts of the focus group discussions were made. The transcripts were coded and analysed with MAXQDA. Thematic analysis was conducted to analyse the transcripts by examining themes within data.[31] In the first phase, familiarization with the data was achieved. Subsequently, one of the researchers generated initial codes and searched for themes among the codes. Later these themes were revised and renamed. Finally, the first researcher (Elizabeth Velema) discussed the codes, themes and previous conclusions with a second researcher (Ellis L. Vyth). After deliberating, agreement about the codes of all text units was achieved. In the results section, participants' meanings are illustrated by using representative quotes. The official language of the focus group discussions was Dutch. Representative quotes were translated to English.

### Data saturation

Focus groups were conducted until data saturation was achieved. This was done by counting new codes per focus group transcript, based on methods by Guest *et al.* (2006).[32] The majority of the codes was derived from the first focus groups. After the

sixth focus group 176 codes were assigned. The seventh focus group generated 3 new codes. At this point, we assumed that an additional focus group would not provide significant new information.

## Results

In total 45 people (23 male; 22 female) participated in seven focus groups. The number of participants ranged from six to eight per focus group. Five participants were low educated, 20 were middle and 20 were high educated (table 2). The participants of one focus group were all employees of the same company, but did not always know each other. The seven companies were a truck factory, a coal handling company, a clearing house, a healthcare provider, a governmental institution, a health care insurer and an accountancy firm. The results described are based on statements of the participants. Table 2 also describes the atmosphere in the group. Table 3 shows for each topic the factors mentioned by the respondents.

### Motives for food selection

We asked participants for their motives when selecting foods in general. Health; price; and taste were mentioned most. Regarding health, nutrient content such as sugars, fats, vitamins and food additives were mentioned. When we asked participants why they take health into account when choosing food ones' appearance (body weight) was mentioned often as a reason to choose healthy foods. A number of participants stated that they do not want to be overweight.

- Woman, group 6: 'I don't want to become or be overweight. Therefore I keep an eye on it. So if my pants are getting tight, I will ensure that they get less tight.'

Price is mentioned in different contexts. Some participants mentioned that they cannot afford to spend a lot of money on food and make their choices on the basis of special offers. Some stated that they consider the price versus the quality and are willing to pay more for better quality, naming factors such as organic, Fairtrade, animal welfare and sustainability. A few said that they do not pay attention to the price.

### Motives for visiting the worksite cafeteria

The most mentioned reason for visiting the worksite cafeteria was to leave the workplace and to relax, or in other words 'having an interruption in the work'. This was clearly stated by the following participant:

- Man, group 3: 'Well, you are for a moment not at your workplace. That is important to do your work properly.'

Convenience is mentioned by some participants. The following statement shows this.

- Man, group 6. 'I buy bread and cheese in the worksite cafeteria. I could have bought it in the supermarket. It is convenient, because I can get it there all the time and as a result, I don't have to do anything in the morning.'

Lastly, the aspect of socializing with colleagues was also mentioned often. Participants mentioned 'having a conversation about other things than work'. Next to reasons for visiting, we also heard reasons for not visiting the worksite cafeteria, for example not having enough time during the 30-minute break for both smoking and visiting the worksite cafeteria. Furthermore, some respondents visited because they had no other option for getting lunch. Availability of other possibilities to get lunch, for instance walk to a bakery was mentioned as a reason not to visit the worksite cafeteria.

**Motives for purchasing food products in the worksite cafeteria**

When asked the employees about motivation for food choices when visiting the worksite cafeteria taste and price were mentioned most.

- Man, group 5: 'It just has to be tasty!'
- Woman, group 1: 'Price is important for some products. As an example, yoghurt drink costs one euro. I could buy a liter in the supermarket for one euro. Here it is a small can. I would never buy that here, although I feel like having it. It is a matter of principle'.

When asked the about the influence of colleagues most employees mentioned that this was not of influence for their food choice.

- Woman, group 1: 'When we have lunch everyone takes what he wants. It is divers, from fries to salads.'

Convenience was mentioned as a factor for the products soup, salad and fruit salad.

**Perceptions towards healthy and unhealthy products in the worksite cafeteria**

When asked to name healthy and unhealthy products in the worksite cafeteria employees mentioned: salads (and salad bar), whole-wheat and regular bread, eggs, dairy, fruit and lean meat and lean cheese as healthy products. Asking for unhealthy items participants mentioned among other things: warm fried snacks, like fries, soup (too salty) and salads with a lot of dressing.

We also asked, if so, for the reasons for choosing these unhealthy products. Respondents mentioned that they were tempted by the tasty look of unhealthy products. Furthermore, they mentioned that they 'deserved it'. Examples of this phenomenon were as follows:

- Woman, group 4: 'It looks so tasty'.
- Man, group 5: 'As a reward, because 'I have had a hard time'. Now I'm allowed to have a snack, a cheat-snack'.

**Solutions to encourage purchase of healthy products in the worksite cafeteria**

Solutions for promoting the purchase of healthy products mentioned were a change in offer by means of offering more kinds of healthy food products, providing knowledge on healthy food, changing the price of healthy food and taking care of a nice presenta-

tion and promotion of healthy food.

- Man, group 5 about unhealthy food; 'Don't offer it anymore'.
- Woman, group 1: 'I don't mind the unhealthy offer, but there should be more alternatives.'
- Woman, group 7: 'There needs to be more variety in the offer'.

It was also mentioned that the price should be reversed.

- Woman, group 7: 'The price should be reversed. Two euro for a fried snack and 40 cents for a salad'.

Providing knowledge on healthiness of food was mentioned in one focus group. The participants mentioned that perhaps not all people really know what is unhealthy, besides fried snacks. Participants also seemed to be sensitive for being seduced to eat healthier.

- Woman, group 1: 'I am convinced that, for instance when you are at a terrace and you get a wonderful whole-wheat sandwich with lettuce and whatever, that looks so tasty, people will choose that. So if you offer that in a good way people will choose it here as well.'

**Table 2a. Characteristics individual participants (n = 45).**

| | | | |
|---|---|---|---|
| Sex | Male | n = 23 | |
| | Female | n = 22 | |
| Ethnicity | Native Dutch | 43 | |
| | Turkish | 1 | |
| | Belgian | 1 | |
| Age | | mean 41.7 | range 18-62 |
| Body Mass Index | | mean 25.5 | range 18.4-41.2 |
| (1 missing) | Healthy weight | n = 24 | |
| | Overweight | n = 13 | |
| | Obesity | n = 7 | |
| Number of working days per week | | 4.3 (0.6) | 3-5 |
| Number of weekly visits to worksite cafeteria | | 3.1 (1.7) | 0-5 |
| Lunch in worksite cafeteria, from home or somewhere else | | 32% always cafeteria<br>64% home<br>4% elsewhere | |
| When in cafeteria: mostly lunch from cafeteria (whole, partially or non) | | 46% whole<br>54% part/non | |
| Education level* | Low | 5 | |
| | Middle | 20 | |
| | High | 20 | |
| Size household | 1.8 adults (1-2) | 0.9 kids (0-4) | |

**Table 2b. Characteristics groups.**

| Group n | Type of business | Education level* | Atmosphere in the group |
|---|---|---|---|
| 1. n = 8 | Governmental institution | n = 7 high<br>n = 1 middle | Atmosphere okay, jokes were made. Respondents did not know each other that well. However, respondents were very reserved in giving answers. Some respondents complained about the products in the worksite cafeteria. |
| 2. n = 6 | Accountancy firm | n = 3 high<br>n = 3 middle | Relaxed atmosphere. Respondents did not know each other that well. All respondents talked freely, participated actively and gave positive and negative aspects of the worksite cafeteria. Respondents talked about sustainability. Differences in education level seemed to make a difference in engagement with motives for healthy and sustainable choices. |
| 3. n = 6 | Health care insurer | n = 5 high<br>n = 1 middle | Good atmosphere, jokes were made. Not all participants talked spontaneously, but everyone seemed to speak freely also when opinions were different. Some participants new each other. Participants were critical about the offer of healthy products in the worksite cafeteria. The range of healthy products was valued as too small. One respondent was very health minded, but it did not seem to influence the others. |
| 4. n = 7 | Clearing house | n = 1 high<br>n = 3 middle<br>n = 3 low | Atmosphere was good, jokes were made and participants spoke freely. Health seemed less important compared to other focus groups. Price was of bigger importance. Eating snacks was considered normal. |
| 5. n = 6 | Truck factory | n = 2 high<br>n = 3 middle<br>n = 1 low | Atmosphere in the group with only male respondents was very good. Although one respondent gave a strong opinion on the importance of healthy behaviour and what it meant to him, not everyone agreed. The younger trainees showed different opinions. |
| 6. n = 6 | Coal handling company | n = 1 high<br>n = 4 middle<br>n = 1 low | Atmosphere was okay. Respondents seemed not very engaged with the topics and were reserved and timid. |
| 7. n = 6 | Healthcare provider | n = 1 high<br>n = 5 middle | The atmosphere was good, jokes were made. Respondents all knew each other. It seemed that some respondents gave socially desired answers, because their manager was quite dominant. Healthy eating seemed to be less important compared to having a break from work and the taste of the food. |

* Low = lower vocational education, middle = secondary vocational education, high = higher vocational education and academic.

## Discussion

The aim of this study was to obtain insights in the factors that move and motivate employees regarding food choices, especially on purchasing food in the worksite cafeteria. Furthermore, we aimed to know why employees visit the worksite cafeteria and to obtain specific strategies suggested by employees that could be used in a worksite cafeteria intervention. To our knowledge this is the first time Dutch employees are involved in a study with a social marketing approach for the purpose of intervention development in the worksite cafeteria.

Participating employees mentioned 'healthiness' as an important factor for food selection in general. The main reason for Dutch employees to regularly visit the worksite cafeteria was to have a break from their work setting. Healthiness plays a less important role when choosing food in the worksite cafeteria. For the setting of the worksite cafeteria 'taste' and 'price' were more prominently mentioned as factors for choosing food. When participants were asked directly for the reason of choosing relatively unhealthy food items like fried snacks, they mentioned that they were tempted by the tasty look. Also the feeling that 'they deserved it' was mentioned as a reason for purchasing unhealthy food products.

The fact that 'healthiness' came forward in this study as an important overall aspect for food choice is in line with former studies.[33-37] However, it is interesting that health is less important when choosing food items in the worksite cafeteria. This might indicate that one's motives when choosing lunch items in the worksite cafeteria are a bit different compared to overall food selection motives, for instance when buying food to consume at home. This seems to be in line with the studies showing that different aspects play a role when eating out of home compared to eating at home. In out of home settings people tend to choose less healthy, resulting in a higher energy intake.[38-41] It seemed that educational level was positively associated with the extent to which healthy eating was considered important. In the focus groups with an average lower level of education health appeared to be of less importance. This corresponds with known literature about socioeconomic disparities in the healthiness of eating patterns.[42-50]

In addition to the motives for choosing healthy or less healthy products it is also important whát products are considered healthy or less healthy by people. It is notable that respondents classified soups when being too salty and salads with a lot of dressing as unhealthy. This is striking, because these products are generally considered healthy. Bucher *et al.* (2015) showed that fruit and vegetables and fiber content of a food item are positively related to the perception of being healthier. And that sugar and fat contents are associated with negative healthiness perceptions.[51] However, it must be noted that besides Buchers' study it is largely unknown how consumers make their judgements on single food items.'[52] It shows that our respondents have relatively a lot of knowledge about the healthiness of food. This can however not be expected to correspond with the total Dutch population.

It seems contradictory to choose unhealthy foods in the worksite cafeteria when 'healthiness' is an important overall factor for food choice. The relapse prevention (RP) model of Marlatt and Gordon [53,54] could be used to interpret this behaviour. The RP model is used to identify determinants of relapse during a certain behaviour change, such as drinking alcohol when stopped drinking or gaining weight after a considerate weight loss. The model states that both immediate determinants (e.g. high-risk situations and coping skills) and hidden earlier determinants (antecedents) (e.g. lifestyle

factors, and urges and cravings) can contribute to a relapse.[55]
The employees stated that 'having a break from work' and 'to relax' were important reasons for visiting the worksite cafeteria. We could consider the employees as being in a high-risk mode: feeling the need to compensate for hard work plus being tempted by availability, which could induce cravings. This could lead thereafter to the 'relapse' of purchasing an unhealthy snack to compensate the disbalance.
The RP models also shows that they rationalise this purchase not to feel guilt; Telling themselves that they deserve it, like some participants mentioned. We already know this mechanism occurs when celebrating a special occasion. [17,55-57] Being in the positive state of a celebration is one of four high risk situations identified by Larimer *et al.* (1999) that triggers the unhealthy behaviour.[55] Next to enjoying a special occasion Verhoeven *et al.* (2015) identified 5 other reasons for unhealthy snacking. *Opportunity induced eating*, *coping with negative emotions*, and *rewarding oneself* all seem to fit in the situation employees are in. *Gaining new energy* and *social pressure* were not explicitly mentioned by respondents and do not seem to be reasons to choose a snack over other food products. All together it implicates that other determinants play a role when buying lunch at work compared to when buying groceries. This insight could be used in intervention development.
We can conclude that it is important to 'help' employees by not exposing them to unhealthy snacks since they are probably in a high-risk situation by a combination of the physical location, the occasion, and the mental situation among which their 'ego depleted state'. Being in a state of ego depletion means that wilful actions have consumed and depleted the limited inner capacity of decision making. In this depleted state, further efforts at self-control are prone to failure.[58]

In this light it would be recommendable to have more healthy, tasty, attractive and convenient food items offered in the worksite cafeteria. Seducing employees by healthy products is an option, since they probably are receptive to these 'temptations'. These products should look tasty and must have a fair price. These recommendations could be classified along the 4 P's of social marketing. We could classify the strategy of 'development of healthier savoury snacks' as the P of Product. Offering tempting healthy snacks with a relatively low price concerns the element Price. Also the Promotion should lay emphasis on healthier products that still give the feeling of being a treat. People could than indulge in the craving but can rationalise this as having made a healthy choice. A positive experience would help to increase the feeling of self-control. The Place for displaying these product should be at the beginning of the route and prominent to increase the change of choosing the heathier option over the unhealthy ones. Multiple studies showed that products at the beginning of the route are more likely to be chosen for.[59-62]
When asking participants directly for ways to stimulate the choice for healthy items

by making use of the 4 P's of social marketing, they mentioned a change in the offer towards more variation of healthy products. Furthermore, a change in price and the way it is offered could work, according to them. Concerning the effect of price in food choice overall, a combination of expanding the healthy offer (Product) together with a price decrease (Price) and nice and eye-catching presentation (Place and Promotion) could be effective in encouraging Dutch customers towards healthier options in the worksite cafeteria. A number of factors may have biased the results of this study. First, the educational level of the respondents was higher compared to average Dutch employees. Since the lower educated participants seemed to find price more important compared to higher educated participants, we should weigh up the importance of providing healthy snacks with low prices. Second, also the ethnicity of the respondents did not correspond nicely with the Dutch population. In future research the reflection of ethnicity in the sample should be better. We now may lack the opinion of non-Dutch employees. Hereby we miss potential culture based arguments. This reflection and small sample let to the limitation that we did not cover the benchmark of segmentation in this study. When using a larger group of participants segments within the sample can be made. This could help to customise an intervention towards a specific segment of the target group.

## Conclusions

This study showed that, although health is considered an important determinant in food choice, taste and price are of bigger importance to Dutch employees when selecting food in the worksite cafeteria. Participants stated that they in the first place visit the worksite cafeteria to have a break from work and are subsequently tempted to buy unhealthy foods, because it is present and they 'deserve it'. This implies that it is important to seduce employees towards healthier food items that feel like a treat underscoring that they are tasty and priced well, instead of focusing on the healthy aspects of the foods.

Offering a 'wider range of healthy food options' and 'having a price in favour of healthy products' are mentioned most by Dutch consumers in order to stimulate healthy choices in the worksite cafeteria.

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## References


1. Ng, M., *et al., Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013.* Lancet, 2014. 384(9945): p. 766-81.
2. Statistics Netherlands, *Lengte en gewicht van personen, ondergewicht en overgewicht; vanaf 1981.* 2016, Statistics Netherlands, The Hague.
3. Teixeira, P.J., *et al., Successful behavior change in obesity interventions in adults: a systematic review of self-regulation mediators.* BMC Med, 2015. 13: p. 84.
4. Brug, J., A. Oenema, and I. Ferreira, *Theory, evidence and Intervention Mapping to improve behavior nutrition and physical activity interventions.* Int J Behav Nutr Phys Act, 2005. 2(1): p. 2.
5. Kremers, S.P., *et al., Environmental influences on energy balance-related behaviors: a dual-process view.* Int J Behav Nutr Phys Act, 2006. 3: p. 9.
6. Swinburn, B., G. Egger, and F. Raza, *Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity.* Prev Med, 1999. 29(6 Pt 1): p. 563-70.
7. Sleddens, E.F.C., *et al., Correlates of dietary behavior in adults: an umbrella review.* Nutrition Reviews, 2015. 73(8): p. 477-499.
8. Estabrooks, P.A. and R.E. Glasgow, *Worksite interventions*, in Cambridge Handbook of Psychology, Health and Medicine, Second Edition. 2014. p. 407-414.
9. Hendren, S. and J. Logomarsino, *Impact of worksite cafeteria interventions on fruit and vegetable consumption in adults. A systematic review.* International Journal of Workplace Health Management, 2017. 10(2): p. 134-152.
10. Maes, L., *et al., Effectiveness of workplace interventions in Europe promoting healthy eating: a systematic review.* Eur J Public Health, 2012. 22(5): p. 677-83.
11. Geaney, F., *et al., The effectiveness of workplace dietary modification interventions: a systematic review.* Prev Med, 2013. 57(5): p. 438-47.
12. Mhurchu, C.N., L.M. Aston, and S.A. Jebb, *Effects of worksite health promotion interventions on employee diets: a systematic review.* Bmc Public Health, 2010. 10.
13. Allan, J., *et al., Environmental interventions for altering eating behaviours of employees in the workplace: a systematic review.* Obes Rev, 2017. 18(2): p. 214-226.
14. McDermott, M.S., *et al., The theory of planned behaviour and discrete food choices: a systematic review and meta-analysis.* Int J Behav Nutr Phys Act, 2015. 12: p. 162.
15. Vella, M.N., *et al., Functional food awareness and perceptions in relation to information sources in older adults.* Nutr J, 2014. 13: p. 44.
16. Hoppert, K., *et al., Integrating sensory evaluation in adaptive conjoint analysis to elaborate the conflicting influence of intrinsic and extrinsic attributes on food choice.* Appetite, 2012. 59(3): p. 949-55.
17. Renner, B., *et al., Why we eat what we eat. The Eating Motivation Survey (TEMS).* Appetite, 2012. 59(1): p. 117-128.
18. Gordon, R., *et al., The effectiveness of social marketing interventions for health improvement: what's the evidence?* Public Health, 2006. 120(12): p. 1133-9.
19. Grier, S. and C.A. Bryant, *Social marketing in public health.* Annu Rev Public Health, 2005. 26: p. 319-39.
20. Andreasen, A.R., *Social Marketing - Its Definition and Domain.* Journal of Public Policy & Marketing, 1994. 13(1): p. 108-114.
21. French, J. and C. Blair-Stevens, *Social marketing national benchmark criteria.* 2006, UK National Social Marketing Centre: London.
22. Andreasen, A.R., *Marketing social marketing in the social change marketplace.* Journal of Public Policy & Marketing, 2002. 21(1): p. 3-13.
23. Morgan, D.L., *The Focus Group Guidebook.* 1998: SAGE Publications, Inc.
24. Wong, L.P., *Focus group discussion: a tool for health and medical research.* Singapore Medical Journal, 2008. 49(3): p. 256-260.
25. Kitzinger, J., Chapter: *Focus groups, in Qualitative research in health care (3rd ed.)*. 2006, Blackwell Publishing; BMJ Books; US: Malden; Williston, VT. p. 21-31.
26. French, J., *et al., Social marketing and public health Theory and practice.* 2010, United States: Oxford University Press.
27. Velema, E., E.L. Vyth, and I.H. Steenhuis, *Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands: intervention development and study design.* BMC Public Health,

2017. 17(1): p. 63.
28. Velema, E., *et al., Nudging and social marketing techniques encourage employees to make healthier food choices: a randomized controlled trial in 30 worksite cafeterias in The Netherlands.* Am J Clin Nutr, 2018.
29. Baarda, D.B., M.P.M. de Goede, and J. Teunissen, *Basisboek kwalitatief onderzoek. Praktische handleiding voor het opzetten en uitvoeren van kwalitatief onderzoek* (Basic qualitative research: *Practical guide for designing and conducting qualitative research*). . 2001, Groningen/Houten: Wolters-Noordhoff bv
30. Farmer, F.L., *et al., Community-Based Social Marketing: Involvement in Health Programs*. Journal of the Community Development Society, 2002. 33(2): p. 1-18.
31. Braun, V. and V. Clarke, *Using thematic analysis in psychology.* Qualitative Research in Psychology, 2006. 3(2): p. 77-101.
32. Guest, G., A. Bunce, and L. Johnson, *How many interviews are enough? An experiment with data saturation and variability.* Field Methods, 2006. 18(1): p. 59-82.
33. Steptoe, A., T.M. Pollard, and J. Wardle, *Development of a Measure of the Motives Underlying the Selection of Food - the Food Choice Questionnaire.* Appetite, 1995. 25(3): p. 267-284.
34. Candel, M., *Consumers' convenience orientation towards meal preparation: conceptualization and measurement*. Appetite, 2001. 36(1): p. 15-28.
35. Fotopoulos, C., *et al., Food Choice Questionnaire (FCQ) revisited. Suggestions for the development of an enhanced general food motivation model.* Appetite, 2009. 52(1): p. 199-208.
36. Furst, T., *et al., Food choice: a conceptual model of the process.* Appetite, 1996. 26(3): p. 247-65.
37. Januszewska, R., Z. Pieniak, and W. Verbeke, *Food choice questionnaire revisited in four countries. Does it still measure the same?* Appetite, 2011. 57(1): p. 94-8.
38. Naska, A., *et al., Eating out is different from eating at home among individuals who occasionally eat out. A cross-sectional study among middle-aged adults from eleven European countries.* Br J Nutr, 2015. 113(12): p. 1951-64.
39. Orfanos, P., *et al., Eating out of home: energy, macro- and micronutrient intakes in 10 European countries. The European Prospective Investigation into Cancer and Nutrition.* Eur J Clin Nutr, 2009. 63 Suppl 4: p. S239-62.
40. Orfanos, P., *et al., Eating out of home and its correlates in 10 European countries. The European Prospective Investigation into Cancer and Nutrition (EPIC) study.* Public Health Nutr, 2007. 10(12): p. 1515-25.
41. Lachat, C., *et al., Eating out of home and its association with dietary intake: a systematic review of the evidence.* Obes Rev, 2012. 13(4): p. 329-46.
42. Smith, G.D. and E. Brunner, *Socio-economic differentials in health: the role of nutrition.* Proc Nutr Soc, 1997. 56(1A): p. 75-90.
43. James, W.P., *et al., Socioeconomic determinants of health. The contribution of nutrition to inequalities in health.* BMJ, 1997. 314(7093): p. 1545-9.
44. Galobardes, B., A. Morabia, and M.S. Bernstein, *Diet and socioeconomic position: does the use of different indicators matter?* Int J Epidemiol, 2001. 30(2): p. 334-40.
45. Galobardes, B., *et al., Indicators of socioeconomic position (part 1).* J Epidemiol Community Health, 2006. 60(1): p. 7-12.
46. Hulshof, K.F., *et al., Socio-economic status, dietary intake and 10 y trends: the Dutch National Food Consumption Survey.* Eur J Clin Nutr, 2003. 57(1): p. 128-37.
47. Darmon, N. and A. Drewnowski, *Does social class predict diet quality?* Am J Clin Nutr, 2008. 87(5): p. 1107-17.
48. Mullie, P., *et al., Dietary patterns and socioeconomic position.* Eur J Clin Nutr, 2010. 64(3): p. 231-8.
49. Dekker, L.H., *et al., Socio-economic status and ethnicity are independently associated with dietary patterns: the HELIUS-Dietary Patterns study.* Food Nutr Res, 2015. 59: p. 26317.
50. Konttinen, H., *et al., Socio-economic disparities in the consumption of vegetables, fruit and energy-dense foods: the role of motive priorities.* Public Health Nutrition, 2013. 16(5): p. 873-882.
51. Bucher, T., B. Muller, and M. Siegrist, *What is healthy food? Objective nutrient profile scores and subjective lay evaluations in comparison.* Appetite, 2015. 95: p. 408-414.
52. Paquette, M.C., *Perceptions of healthy eating: state of knowledge and research gaps.* Can J Public Health, 2005. 96 Suppl 3: p. S15-9, S16-21.
53. Marlatt, G.A. and W.H. George, *Relapse prevention: introduction and overview of the model.* Br J Addict, 1984. 79(3): p. 261-73.
54. Marlatt, G.A. and J.R. Gordon, *Relapse Prevention: Maintenance Strategies in the Treatment of Addictive Behaviors.* 1985, New York: Guilford Press.

55. Larimer, M.E., R.S. Palmer, and G.A. Marlatt, *Relapse prevention. An overview of Marlatt's cognitive-behavioral model*. Alcohol Res Health, 1999. 23(2): p. 151-60.
56. Klein, H., *Self-Reported Reasons for Why College-Students Drink.* Journal of Alcohol and Drug Education, 1992. 37(2): p. 14-28.
57. Verhoeven, A.A., *et al., It's my party and I eat if I want to. Reasons for unhealthy snacking.* Appetite, 2015. 84: p. 20-7.
58. Inzlicht, M. and B.J. Schmeichel, *What Is Ego Depletion? Toward a Mechanistic Revision of the Resource Model of Self-Control.* Perspectives on Psychological Science, 2012. 7(5): p. 450-463.
59. Bucher, T., *et al., Nudging consumers towards healthier choices: a systematic review of positional influences on food choice.* Br J Nutr, 2016. 115(12): p. 2252-63.
60. Engbers, L.H., *et al., Worksite health promotion programs with environmental changes: a systematic review.* Am J Prev Med, 2005. 29(1): p. 61-70.
61. Kleef van, E., K. Otten, and H. Trijp van, *Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices.* BMC Public Health, 2012. 12(1072).
62. Skov, L.R., *et al., Choice architecture as a means to change eating behaviour in self-service settings: a systematic review.* Obes Rev, 2013. 14(3): p. 187-96.

Chapter 3

# Stakeholders' view on implementing an intervention with nudging strategies to stimulate healthy choices in Dutch worksite cafeterias

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*Submitted*

## Abstract

*Objective*

The worksite cafeteria is a suitable place to encourage healthier eating behaviour. To successfully implement healthier worksites using nudging strategies, caterers, nutritional experts and facility managers must play a key role. Therefore, the aim of this study is to gain insight into the factors that, according to these stakeholders, are related to the adoption and continued implementation of a healthy worksite cafeteria intervention using nudging strategies.

*Design*

We conducted eight qualitative semi-structured interviews with fourteen stakeholders to explore their opinions about factors influencing the adoption of a healthy worksite cafeteria intervention. Furthermore, we identified barriers and facilitators influencing continued implementation. Constructs from the Diffusion of Innovations Theory were included in the interview guide. The stakeholders interviewed were caterers, nutrition researchers, facility managers and health management consultants. The framework approach was used to analyse the data.

*Results*

Important factors for adoption are guaranteeing freedom of choice and profitability, and ensuring the availability of attractive healthy options. Implementing a healthy worksite cafeteria intervention using nudging strategies seems compatible with the values, goals and ways that caterers work. It is not overly complex and is a selling point to employers. The involvement of catering employees united by the belief in the value and purpose of the intervention appears important for continued implementation.

*Conclusion*

Key stakeholders have a positive attitude towards a healthy worksite cafeteria that uses nudging strategies, as long as this does not affect profitability and a broad range of attractive healthy options are available. Explaining the aim of the intervention to the professionals implementing it and demonstrating its proven effectiveness could enhance successful implementation.

## Keywords

Qualitative research, food choice, worksite cafeteria, nudging.

## Introduction

Improving peoples' eating behaviour is important in the light of the increase of overweight worldwide [1], including in the Netherlands.[2] The Netherlands has a working population of almost 9 million people [3] with Dutch men and women spending on average 36 and 26 hours at work per week respectively, which means work takes up the most time after personal time including sleeping and eating.[4,5] Considering this, encouraging a healthy lifestyle in the work setting is essential.

Over the last decade, an increasing number of employers have offered programmes to increase the health of their employees. The majority of programmes focus on increasing physical activity.[6-8] However, in addition to physical activity, the offer of food at work is receiving increasing attention [9] and employers are demonstrating a willingness to support their employees in making healthier food choices. While this has previously been done in the education context, it is also occurring more often in worksite cafeterias using a strategy of nudging towards healthier choices.[10-12] Nudging refers to subtle changes in the environment to alter peoples' choices, without restricting any specific option, and it is also referred to as 'choice architecture'.[13] One example is the placement of fruit more prominently, such as at the cash register, which increases sales.[14,15] Nudging and steering employees' food choices in the worksite cafeteria by means of changing the environment is becoming more commonly discussed in the literature on public health interventions.[16-18] However, it is still seen as an innovation by many of the relevant stakeholders, such as catering managers and facility managers. An innovation can be defined as an idea, practice or object that is perceived as new by an individual or other unit of adoption. Moreover, in order to successfully implement an innovation, one should take specific factors into account. In Diffusion of Innovations Theory (DOIT), Rogers describes the characteristics of an innovation that are most likely to affect the speed and extent of the adoption process.[19-21] In other words, DOIT defines the factors and actions that are needed for successful implementation. The first action required is to identify the stakeholders who are expected to adopt and implement the innovation. For an innovation that aims to improve food choice in a worksite cafeteria using nudging strategies, these key stakeholders are caterers, nutrition researchers, facility managers and health management consultants of insurance companies (as the possible financers of such an intervention). It is useful to consult the key stakeholders during intervention development and prior to implementation to reveal possible barriers and facilitating factors and thereby increase the chance of success. In several fields of research, implementation itself is a key topic, since the process of good implementation has a considerable impact on the outcomes of the intervention.[22,23] However, although an increase in interventions in worksite cafeterias can be seen, the emphasis is usually on the effects on food purchase or intake.[9,18,24-26] This means that process evaluations about factors that enhance or impede the implementation of worksite health promotion interventions are not systematically performed alongside effectiveness studies.[24]

In the few studies that have reported process components, the most frequent reported facilitator was strong management support; lack of resources was the most frequent reported barrier. Furthermore, little is known specifically about the implementation of an intervention using nudging strategies to change food choices in worksite cafeterias. This is, however, of interest because in the Netherlands employers usually outsource the running of their worksite cafeteria to a caterer, and together they determine what kind of service will be offered. Thus, in the case of the implementation of a worksite cafeteria intervention, the agreement and conviction of these stakeholders is required. This study aims to fill these gaps.

Prior to and during the current study, we developed an intervention consisting of a set of nudging strategies to encourage people in the worksite cafeteria to make healthier food choices; for example, displaying a greater proportion of healthy sandwiches than usual. The aim of the current study was to determine the factors that would influence the adoption and continued implementation of an intervention consisting of strategies aimed at nudging healthier food choices in the worksite cafeteria by the individuals and organizations referred to as the key stakeholders: the contract caterers, nutrition researchers, facility managers and health management consultants. The results of our study will allow us to draw implications for actual intervention development and content with respect to the adoption and the continued implementation of nudging interventions in the worksite cafeteria. The study will add to the findings of our previous study, in which we investigated the context from the perspective of the customers of the potential healthy worksite cafeteria.[27] The latter focus group study showed that the drivers of food selection in the worksite cafeteria were different to other settings. Healthiness was found to play a less important role in food choice in the worksite cafeteria. Furthermore, customers mentioned being tempted by unhealthy foods and having the feeling that they deserved a treat as a result of their hard work. Therefore, our current research question is: 'What factors, according to key stakeholders, will facilitate or impede the adoption and continued implementation of a healthy worksite cafeteria intervention using nudging strategies?' Due to the innovative character of the intervention, we applied factors from the DOIT theoretical framework in the interviews to answer this question.



## Methods

### Design and participants

We conducted eight semi-structured interviews with a total of 14 stakeholders to determine the factors that would influence the adoption of a healthy worksite cafeteria intervention. All of the interviews were held in May and June 2014 in the Netherlands. The duration of the interviews varied from 1 to 1.5 hours. We selected important stakeholders in contract catering with the assistance of the Dutch trade association for catering companies. Furthermore, we asked participants to name other important professionals

to include in this study. The experts were from different professional backgrounds: four experts were working for catering companies, of which one was a manager and three were consultants in food quality and brands; two experts were secretaries for the Dutch trade association for catering companies; three interviewees were nutrition researchers; two others worked for the facility service of a large health insurance company; two were health management consultants at different insurance companies; and one worked as a health consultant for a governmental institution. All of the interviewees were adults and Dutch-speaking. This study did not require ethics approval according to the Dutch Medical Research Involving Human Subjects Act (in Dutch WMO). Verbal informed consent to participate was obtained. We conducted one interview with three nutritional experts, four interviews involving two experts and three interviews of only one expert. We determined this clustering in consultation with the participants, which had the advantage that respondents from a similar background could complement each other.

### Interview topics

We based our interview topic list on two theoretical models: DOIT [21] and Social Marketing.[28] We incorporated a selection of four attributes from DOIT (table 1) to help identify the barriers and facilitators influencing the feasibility and continued implementation of the intervention. The first attribute considered relevant and incorporated into the interview topic list was relative advantage; that is, the degree to which an innovation is perceived as better than the idea it supersedes. The second attribute was compatibility; that is, the match between the adopters' values, needs, beliefs and perceived needs, as well as with daily practice. The third was complexity, which is the degree to which an innovation is perceived as difficult to understand and use. The fourth was reversibility: the extent to which an intervention is easily undone. The attribute of observability was not applicable in this setting, since the effects of the intervention would not be immediately visible to our experts. Additionally, strategies that may be incorporated into the intervention; for example, those derived from the 'method mix' in the theory of social marketing, were verified. Social marketing integrates marketing concepts with other approaches to influence behaviour for the greater social good.[28] One of eight fundamental concepts (benchmarks) in social marketing is the methods mix, which prescribes the use of an appropriate mix of methods to bring about behaviour change.[29] At the operational level, these are principally marketing 'tactics': product, price, place and promotion – the 4 P's. Changing aspects of these 4 P's in the worksite cafeteria might trigger more healthy purchase behaviour.

### Interview protocol

Prior to the interview, we gave the experts a short description of the aim, method and the content of the intervention referred to as *The healthy worksite cafeteria*. We first

**Table 1. Main interview topics.**

| Introduction | Questions |
|---|---|
| | • What are the important requirements for a worksite cafeteria in general? |
| Content intervention (4 P's) | • What are the important requirements concerning the products offered (assortment) in a worksite cafeteria? |
| | • What are the important requirements concerning the price of products in a worksite cafeteria? |
| | • What are the important requirements concerning the place of products in a worksite cafeteria? |
| | • What are the important requirements concerning promotion in a worksite cafeteria? |
| **Characteristics that affect adoption** | Questions |
| Relative advantage | • What are the possible advantages of a healthy worksite cafeteria? (What are the requirements for a healthy worksite cafeteria and what is already being done?) |
| Content intervention (4 P's) | • What possible changes could be made to the products offered (assortment) to achieve a healthy worksite cafeteria? |
| | • What possible changes to the price of products would be required to achieve a healthy worksite cafeteria? |
| | • What possible changes to the place of products would be required to achieve a healthy worksite cafeteria? |
| | • What possible changes to the promotion of products would be required to achieve a healthy worksite cafeteria? |
| Compatibility | • Would a healthy worksite cafeteria fit with the standards, values and goals of stakeholders? |
| Complexity | • Which elements would increase the complexity of implementing a healthy worksite cafeteria? |
| Reversibility | • Would a healthy worksite cafeteria be reversible? |
| **Characteristics that affect continued implementation** | Questions |
| | • What are the facilitators of or barriers to the continued implementation of a healthy worksite cafeteria? |

The phrase *healthy worksite cafeteria* is defined here as a set of strategies, including nudging strategies, that aim to encourage healthier purchase behaviour. This might also be considered a healthy worksite cafeteria intervention.

asked the respondents about the requirements of a worksite cafeteria in general to introduce the topic. Subsequently, we asked about specific requirements for a healthy worksite cafeteria intervention and the factors that would have an impact on the implementation of such an intervention.

### Data analysis

We used the framework approach to thematically analyse the data with open coding.[30-32] One researcher (EV) recorded the interviews with a digital voice recorder (Olympus VN-5500PC) and made full transcripts. Subsequently, this researcher divided the transcripts into small units. The text units were coded and categorised according to the interview topics. Codes were checked independently by a second researcher (ELV), after which the coding and emerging themes were discussed. There was initial coder disagreement for 37 of the 274 codes (13.5 %). After discussion the codes were merged, added or text units were coded differently until all differences in agreement between the two researchers were resolved. After the coding process, the text units were sorted according to the interview topic. Using a constant comparative method of analysis, summaries were made for each topic by going through the transcripts and identifying themes.[30] For some topics, the type of respondent (e.g. catering manager or a nutritional expert) was taken into account because some questions were about the opinion or response of the specific occupational group. Therefore, all of the text units were coded by the type of respondent. Finally, summary reports on each topic were written.[33] The data were analysed using MAXQDA 2007.

## Results

In this results section we present the views of experts concerning the adoption and continued implementation of a healthy worksite cafeteria intervention using nudging strategies that has the aim to induce healthier purchase behaviour. First, we report on the experts' answers concerning the characteristics of a worksite cafeteria in general (table 2, left column). Second, we will present the requirements for a more healthy worksite cafeteria (table 2, right column). The requirements are divided according to the 4 P's. Finally, we will discuss table 3, providing an overview of the expected facilitators of and barriers to a healthy worksite cafeteria innovation that are related to both its adoption and continued implementation. This will involve the checking of the relative advance, compatibility, complexity and reversibility of the innovation based on Diffusion of Innovations Theory (DOIT) [21], as well as important aspects of a worksite cafeteria and ways to make it healthier.

As mentioned, respondents were first asked to name the requirements of a good worksite cafeteria in general (table 2). In response, *a broad assortment* (wide range of products), *freedom of choice* and *healthiness of products* were mentioned as important elements. In general, the experts stated that the assortment must be diverse in a way that customers are free to choose whatever they prefer, but which also implies a healthy choice. However, the caterers and facility managers considered the freedom of choice the most important factor, while the nutritional experts and health managers emphasized the importance of healthy products within the assortment, preferably using

**Table 2. Requirements for a good worksite cafeteria.** (In general and when making the worksite cafeteria more healthy by means of nudging strategies, according to stakeholders, divided into the 4 P's: product, price, place and promotion).

| | Requirements for a good worksite cafeteria in general | Requirements when making a worksite cafeteria more healthy |
|---|---|---|
| **Overall** | In line with visitors' expectations, safe and hygienic, skilled staff, creating a moment of rest, sustainable, addition to working day, satisfied guests. | Providing knowledge, communicating 'why', *Guidelines for Healthier Canteens* of the Netherlands Nutrition Centre (to replace unhealthy products with healthy ones), Experience/fun. |
| **Product** | Healthy products, freedom of choice, broad assortment, tasteful products, not too much choice, quality marks and criteria, good quality of products, varying assortment. | Snacks not available every day, bigger proportion of healthy products (as described in *Guidelines for Healthier Canteens* of the Netherlands Nutrition Centre), smaller portions, healthy choice labelling, fewer snacks, more vegetables (also in meals), new product groups (e.g. vegetable juice), less choice, seasonal products, easy to eat, healthy snacks, choice logo/product composition/labelling. |
| **Price** | Good price, good price-quality ratio, commercially viable. | Price policy: healthy products lower price, unhealthy products higher price, combo-deals, price offers in app. |
| **Place** | Ambience, helpful in making a healthy choice. | Healthy products first in service line, healthy products at eye level/shelf layout, snack only per order, snacks less visible products at counter, no candy at counter, serving sauce separately, changing service line constantly. |
| **Promotion** | Attractive presentation of products. | Temporary products/campaigns, connecting with physical activity/education, smaller portions, fewer unhealthy products, no interference with sustainability, no misleading, embedding in employer policy, nudging, healthy snacks, must look tasteful, no promotion using 'healthy' or 'organic', experience/fun, banners/displays, connection to a theme, continuous promotion, permanent location for promotion of healthy products, nice tableware, rural ambiance, intranet, fancy names for products, savings system, recipes to take home, kick-off start, choice logo to create awareness, robust, promoting energy/vitality. |

an attractive display and thereby supporting the choice of healthy options.
The following responses were elicited by the question: 'What are the important aspects of a worksite cafeteria?':

- 'The worksite cafeteria should contain something for everyone. So, products for people who want to eat healthily, for people who want to eat luxuriously, but also for people who have a smaller budget. An assortment that fits... that you can choose to eat healthily at some point, but that you can also get your fried snack. It should provide enough variety to make healthy choices and allow you to have the combination you want. You should not be forced; for example, only being able to buy a healthy sandwich.' *(Catering expert)*
- 'Customers should mainly be supported to make a healthy choice. They should be guided towards it. Especially because they will probably use the worksite cafeteria every day.' *(Nutritional expert)*

Table 2 also presents the requirements or ways to make a worksite cafeteria more healthy according to the experts. In addition, we asked the respondents about the importance of product, price, place and promotion as part of the marketing mix, since many marketing strategies correspond to nudging strategies. In general, providing knowledge and generating a norm about what is normal and healthy eating behaviour was mentioned by caterers, one facility manager and one health manager.
They all stated that it is important to explain why healthy eating behaviour is worthwhile. Examples of the provision of information included: providing insight into the number of daily calories needed and the effect of certain nutrients on performance (at work). The nutrition experts did not mention this. One caterer suggested the labelling of healthy products. She was familiar with a study of Vyth *et al.* (2011) showing that the nudging strategy of labelling foods with the Choices nutrition logo to help customers choose more healthy products does not have a significant effect on employees' lunchtime food choices. [34] She stated that companies often request a healthy assortment, but still want this to be accompanied by signs so the customer can see which products are the healthier ones. The nutrition experts also stated that it is important to change the norm, such as the norm of what a healthy worksite cafeteria should sell. Not selling fried snacks every day could also play a role in this.
One expert stated: 'It is not only about selling fewer fried snacks, but also the symbolism of starting to change the norm.' The experts also mentioned the importance of good communication prior to the implementation of *The healthy worksite cafeteria*, with all changes negotiated and discussed with clients (companies) and caterers. This is important for the caterers because they have to make practical adjustments, such as changing the interior and their wholesale purchases. It is also important for the employers because they need to be informed about why and how a healthy worksite cafeteria is expected to have positive effects on employees. Finally, one specific factor men-

tioned in relation to making a worksite cafeteria more healthy is compliance with the *Guidelines for healthier canteens* of the Netherlands Nutrition Centre. These guidelines prescribe a shift in the range of products offered in cafeterias towards more healthier options. In addition, it is suggested that healthy products should be predominantly displayed, but change should occur in small steps.

### Product, Price, Place and Promotion

In the following we highlight some requirements for a healthy worksite cafeteria mentioned by the experts concerning the 4 P's presented in table 2.

***Product:*** regarding strategies concerning food products, the experts stated that the assortment should include enough healthy options within all product groups and choosing healthy substitutes (replace products with healthier options within the contract obligations). Multiple catering experts also stated that shifting the share of healthy products displayed within a product group would be an option to encourage healthy sales, but should be implemented in small steps. Furthermore, healthier options should look tempting. Customers should not feel they are being forced to buy something healthy. For example, you might decrease the number of snack options while increasing the variety and number of salads on offer. Providing smaller portions of both pre-packed and non-pre-packed food was also mentioned. The insurance company experts mentioned that providing information about healthy products was necessary.

***Price:*** the responses to the question concerning to what extent price changes could be implemented and encourage a healthier choice varied. The nutrition experts and caterers stated that price is an important factor in encouraging and/or discouraging purchases. For example, it was considered important to have fair prices for healthy products and not have cheap offers for chocolate bars. Furthermore, it was suggested that price adjustments aiming to stimulate a healthy choice should not be framed as a tax. However, one facility manager stated that you should not implement price strategies at all, because he believed that people would react negatively to price changes. He also mentioned that someone who would like to have a snack would buy it anyway, despite a considerable price increase. However, according to this expert, promoting a healthy choice by means of healthy offers, such as a combo deal, was something that could work.

- 'Using deals from a health perspective could work. Then you could seduce someone to try it and maybe this helps them to choose it next time if the price is back to normal.' (*Facility manager)*

Some caterers mentioned that price changes – increasing prices of unhealthy products and decreasing prices of healthy products – could work and the strategy is already used, but that it is only feasible to some extent, as a result of the contract between the

caterer and the ordering party. The ordering party (employer) should be advised and convinced by the caterer of the importance of stimulating healthier choices by means of price differences.

***Place:*** concerning the possible effect and feasibility of making changes in the placement of products, respondents were positive about the idea of placing healthier products more prominently, such as at the beginning of the service line.

- 'We know from marketing in supermarkets that we can achieve a lot with routing, although the supermarkets have financial motives. We would have another purpose.' *(Facility manager)*

***Promotion:*** to promote healthier choices the focus should be on the fun-factor, positive framing and providing information about healthy food, but it should not be too patronizing. Promoting healthy food at the same spot daily, or telling a story, for example, about the origin of products and the use of temporary campaigns or games, were emphasized. Several experts said that it is more important to present healthy food attractively than to communicate about its healthiness, and that it is even better not to communicate about health. They had the experience that this could have adverse effects. This, however, could differ depending on the type of consumers in the cafeteria. According to one caterer, communicating about positive effects such as 'having more energy' could be an option. However, a nutritionist stated that while marketing tools could be used people should not be misled. Finally, the importance of the cafeteria being an attractive place and implicitly communicating that a healthy cafeteria is normal was mentioned as necessary for success.

### Factors based on Diffusion of Innovations Theory

The following reports on the aspects of DOIT that are important for the successful adoption and continued implementation of an innovation. All possible facilitating factors and barriers that were mentioned are shown in table 3.

**Table 3. Facilitators of and barriers to adoption and continued implementation of the innovation of a 'healthy worksite cafeteria' with nudging strategies.**

| Attributes to the innovation: **Relative advance** | |
|---|---|
| **Facilitators** | **Barriers** |
| • Proof of effect from a scientific effect study<br>• Possible positive effect on productivity, sickness absence and sustainable employability<br>• Caterers' selling point to employers<br>• To provide people with knowledge about healthier choices<br>• The belief that it helps people to behave in a heathier way<br>• The belief in positively changing peoples' behaviour<br>• To meet demand<br>• Distinctive character<br>• Pride of caterer when running a healthy worksite cafeteria<br>• Showing engagement as employer | • Change can cause resistance<br>• Patronizing |
| Attributes to the innovation: **Compatibility** | |
| **Facilitators** | **Barriers** |
| • A 'healthy worksite cafeteria' should not violate freedom of choice<br>• A 'healthy worksite cafeteria' should not undermine profitability<br>• Every stakeholder pays<br>• Making changes negotiable<br>• Small steps<br>• Good organization and communication with caterers<br>• Creating awareness<br>• Not communicating changing choice explicitly<br>• Connecting to physical activity programme/ health programme<br>• Cooperation with dietitian | • A 'healthy worksite cafeteria' violates freedom of choice<br>• Room to display<br>• Variety in hardware available<br>• Room in cafeteria and set-up buffet<br>• Waste of fresh products<br>• Fear of lower turnover<br>• No priority employer<br>• Customers might spend less money than usual<br>• Keep vending machines |
| Attributes to the innovation: **Complexity** | |
| **Facilitators** | **Barriers** |
| • Instruction and guidance of staff in execution<br>• Explanation of the goal of the intervention to staff | • Nutritional knowledge level of staff<br>• Resistance of catering staff<br>• Not enough staff<br>• Contract agreements<br>• Set-up/interior of cafeteria; not enough room for products<br>• Availability of food products<br>• Hygiene rules<br>• Prevention of surplus consumption<br>• Few alternative snacks<br>• Logistics<br>• Interfering with sustainability<br>• Resistance of catering staff |

**Table 3** *(continued from previous page)*. **Facilitators of and barriers to adoption and continued implementation of the innovation of the 'healthy worksite cafeteria' with nudging strategies.**

| Attributes to the innovation: **Reversibility** | |
|---|---|
| **Facilitators** | **Barriers** |
| • Big conversion not reversible<br>• Other changes are reversible<br>• No consensus on importance of reversibility | |
| Attributes to the innovation: **Continued implementation** | |
| **Facilitators** | **Barriers** |
| • Motivating/challenging catering staff<br>• Involvement of district managers<br>• Visibility of success strategies<br>• Effectiveness and scientific proof of the effect<br>• Monitoring and development of intervention<br>• Triggering of staff and feedback on intervention<br>• Feasibility intervention<br>• Profitability<br>• Intervention strategies suitable to be part of catering contract | |

The factors that contribute to the adoption and continued implementation of a healthy worksite cafeteria intervention (positive: facilitating factors and negative: barriers) were analysed on the basis of five factors from DOIT: *Relative advantage*, or the degree to which an innovation is perceived as better than the idea it supersedes; *Compatibility*, or the match between the adopters' values, needs, beliefs and perceived needs as well as with daily practice; *Complexity*, or the degree to which an innovation is perceived as difficult to understand and use; *Reversibility*, or the extent to which an intervention is easily undone; and *Continued implementation*, which concerns the factors that are specifically related to continued implementation.

### Relative advance

After considering the requirements of a good and a healthy worksite cafeteria, the relative advance of such a 'healthy worksite cafeteria' was discussed with the experts. When an innovation offers no relative advance over the former way of working it has no chance of success. The caterers interviewed explained that knowing how to exploit a healthy worksite cafeteria would function as a selling point or way to differentiate their service. In addition, a facility manager stated: '... if you could link a healthy worksite cafeteria to a proven added value it would obtain a different status within the company'. He explained that scientifically proven effects of a healthy worksite cafeteria would also increase the support for implementation, especially if a healthy worksite cafeteria resulted in a decrease in sickness absence and an increase in productivity, which would

demonstrate the return on investment. In addition, a caterer, a facility manager, a health manager and a health promoter all mentioned the importance of return on investment. Furthermore, the combination of providing knowledge and helping people to behave in a healthier way were seen as possible positive effects of a healthy worksite cafeteria. The provision of knowledge applies to both the clients of the worksite cafeteria and the caterers, in the sense of knowing what is and what is not healthy and why. The experts stated that behaviour change occurs through awareness and that a healthy worksite cafeteria could play a role in that mechanism, for example by offering a healthier assortment. The ultimate goal of health consultants would be that employees subsequently exhibit this behaviour change also in their private lives. Other factors mentioned by the experts were pride and charisma of a caterer and, in relation to the employer, the ability to show engagement with their employees.

### Compatibility

Similar to relative advance, the compatibility of an innovation is also an important prerequisite for successful adoption and implementation. According to the facility managers and caterers interviewed, a healthy worksite cafeteria would be compatible with their daily practice under the condition that it does not undermine profitability. One facility manager stated that one barrier here could be the freedom of choice for the customer, which was of high priority in his company. Furthermore, the variety in equipment and its availability and room to display or store products in worksite cafeterias could be limiting factors. Finally, possible food waste was mentioned by a nutritional expert as a factor that would not meet their values.

### Complexity



Making an innovation uncomplex or not seeming to be complex is another important aspect for successful adoption, especially according to the implementing stakeholders. The caterers stated that the overall operation of a healthy worksite cafeteria would not be very complex. However, certain aspects would have to be considered. First, the level of nutritional knowledge of the catering employees could become an element of complexity. Many instructions and guidance in the worksite cafeteria might be required to help catering employees implement the strategies. A second factor that could make adoption complex is the potential for resistance from catering staff to trying something new and to implementing strategies that, in their opinion, work against pleasing the customer. To tackle this, the caterers stated that the employees of the caterer should be well informed about the goal of the intervention and coached throughout the implementation phase. Furthermore, as a third factor, the contract can create complexity by hindering changes to the assortment of food available. Finally, the availability of products at the wholesale level could introduce a fourth factor of complexity.

### Reversibility

Reversibility refers to the ease with which adjustments, such as those required to implement strategies for a healthy worksite cafeteria, can be undone. When such adjustments are drastic, the chances of implementation decreases. In this regard, the experts stated that reversibility is of minor importance because ultimately everything is reversible. Caterers and employers really want to show that they have made the changes based on a genuine conviction: 'this is a change we support unreservedly'.

### Continued implementation

With respect to ensuring continued implementation, the experts especially mentioned motivating catering staff to make an effort to continue implementing the intervention. This could be stimulated, for example, by comparing their sales with the sales of other cafeterias. The district managers of catering companies should be strict in checking that the intervention is being properly executed. Therefore, their involvement is also very important. In addition, the caterers stated that the success of the strategies would facilitate continued implementation. Finally, companies are financially driven; thus, if it is profitable, continued implementation is more likely to occur.

## Discussion

The aim of this study was to obtain insight into the factors that, according to key stakeholders, may affect the adoption of an intervention targeted at influencing food choice by means of nudging strategies in Dutch worksite cafeterias. We also wanted to identify the barriers to and facilitators of the continued implementation of such an intervention. We did this by conducting eight qualitative interviews that included elements based on Diffusion of Innovations Theory and Social Marketing in the topic list.

### Factors for adoption

Summarizing our most important results on the basis of the DOIT factors of relative advance, compatibility, complexity and reversibility, we found that, overall, stakeholders were positive towards the implementation of a healthy worksite cafeteria intervention using nudging strategies. They were in favour of stimulating healthy choices as long as customers were still free to choose whatever they preferred. Freedom of choice was specifically mentioned by both the caterers and facility managers, who felt that this would make the intervention plausible. This is in agreement with studies that have demonstrated the importance of customer satisfaction and loyalty because of the financial benefits derived from them.[35] Furthermore, regarding the importance of healthy products within the assortment, the nutritional experts and health managers both emphasized it would be preferable to use an attractive display and thereby support the choice of healthy options. One solution for making a worksite cafeteria healthier without undermining freedom of choice would be to reduce the less healthy

options, such as fried snacks, combined with a broader range of healthier options, such as salads. This could be seen as addressing the freedom of choice factor. In addition, the opportunity for a caterer to positively distinguish their service was also considered a positive element and thereby a relative advance. This accords with a survey among Dutch working people, which found that 55 % of employees would appreciate the employer offering them more healthier lunch options, and that this could be achieved if the employer hired a caterer who knew how to achieve this.[36]

Concerning relative advance, in particular, the caterers also mentioned that not undermining profitability was a prerequisite to any intervention. Logically, a catering company has the goal of making a living out of providing food and beverages. Running a business without making a profit is not sustainable. However, healthy, freshly prepared foods are more expensive for various reasons, such as higher costs for personnel. Fried snacks are cheaper as they are easier to prepare and there tends to be less waste because the amount of food on offer in the worksite cafeteria can be better aligned with demand. In addition, the wholesale purchase price for the goods is very low in relation to the sale price. Nevertheless, a healthy worksite cafeteria can still be profitable. In a study that looked at the effects of increasing prices of unhealthy products and decreasing prices of healthier products in vending machines, French *et al.* (2003) found that profitability was not adversely affected. Nevertheless, increasing prices is not formally considered a nudging strategy because the consumer does not have the choice of paying the original price. Instead, this strategy is considered a form of demarketing.[37] In our study, while the caterers agreed to cooperate in increasing prices of fried snacks, some of them emphasized they would rather positively frame the healthy products than demarket the unhealthy products. This is in line with the literature showing the unpopularity of interventions or policies that 'punish' compared to those that reward. The Nuffield Council on Bioethics 'intervention ladder' presents the various interventions or policies on a scale ranging from a little intrusive at the bottom of the ladder to more disincentives higher up the ladder.[38] This structurally embodies the assumption that personal autonomy is maximised by non-intervention; the lowest rung on the ladder. While higher up the ladder we find innovations that are often the most effective, there is less public acceptability and therefore these options are not popular with policymakers.[39] The caterers in our study reflected this reality in being open to but hesitant about the use of disincentives. Finally, the stakeholders considered the complexity of implementing a healthy worksite cafeteria intervention using nudging strategies as a minimal concern.



### Factors affecting continued implementation

In addition to the above-mentioned factors that were considered important for the adoption of a healthy worksite cafeteria intervention, motivating catering employees and keeping them involved was mentioned as important for successful continued implementation. In a review of factors affecting the implementation of health promo-

tion and prevention programmes, Durlak *et al.* (2008) demonstrated the importance of a shared vision, among other factors. A shared vision is the extent to which organizational members are united regarding the value and purpose of the innovation.[40] Therefore, it is important to ensure the vision of the executing stakeholder is clear and agreed upon before and during the implementation of an intervention.
Furthermore, concerning barriers to and facilitators of continued intervention, our specific setting adds to the findings of two comparable implementation studies. Jilcott Pitts *et al.* (2016) for example, investigated barriers to and facilitators of the implementation of guidelines promoting healthy food and beverage consumption in hospital and government worksite cafeterias. The guidelines included strategies such as, 'Remove all fryers and deep fat fried products on the cafeteria menu'. The facilitators included leadership support and the assistance of dietitians, while the barriers included concerns about customer complaints and additional expertise required for menu labelling. However, implementing such guidelines in government settings is not completely generalizable to Dutch worksite cafeterias that also include commercial business settings. In government worksites, the implementation of such strategies could be more readily imposed, while in other settings the intrinsic motivation of the employer is necessary. Furthermore, strategies such as removing all deep fat fried products do not fit the description of nudging and presumably result in different facilitating and opposing factors.[41] Another study, by Fitzgerald *et al.*(2016) examined the barriers to and facilitators of the implementation of complex workplace dietary interventions and did include commercial business settings. However, their intervention included education, it was conducted in large manufacturing workplaces in Ireland and they did not include catering managers.[42] While this makes it difficult to compare with their study with ours, similar themes did emerge; for example, contextual factors were found to influence adoption and continued implementation. Tacit workplace cultures, including 'traditional' menu preferences and anticipated and realised resistance to change, prevented full-scale implementation of their environmental intervention. In our study, anticipated resistance was also mentioned by the stakeholders as a factor that would counter the relative advance of implementing the intervention. The stakeholders, therefore, emphasized that freedom of choice must be guaranteed.

### Strengths and limitations

The first strength of this qualitative study with the various stakeholders involved in Dutch worksite cafeterias is that it contributes additional findings to a few similar studies in the Dutch setting [43,44], by specifically investigating the adoption and continued implementation of a nudging intervention. The insights obtained in this study will be valuable to those developing and implementing an intervention aimed at encouraging healthier food choices in worksite cafeterias.[24,40,45-47] Our study also contributes further insights to the two comparable implementation studies mentioned above [41,42],

but is applicable to the specific Dutch setting, which has its own eating habits reflected in lunch at work.[48-50] The second strength of this study is the broad selection of relevant stakeholders. This enabled us to also gain insights from the perspective of the employer, who ultimately decides which catering company should run the worksite cafeteria. This provided additional insights into the best ways to convince employers to opt for a healthy worksite cafeteria. This might include the assistance of health management consultants who can demonstrate how such an intervention would be an opportunity for the employer to decrease the health risk of their workers.
One limitation lies in the fact that some respondents already understood the idea of nudging interventions prior to the interview, while the types of strategies a healthy worksite cafeteria could include had to be explained to others at the beginning of the interview. This could have affected their responses. The respondents who were not already familiar with the framework of the intervention had less time to think about positive and negative aspects. As a result, we may have missed the opportunity to record all of their ideas by not giving them more time to reflect. For example, we could have employed a follow-up interview. Furthermore, qualitative research is always affected by the interpretation of the researchers, and as a result of the structuring of questions, the responses are partly guided in a certain direction.

### Research recommendations and implications for practice

Future research into interventions with the aim of increasing healthier choices by means of nudging strategies in the worksite cafeteria could focus on two goals:

1. the development of an intervention that ensures the satisfaction of customers and the profitability for caterers and
2. examining the effect of a healthy worksite cafeteria intervention using nudging strategies on the vitality of employees.

The first could be executed by implementation studies combined with qualitative consumers studies. In relation to the second goal, future studies should aim to measure the effect of nudging strategies on food choice behaviour by collecting sales data or measuring vitality in a randomised trial. This could help to convince employers, since it would endorse the idea that there is a return on investment in a healthy workforce.
However, proving an effect on vitality would require a longitudinal research design, which is time-consuming. Furthermore, controlling for all other factors that influence health besides eating behaviour is very complex. Nevertheless, the first step could be to measure and demonstrate the satisfaction of customers, which could also contribute to successful continued implementation and corresponds to the first aim. Furthermore, future research should also study the effect of different approaches to convincing stakeholders to adopt and implement this intervention. The pursuit of both of the goals mentioned above would contribute to this. Moreover, the best ways to motivate catering employees and keep them involved should also be studied. This specific insight on

implementation strategies could then form the basis for the development of an implementation tool.

Implications for the practice of catering professionals include the provision of more tempting, healthy food products that are placed prominently and offered for a fair price. Corresponding to our focus group study with customers of Dutch worksite cafeterias, a greater share of healthy options is an important factor.[27] Our consumer study also showed that they are often seduced by products displayed in the worksite cafeteria, which are often relatively unhealthy. Catering professionals should, therefore, find ways to offer tempting healthy lunch options and develop a price strategy that stimulates healthy purchases, like increasing the prices of fried snacks or giving discounts on healthy salads or healthy sandwiches. Ways that would not violate the profit rule.

## Conclusion

This study provides important insights into experts' opinions about the attributes required to adopt and continuously implement a healthy worksite cafeteria intervention using nudging strategies. It can be concluded that key stakeholders have a positive attitude towards the use of nudging to create a healthy worksite cafeteria, as long as this does not undermine profitability and a broad range of attractive healthy options is available. Furthermore, successful implementation could be enhanced by convincing employers to shift towards a healthy worksite cafeteria and explaining the aim of the intervention to all those involved in the implementation, as well as demonstrating its proven effectiveness. We recommend that implementation tools should assist caterers in convincing employers to choose a healthy worksite cafeteria using nudging strategies; for example, by demonstrating customer satisfaction, or by showing employers that there are ways to introduce healthier options while maintaining freedom of choice.

## References


1. Ng, M., *et al., Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013.* Lancet, 2014. 384(9945): p. 766-81.
2. Statistics Netherlands, *Leefstijlmonitor.* 2018, Statistics Netherlands, The Hague.
3. Statistics Netherlands, *Employed labor force and unemployment*. 2018, Statistics Netherlands, The Hague.
4. Roeters, A. and J.D. Vlasblom, *Een week in vogelvlucht, in Een week in kaart.* 2017, Sociaal Cultureel Planbureau: Den Haag.
5. Statistics Netherlands, *Wekelijkse arbeidsduur van mannen en vrouwen, in Enquete Beroepsbevolking.* 2017, Statistics Netherlands, The Hague.
6. Malik, S.H., H. Blake, and L.S. Suggs, *A systematic review of workplace health promotion interventions for increasing physical activity.* Br J Health Psychol, 2014. 19(1): p. 149-80.
7. Pereira, M.J., *et al., The impact of onsite workplace health-enhancing physical activity interventions on worker productivity: a systematic review.* Occup Environ Med, 2015. 72(6): p. 401-12.
8. Commissaris, D.A., *et al., Interventions to reduce sedentary behavior and increase physical activity during productive work: a systematic review.* Scand J Work Environ Health, 2016. 42(3): p. 181-91.
9. Allan, J., *et al., Environmental interventions for altering eating behaviours of employees in the workplace: a systematic review.* Obes Rev, 2017. 18(2): p. 214-226.
10. Mhurchu, C.N., L.M. Aston, and S.A. Jebb, *Effects of worksite health promotion interventions on employee diets: a systematic review.* BMC Public Health, 2010. 10.
11. Jensen, J.D., *Can worksite nutritional interventions improve productivity and firm profitability?* A literature review. Perspectives in Public Health, 2011. 131(4): p. 184-192.
12. Steenhuis, I., *et al., The impact of educational and environmental interventions in Dutch worksite cafeterias.* Health Promot Int, 2004. 19(3): p. 335-43.
13. Thaler, R.H. and C.R. Sunstein, *Nudge: Improving decisions about health, wealth and happiness.* 2008: New Haven: Yale University Press.
14. Bucher, T., *et al., Nudging consumers towards healthier choices: a systematic review of positional influences on food choice.* Br J Nutr, 2016. 115(12): p. 2252-63.
15. Van Gestel, L.C., F.M. Kroese, and D.T.D. De Ridder, *Nudging at the checkout counter - A longitudinal study of the effect of a food repositioning nudge on healthy food choice.* Psychol Health, 2018. 33(6): p. 800-809.
16. Hollands, G.J., *et al., Impact of reducing portion sizes in worksite cafeterias: a stepped wedge randomised controlled pilot trial.* International Journal of Behavioral Nutrition and Physical Activity, 2018. 15.
17. Vadiveloo, M.K., *et al., Does a grill menu redesign influence sales, nutrients purchased, and consumer acceptance in a worksite cafeteria?* Prev Med Rep, 2017. 8: p. 140-147.
18. Hendren, S. and J. Logomarsino, *Impact of worksite cafeteria interventions on fruit and vegetable consumption in adults* A systematic review. International Journal of Workplace Health Management, 2017. 10(2): p. 134-152.
19. Greenhalgh, T., *et al., Diffusion of innovations in service organizations: Systematic review and recommendations.* The Milbank Quarterly, 2004. 82(4).
20. Wejnert, B., *Integrating models of diffusion of innovations: A Conceptual Framework.* Annual Review of Sociology, 2002. 28(1): p. 297-326.
21. Rogers, E.M., *Diffusions of innovations.* Vol. 5th Edition. 2003, New York: Simon & Schuster.
22. Ross, J., *et al., Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update).* Implementation Science, 2016. 11.
23. Naylor, P.J., *et al., Implementation of school based physical activity interventions*: A systematic review. Preventive Medicine, 2015. 72: p. 95-115.
24. Wierenga, D., *et al., What is actually measured in process evaluations for worksite health promotion programs: a systematic review.* BMC Public Health, 2013. 13.
25. Wierenga, D., *et al., A 7-Step Strategy for the Implementation of Worksite Lifestyle Interventions: Helpful or Not?* Journal of Occupational and Environmental Medicine, 2016. 58(5): p. e159-e165.
26. Sawada, K., *et al., Social marketing including financial incentive programs at worksite cafeterias for preventing obesity: a systematic review.* Syst Rev, 2019. 8(1): p. 66.
27. Velema, E., E.L. Vyth, and I.H.M. Steenhuis, *'I've worked so hard, I deserve a snack in the worksite cafeteria': A focus group study.* Appetite, 2019. 133: p. 297-304.
28. Grier, S. and C.A. Bryant, *Social marketing in public health.* Annu Rev Public Health, 2005. 26: p. 319-39.
29. Andreasen, A.R., *Marketing social marketing in the social change marketplace.* Journal of Public Policy &

Marketing, 2002. 21(1): p. 3-13.
30. Pope, C., S. Ziebland, and N. Mays, *Qualitative research in health care: Analysing qualitative data*. British Medical Journal, 2000. 320: p. 3.
31. Elo, S. and H. Kyngas, *The qualitative content analysis process.* J Adv Nurs, 2008. 62(1): p. 107-15.
32. Gale, N.K., *et al., Using the framework method for the analysis of qualitative data in multi-disciplinary health research.* BMC Med Res Methodol, 2013. 13: p. 117.
33. Braun, V. and V. Clarke, *Using thematic analysis in psychology.* Qualitative Research in Psychology, 2006. .3(2): p. pp.
34. Vyth, E.L., *et al., Influence of placement of a nutrition logo on cafeteria menu items on lunchtime food Choices at Dutch work sites.* J Am Diet Assoc, 2011. 111(1): p. 131-6.
35. Hill, N. and J. Alexander, *The handbook of Customer Satisfaction and Loyalty Measurement.* 3rd Edition ed. 2006, London: Routledge.
36. De Jongh, J. and F. McDougal, *Healthy lifestyle and vitality at work*, C.G. Gewicht, Editor. 2014, Ruigrok Netpanel: Amsterdam.
37. French, S.A., *Pricing effects on food choices.* J Nutr, 2003. 133(3): p. 841S-843S.
38. *Public Health: ethical issues.* 2007, Nuffield Council on Bioethics: London.
39. Diepeveen, S., *et al., Public acceptability of government intervention to change health-related behaviours: a systematic review and narrative synthesis.* BMC Public Health, 2013. 13: p. 756.
40. Durlak, J.A. and E.P. DuPre, *Implementation matters: a review of research on the influence of implementation on program outcomes and the factors affecting implementation*. Am J Community Psychol, 2008. 41(3-4): p. 327-50.
41. Jilcott Pitts, S.B., *et al., Implementing healthier foodservice guidelines in hospital and federal worksite cafeterias: barriers, facilitators and keys to success.* J Hum Nutr Diet, 2016. 29(6): p. 677-686.
42. Fitzgerald, S., *et al., Barriers to and facilitators of implementing complex workplace dietary interventions: process evaluation results of a cluster controlled trial.* BMC Health Serv Res, 2016. 16: p. 139.
43. Steenhuis, I.H.M., P. Van Assema, and K. Glanz, *Strengthening environmental and educational nutrition programmes in worksite cafeterias and supermarkets in the Netherlands.* Health Promotion International, 2001. 16(1): p. 21-33.
44. Vermeer, W.M., I.H. Steenhuis, and J.C. Seidell, *From the point-of-purchase perspective: a qualitative study of the feasibility of interventions aimed at portion-size.* Health Policy, 2009. 90(1): p. 73-80.
45. Fleuren, M., K. Wiefferink, and T. Paulussen, *Determinants of innovation within health care organizations: literature review and Delphi study.* Int J Qual Health Care, 2004. 16(2): p. 107-23.
46. Truong, V.D. and N.V.H. Dang, *Reviewing Research Evidence for Social Marketing: Systematic Literature Reviews, in Formative Research in Social Marketing: Innovative Methods to Gain Consumer Insights*, K. Kubacki and S. Rundle-Thiele, Editors. 2017, Springer Singapore: Singapore. p. 183-250.
47. Carins, J.E. and S.R. Rundle-Thiele, *Eating for the better: a social marketing review (2000-2012)*. Public Health Nutr, 2014. 17(7): p. 1628-39.
48. Huseinovic, E., *et al., Timing of eating across ten European countries – results from the European Prospective Investigation into Cancer and Nutrition (EPIC) calibration study.* Public Health Nutrition, 2018: p. 1-12.
49. EFSA, *EFSA Comprehensive European Food Consuption Database in Exposure Assessment.* 2011, European Food Safety Authority: Parma.
50. Park, M.K., *et al., Comparison of meal patterns across five European countries using standardized 24-h recall (GloboDiet) data from the EFCOVAL project.* European Journal of Nutrition, 2018. 57(3): p. 1045-1057.

3


Chapter 4

# Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands: intervention development and study design

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## Abstract

*Background*

The worksite cafeteria is a suitable setting for interventions focusing on changing eating behaviour, because a lot of employees visit the worksite cafeteria regularly and a variety of interventions could be implemented there.

The aim of this paper is to describe the intervention development and design of the evaluation of an intervention to make the purchase behaviour of employees in the worksite cafeteria healthier. The developed intervention called *The worksite cafeteria 2.0* consists of a set of 19 strategies based on theory of nudging and social marketing (marketing mix). The intervention will be evaluated in a real life setting, that is Dutch worksite cafeterias of different companies and with a number of contract catering organizations.

*Methods/design*

The study is a randomised controlled trial (RCT), with 34 Dutch worksite cafeterias randomly allocated to the 12-week intervention or to the control group.

Primary outcomes are sales data of selected product groups like sandwiches, salads, snacks and bread topping. Secondary outcomes are satisfaction of employees with the cafeteria and vitality.

*Discussion*

When executed, the described RCT will provide better knowledge in the effect of the intervention *The worksite cafeteria 2.0* on the purchasing behaviour of Dutch employees in worksite cafeterias.

*Trial registration*

Dutch Trial register: NTR5372

## Keywords

Nudging, social marketing, worksite cafeteria, purchasing behaviour, employee, overweight, randomised controlled trial.

## Introduction

Rates of overweight in the Netherlands are high. To illustrate, in 2014, 43 % of Dutch men and 31 % of Dutch women were overweight.[1] Overweight is associated with the incidence of co-morbidity such as type II diabetes, cardiovascular diseases and several types of cancer [2], which underpins the importance of targeting this health problem. Additional to the burden of disease, also healthcare spending and costs of sick leave stress the concern of the increasing prevalence of overweight and obesity.[3-6]

Overweight and obesity are generally the result of an imbalance between energy intake (eating) and energy expenditure (physical activity).[7] The current 'obesogenicity' of the environment, which means an abundant availability, easy accessibility and aggressive marketing of foods, together with declines in physical activity, makes it difficult not to gain weight.[8]

A commonly used strategy in decreasing overweight is to focus on changing eating behaviours. Eating behaviours influence energy intake through choices about when and where to eat, and the types and amounts of foods chosen, including decisions about starting and stop eating.[9,10] Moreover, interventions with a dietary component result in weight loss.[11] A suitable location for targeting eating behaviour could be the worksite cafeteria, since it is a natural social context where most employees eat at least one meal during their workday. The Netherlands has a working population of more than 7 million people [12] of which about 45 % have lunch daily at the worksite cafeteria [13]. Thereby, choosing the worksite cafeteria as a location to intervene in eating behaviour gives the opportunity to reach people more than once as they visit the worksite cafeteria regularly. Finally, worksites could potentially reach a large part of the adult population including many who have not traditionally been engaged in health promotion activities.[14,15]

Regarding the dietary intake of employees, improvements can be made. Although little is known about the current health status of Dutch worksite cafeterias, several studies show adverse effects of (associations with) foods produced and eaten outside the home. For instance, out of home eating has been associated with a higher energy and fat intake [16,17], a higher energy density [18] and food portions in places to eat outside the home exceed standard portion sizes.[19] Large portions in turn have been related to a higher energy intake.[20-23]

Today Dutch worksite cafeterias have already been used as a setting for interventions focusing on changing eating behaviour.[24-29] For example, the placing of informational sheets near food products with the caloric (kcal) value of a product translated into the number of minutes to perform a certain (occupational) activity [24], or the labeling of low-fat products.[26] Results of these interventions however were mixed. The environmental intervention of Engbers *et al.* (2006) was modestly effective in changing behavioural determinants towards eating less fat (social support, self-efficacy and attitude), but ineffective in positively changing actual fat, fruit and vegetable intake of office workers. Labeling low-fat products also showed partial effectiveness. For the whole study popula-

tion no significant effects on consumption data were found. The data however did show a beneficial and significant treatment effect of the labeling program on total fat intake for respondents who believed they ate a high-fat diet. Sales data revealed a significant effect of the labeling program on desserts, but not for the other products.[26]

Also outside the Netherlands strategies to improve eating behaviour in the worksite cafeteria are studied. For instance, increasing the availability of healthy foods like fruits and vegetables and products low in energy density [30,31], offering smaller portions [32], providing nutrition information on menus [33,34] placing a sign with the message 'Pick me! I am low calorie' on the low-fat milk [35], or showing a nutrition logo on healthy products.[15] However, not all strategies are effective in improving eating behaviour [29] and the quality and reporting of worksite intervention studies is low [36], so searching for a new approach is needed.

A method introduced in this setting recently is the concept of nudging.[37] Nudging is defined as changing the presentation of choice options in a way that it makes the desired choice – in our case the healthier option – the easy, automatic and default option, without forbidding any options.[38] Nudges can be seen as relatively simple, easy to implement and inexpensive interventions. Besides, consumers preservation of liberty of choice is a key characteristic of nudging.[38] Another strength of this relatively new strategy is the fact that it is effortless for consumers because it does not result in ego depletion.[39] Ego depletion is the phenomenon that acts of self-control at T1 reduce performance on subsequent, seemingly unrelated self-control tasks at T2.[40] In this new field of nudging strategies, the focus is most often on the effect of one or two strategies within one intervention, for instance, Van Kleef *et al.* (2012) tested the nudge of offering healthy snacks in larger shares and at higher shelves at the checkout counter in a hospital staff restaurant.[41] However, the character of nudges, not depleting self-control, make them suitable to use simultaneously. A combination of mostly proven effective nudging strategies would have potential to result in a cumulative effect, and has to our knowledge never been studied before, especially not in worksite cafeterias.

Next to nudging also relatively new in the field of intervention development for health promotion is social marketing. Social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good.[42] Furthermore, social marketing aims to change behaviour, by getting acquainted with the target audience. Social marketing is considered a useful tool in changing peoples' health behaviour. Stead *et al.* (2006) found in their review that there was evidence that interventions adopting social marketing principles could be effective across a range of behaviours, with a range of target groups, in different settings, and can influence policy and professional practice as well as individuals.[43] Carins *et al.* (2013) who also conducted a review, stated that social marketing when employed to its full extent offers the potential to improve healthy eating behaviour.[44]

Some social marketing strategies can be seen as a form of nudging. They aim to change behaviour and do not forbid undesirable behaviour. Shaping the food environment by the use of nudging and social marketing techniques seems a promising strategy to examine in order to change purchasing and subsequently eating behaviour. The worksite cafeteria is a suitable food environment to shape.

Considering this, the objective of this study is to develop an intervention, called *The worksite cafeteria 2.0*, based on nudging and social marketing techniques to improve eating behaviour of Dutch employees. Subsequently the aim is to describe the design of a study to measure the effect of multiple simultaneously executed strategies in *The worksite cafeteria 2.0* on purchasing behaviour of visitors in Dutch worksite cafeterias. The research question of the described study protocol will be: What is the effect of a healthier worksite cafeteria based on nudging and social marketing techniques on the purchasing behaviour of employees?

## Methods and research design

### Design

The effects of a healthier worksite cafeteria will be studied by means of a two-arm, (pre-stratified) randomised controlled trial (RCT). The RCT is designed to evaluate the effect of a 12-week intervention in the worksite cafeteria that is aimed at changing food choices in the worksite cafeteria towards healthier ones. A linear mixed model is used to also execute repeated measures. Primary outcomes are sales data of products in eight product groups, measured via cask register output. Secondary outcomes include satisfaction with the worksite cafeteria and vitality. The sample will include approximately 34 worksite cafeterias of 6 different catering companies. Worksite cafeterias will be randomly assigned (1:1) to the intervention or control arm. The randomization will be a block randomization with the size of worksite cafeterias (<500 or ≥500 customers daily) and order of inclusion as blocking variables, performed by the researcher. Outcome measures will be collected at baseline and weekly during the 12-week intervention phase to assess changes in food choice behaviour of visitors. Figure 1 provides an overview of the timeline of the study design. The Medical Ethics Committee of the VU Medical Centre confirmed that this study does not apply to the Medical Research Involving Human Subject Act (WMO), due to the nature of the measurements (sales data and anonymous questionnaires).

### Intervention

The intervention called *The worksite cafeteria 2.0* consists of 19 strategies (table 1), all with a probability to result in healthier food behaviour. The strategies are divided over four elements: the so-called 4 P's of marketing: Product, Place, Price and Promotion. *The worksite cafeteria 2.0* is developed based on nudging and social marketing strategies and corresponds with the *Guidelines for healthier canteens*.[45] These guidelines are

developed by the Netherlands Nutrition Centre in collaboration with scientific experts on food and behaviour and users of these guidelines like caterers. The guidelines offer strategies about how to arrange a sport or school canteen or worksite cafeteria that induces visitors to show healthier eating behaviour. We developed the intervention in four phases: collecting strategies from literature, qualitative face to face expert interviews, qualitative focus group interviews with employees of different Dutch companies and a feasibility pilot study. The first phase consisted of deriving effective strategies from the field of food behaviour and marketing science (e.g. serving healthy foods first in buffet lines improves overall meal selection [46]). Second, experts in the field of contract catering, nutrition and facility management were consulted to identify promising strategies within current effective strategies, taking the feasibility in catering practice and their expertise into account. This was done be conducting eight semi-structured interviews with fourteen experts (publication in preparation). Third, the views and motivations of the target population, namely Dutch employees who regularly visit a worksite cafeteria, towards choosing lunch were obtained. Therefore seven focus group interviews, with 45 employees, were conducted (publication in preparation).
The fourth phase consisted of a feasibility pilot study in two worksite cafeterias in order to test the feasibility of the intervention strategies (not published).

### Sample sizes

The power calculation is based on the main outcome measure of the linear mixed model: sales data of sandwiches, sandwich filling, salads, (hot) meals, fruit and vegetables, 'combo-deals', snacks and candy. Using a standard deviation of 10 %, a sample of 15 intervention and 15 control worksite cafeterias are needed to detect a 20 % mean increase in 'better choice' products between the intervention and the control group, at 80 % power, a 5 % level of significance and an estimated intra-cluster correlation (ICC) coefficient of sales within worksites of 0.15. The ICC represents how strongly sales in one worksite cafeteria are related. This increase of 20 % is based on the sales of sandwiches and snacks in a pilot study testing this intervention (not published). The standard deviation of 10 % is based on the same pilot study. To account for a possible 10 % drop out of location or sudden difficulties like incorrect cash desk registration, 34 worksite restaurants will be randomised [26, 27, 29] and divided over the experimental group and the control group. By comparisons of the sales data between the experimental and the control group the effect of *The healthy worksite cafeteria* strategies can be studied.

### Recruitment of worksite cafeterias

Thirty-four worksite cafeterias will be recruited to participate in the study. All caterers who are a member of the trade association for Dutch catering companies 'Veneca' are asked to provide worksites of some of their clients (companies) to join in the study. The three biggest catering companies affiliated with Veneca have a market share of 80 %

**Table 1. Intervention strategies and references.**

| Product | Reference |
|---|---|
| 1. In every product category at least one product of better choice is visibly offered. | 56 |
| 2. A warm lunch meal is also offered in a smaller portion. | 27 |
| 3. Fruit and vegetables are offered. | 30 |
| 4. Fruit and vegetables are offered ready to eat (peeled). | 57, 58 |
| 5. Water is offered for free. | 59 |
| 6a. The visible share of healthy (better choice) products is at least 60 %. | 60 |
| 6b. The visible share of healthy (better choice) products is at least 80 %. | 60 |
| 7a. Warm snacks[a] are offered up to three days a week. | 61 |
| 7b. Warm snacks[a] are offered up to one day a week. | 61 |
| 8. Salads are offered without dressing and with different vegetables. | 48, 61 |
| **Place** | **Reference** |
| 9. Healthy products are in the beginning of the route. These products are: salads, fruit & vegetables, bread, bread topping and healthy sandwiches [b,c]. | 46 |
| 10. Of every product group the preferred product or presentation of this product is most visible (at front on eye level). | 54, 62 |
| 11. In case of a shelf at the cash desk it is partly filled with fruit & vegetables. Fruit & vegetables are on top or at front. | 41 |
| 11a. In case of a shelf at the cash desk it is only filled with fruit & vegetables. | 41 |
| **Price** | **Reference** |
| 12. A relatively cheap combo-deal is offered with milk[d]/coffee/tea/vegetable juice, sandwich [b,c], and fruit with a price comparable with the average price of a sandwich in the same restaurant. | 63 |
| 13. Prices of warm snacks[a] (e.g. chicken nuggets) are 25 % increased and prices of healthy sandwiches [b,c] are 25 % decreased. | 64-66 |
| 14. Within a product category preferred products are 25 % lowered in price and exception products are 25 % higher in price compared with the normal prices in same restaurant. | 64-66 |
| **Promotion** | **Reference** |
| 15. There is only promotion of food products in the preferred category (or the choice criteria for combined meals). | |
| 16. When a healthy product is promoted is has a recognizable, permanent spot in the restaurant. | |
| 17. On the menu, e.g. on displays or intranet the healthy products are mentioned first. | 67 |
| 18. On the menu healthy dishes are presented in an attractive way. | 68 |
| 19. Healthy products are promoted with temporary campaigns like with a stand. | |

a. Snacks contain all fried snacks like fries, chicken nuggets, or spring rolls, but also puff pastry snacks like, sausage rolls and cheese rolls.
b. 'Healthy' sandwiches that meet the criteria of the Choice logo.
c. This can also be a salad that meets the criteria of the Choice logo. In collaboration with dietitians of all catering companies a list with products will be formed.
d. This can also be buttermilk or a semi-skimmed milk drink without added sugar.

of the Dutch contract catering market. Recruitment of worksite cafeterias will be done in different ways. The catering companies will be approached by the Quality Committee of Veneca. The Quality Committee consists of representatives of all members of Veneca. They are concerned with topics like sustainability and health in contract catering.
By means of multiple presentations of the researcher for the Quality Committee and supplementary letters for recruitment, caterers are being able to inform their customers about joining in the study. Also catering companies not being member of Veneca will be encouraged to join. This will be done by means of promoting the study on a national human resource congress, a call at an online radio station (werken.fm), an article in a magazine for the hotel and catering industry, in a national newspaper and by informing the sustainability working group of government agencies about the study. In order to ensure the representativeness of worksite cafeterias caterers will be encouraged to approach clients of different types of businesses, like factories. The researchers will decide whether the worksite cafeterias comply with the inclusion criteria.

### Inclusion criteria

Inclusion criteria for worksite cafeterias are

1. a minimum of 100 lunch customers per day, to ensure sufficient sales,
2. a cash desk system that can register separate products, in order to measure sales shifts within products groups,
3. cash desks are staffed or all products must be scanned, to ensure accurate registration,
4. the worksite cafeteria or the company will not organise active nutritional or health campaigns from January 2016 until August 2016, because it could interfere with the effect of the intervention,
5. the company gives permission to change the selection of products for 12 weeks during the experiment,
6. the company gives permission to change the routing in the restaurant for 12 weeks during the experiment,
7. the company gives permission to change the price of products for 12 weeks during the experiment,
8. the company gives permission to change the promotion of products and menu for 12 weeks during the experiment,
9. the company gives permission for measuring sales data during the study,
10. the company gives permission for conducting a questionnaire within their employees. To finalise the inclusion the researcher, together with the account manager of the catering company, will visit the worksite cafeteria for a meeting with the employer or his representative, to make sure all conditions for participating in the research are clear.

## Implementation

After conducting the randomization, all catering teams of the intervention worksite cafeterias will be visited by the researcher and their usual account manager of the catering company. In this meeting the researcher will explain all strategies and train the cafeteria managers to instruct their team. In the phase between randomization and start of the intervention, several training sessions will be planned with the catering manager and the researcher.

## Measures

This project will use three ways of data collection: sales data, a worksite cafeteria scan and a questionnaire. All measures are quantitative and will be done the same way in both intervention and control worksites. Sales data are the primary outcome measure and will be objectively measured by obtaining cash register output. The worksite cafeteria scan, from here referred to as 'scan' is a checklist to objectively measure the degree in which the intervention is executed correctly, or in the case of the control group, the extent to which the worksite cafeteria already applies strategies that are also part of the bundle of strategies of the intervention *The worksite cafeteria 2.0*.
The questionnaire will obtain subjective data of the employees visiting the worksite cafeteria. Employees of all participating companies (both experimental and control group) will fill in the questionnaire at the pre-measuring phase and during the intervention phase. Figure 1 shows all measures within the time frame.

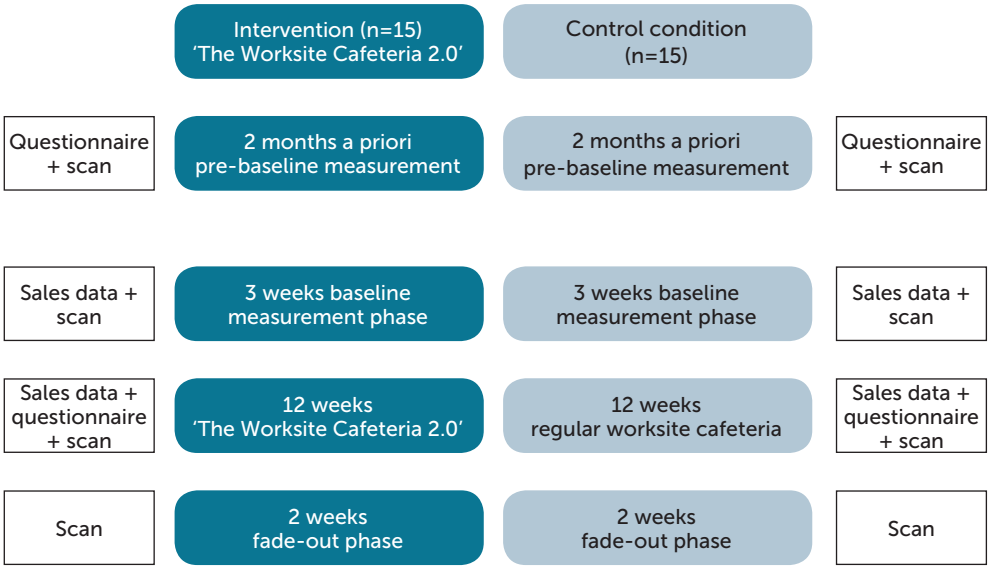


**Figure 1. Time planning of measurements RCT.**

### Sales

Daily sales of sandwiches, sandwich filling, salads, (hot) meals, fruit and vegetables, 'combo-deals', snacks and candy will be registered for 15 weeks (3 weeks pre-measuring and 12 weeks intervention) in both intervention and control group worksite cafeterias. All food products can be classified for relative healthiness, in one out of three categories within its product group. The classification is based on the levels of saturated fat and trans fat, added sugar, salt, dietary fiber and overall energy density.[47-49] Products can be classified in the following categories: the 'preference category', which is the most healthy category, the 'middle category' which is less healthy, but still reasonable, or the 'exception category', for products most unfavorable within the product category. The first two categories 'preference category' and 'middle category' are taken together into the so-called 'better choice'. This provides a dichotomy within product groups: 'better choice' products, versus 'exception' products.[48]

The primary outcome measure of this research project is the proportion of sales of 'better choice' products within the product categories sandwiches, sandwich filling, salads, (hot) meals and snacks and the sales of fruit and vegetables, 'combo-deals' and candy. The difference in (proportions of) sales of these products will be compared between the intervention group and the control group. All measured product categories correspond to the intervention strategies. In Dutch worksite cafeterias prepared sandwiches, bread combined with separate toppings or fillings and snacks are common lunch items [50], therefore certain intervention strategies target these products. The sales data will provide insight in the effect of the larger visible share, better pricing, placement and promotion of healthier 'better choice' products and the effects of not promoting less healthy products like snacks.



### Worksite cafeteria scan

The worksite cafeteria scan (scan) is a measuring tool to scan the degree of implementation of the intervention. For all strategies in the intervention it is measured to what extend they are executed correctly. The scan consists of a checklist with all the 19 strategies of the intervention. For each strategy has to be scored if it is executed and how it is executed ('correct' or 'incorrect'). The scan is not tested for reliability and validity, however the researcher who will train the worksite cafeteria managers on how to execute the strategies, is the same to scan the degree of use and implementation of the strategies before and during the intervention phase. Also worksite cafeterias in the control group will be scanned to be able to compare their status with the intervention cafeterias. Both the researcher and one trained research assistant will execute the first scan in a worksite cafeteria together, to take care of the validity. When no discrepancies occur, both researchers will perform scans on their own. During the 12-week intervention phase, bi-weekly scans are executed unannounced in the intervention cafeterias. The control restaurants will be scanned every 4 weeks by the researcher or research assistant.

### Questionnaires

To gain insight into the satisfaction of guests about the worksite cafeterias, employees of all worksites will be asked to fill in an online questionnaire at baseline and after the intervention phase. The questionnaire assesses elements of the satisfaction with the worksite cafeteria and vitality with the Vita-16.[51] Further, self-reported demographic variables will be collected like age, sex, body weight, height, level of education, marital status, household size, frequency of having lunch at the worksite cafeteria and the proportion of lunch purchased in the worksite cafeteria. Concepts like frequency of having lunch at the worksite cafeteria were tested by two researchers (IS and ELV). They tested if the answer categories were appropriate and if questions were stated clear and neutrally. A small test panel of eight persons tested the questionnaire thereafter. They reviewed the questionnaire on clarity and gave feedback. The feedback was used to improve the questionnaire.

Also demographic characteristics of the companies will be measured by the researchers, like work sector (white collar, blue collar) and size of the company (amount of employees). Worksite cafeterias' demographic and geographic characteristics that are measured are size (visitors daily), area (urban, suburban or rural), amount and proximity of competing lunch venues/purchase points for food, catering company (name, size and formula), contract form and mean amount of money spent per visitor per lunch.

### Statistical analysis sales data

We will use a linear mixed model (LMM) analysis to compare the intervention and control group. We distinguish three levels of data: time (level 1), the individual worksite cafeteria (level 2) and the catering companies (level 3). We adjust for this clustering of our data via a linear mixed model, including random intercepts and slopes where necessary according to the common procedure described in Twisk.[52]

### Statistical analysis Worksite cafeteria scan

The worksite cafeteria scan is an instrument to measure to which level the intervention is executed and if it is executed correctly. For each strategy can be filled out if this is executed (yes/no) and if it is correctly or incorrectly conducted. A percentage of correctly implemented strategies will be the result of the scan. Strategies that are not applicable will kept out the calculation.

We will not test for baseline differences based on arguments of De Boer *et al.* [53] to actively adopt the CONSORT 2010 statement by not publishing significance tests for baseline differences. Adjustment for prognostic variables will nevertheless be made. We will report results of the fully adjusted as well as crude analyses.

Also the level of correctly executing the intervention will be measured in the intervention group during the intervention phase (12 weeks, every 2 weeks) with longitudinal data analysis.

### Statistical analysis questionnaire

By means of linear mixed model analyses differences between visitors of the intervention and control group worksite cafeterias will be obtained. Also differences in satisfaction with the worksite cafeteria before and during the intervention will be analyzed with a linear mixed model. Satisfaction with the worksite cafeteria will be subdivided in satisfaction with the products offered, the price of products and the way and order that products are placed. A regression analysis will be obtained to take possible confounding variables into account.

Descriptive statistics of the worksite cafeterias will be used to characterise the intervention and control group at baseline. Moreover, descriptive statistics will be used to identify satisfaction, food choice behaviour and subjective health of all participating employees in the pre-test.
Statistical analyses will be conducted using standard statistical computer software (IBM SPSS Statistics 20.0) and MLwiN 2.35 software for mixed models. All statistical tests will be two-tailed and a 5 % significance level will be maintained throughout the analyses.

## Discussion

The objective of this study was to develop an intervention (named *The worksite cafeteria 2.0*) based on nudging and social marketing techniques to make purchase behaviour of Dutch employees healthier. Furthermore, the aim was to describe the design of a study to measure the effect of multiple simultaneously executed strategies in *The worksite cafeteria 2.0* on purchasing behaviour of visitors in Dutch worksite cafeterias. Thereby answering the research question: What is the effect of a healthier worksite cafeteria based on nudging and social marketing techniques on the purchasing behaviour of employees?
To our knowledge there are no studies that made a combination of evidenced based strategies with nudging and social marketing strategies and that are tested in 'real life'. Whereby 'real life' means in different real worksites with different catering companies.

We will discuss several strengths of this study. A first strength considering the design is the fact that the effect will be tested in real life Dutch worksite cafeterias, taking the variety between catering companies and industrial branches into account. This has the advantage over other studies that it gives realistic insight in the effect of the intervention in real life settings and increasing generalizability, but it also will provide insight in the support for such intervention. By means of organizing this intervention study one gets insight in the amount of effort it takes to convince several companies to implement the strategies, in other words, insight in the amount of support that is needed for adoption and continuous implementation.
Second, to choose worksite cafeterias as a target location gives the opportunity to

reach many people at their daily routine of visiting the worksite cafeteria. Since people will not have to sign up themselves, probably also people who are not traditionally engaged in health promotion campaigns can be reached. This could be an addition to health interventions reaching mostly only motivated people. Offering a solution for those people not intrinsically motivated would fill a gap.

A third strength of this intervention development and trial is the collaboration with multiple stakeholders like several catering companies, the Netherlands Nutrition Centre, Ministry of Health, Youth on a Healthy Weight (JOGG) and Veneca. By means of involving several catering companies the intervention will be developed and tested in practice. Working with catering companies from the start can tackle the common gap between research and practice, especially in the practical feasibility. The collaboration with Veneca enables the implementation of *The worksite cafeteria 2.0* on a larger scale. The position of Veneca gives them the ability to reach all catering companies and other stakeholders needed when making agreements for contract catering industry.

The last strengths to mention concerning the design is that the effect will be tested with a randomised controlled trial and by using objective data collection, namely sales data. Randomly allocating worksite cafeterias to the intervention group or to the control group is considered the golden standard for determining the efficacy of interventions and objective data are preferred over subjective data.

Finally also the intervention itself has some important strengths. The use of nudging and social marketing strategies is a promising tactic in changing people's behaviour. [54,55] Just changing the environment has the potential effect of not invoking negative reactions. Furthermore, executing effective strategies simultaneously can have a cumulative effect and could be more effective in a heterogeneous group.

The present study is also subject to some limitations that need to be acknowledged. First, when recruiting worksite cafeterias for the RCT some bias can be expected. Probably companies who are more interested in a healthy lifestyle are more willing to participate. These worksite cafeterias will probably already have a healthier assortment and therefore the effect could possibly be relatively small. Therefore, in recruiting worksites we will put extra effort in including companies with a so-called blue collar workforce.

Second, although a minimum of strategies must be executed, some strategies will not be applicable in certain cafeterias which may result in diversity within the interventions tested. For example, offering a smaller portion of a hot meal is not applicable if a cafeteria does not sell hot meals. Non applicable strategies could lead to an intervention less effective and differences in the intervention could make it difficult to interpret the effect. However, also in the control group some strategies would have not be applicable in some worksites. This will reflect the real life execution and effect of such intervention.

The third limitation is the possibility of missing or false data, as a result of incorrect registration of products at the cash desk. Although the majority of the worksite cafeterias

scan most of their products at the cash desk, some products will be registered with buttons. This could lead to incorrect registration of products. A final limitation is that the correct realization of all strategies cannot be controlled by the research team every day. Catering employees will be trained to execute the strategies as correctly as possible and bi-weekly the research team will visit the intervention cafeterias unannounced to check whether the strategies are executed correctly.

In conclusion, this healthy worksite cafeteria intervention is based on a unique combination of nudging and social marketing techniques. It will facilitate employees to purchase healthier products in real life worksite cafeterias. By developing this intervention with input of employees and in close cooperation with catering and nutrition experts and the most important catering companies in the Netherlands, it has a good chance of long-term implementation.

## References


1. Statistics Netherlands, *Lengte en gewicht van personen, ondergewicht en overgewicht; vanaf 1981.* 2016, Statistics Netherlands, The Hague.
2. Guh, D.P., *et al., The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis.* BMC Public Health, 2009. 9: p. 88.
3. Epstein, L.H., *et al., Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review.* Am J Clin Nutr, 2012. 95(4): p. 789-809.
4. Bell, J.F., *et al., Health-care expenditures of overweight and obese males and females in the medical expenditures panel survey by age cohort.* Obesity (Silver Spring), 2011. 19(1): p. 228-32.
5. Lal, A., *et al., Health care and lost productivity costs of overweight and obesity in New Zealand.* Aust N Z J Public Health, 2012. 36(6): p. 550-6.
6. van Duijvenbode, D.C., *et al., The relationship between overweight and obesity, and sick leave: a systematic review.* Int J Obes (Lond), 2009. 33(8): p. 807-16.
7. Hill, J.O., *Understanding and addressing the epidemic of obesity: an energy balance perspective.* Endocr Rev, 2006. 27(7): p. 750-61.
8. Swinburn, B., G. Egger, and F. Raza, *Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity.* Prev Med, 1999. 29(6 Pt 1): p. 563-70.
9. Blundell, J.E. and J. Cooling, *Routes to obesity: phenotypes, food choices and activity.* British Journal of Nutrition, 2000. 83: p. S33-S38.
10. Blundell, J.E., *et al., Resistance and susceptibility to weight gain: Individual variability in response to a high-fat diet.* Physiology & Behavior, 2005. 86(5): p. 614-622.
11. Wu, T., *et al., Long-term effectiveness of diet-plus-exercise interventions vs. diet-only interventions for weight loss: a meta-analysis.* Obesity Reviews, 2009. 10(3): p. 313-323.
12. Statistics Netherlands, *Beroepsbevolking; kerncijfers naar geslacht en andere kenmerken 1996-2014* 2015, Statistics Netherlands, The Hague.
13. TNS-NIPO, *Liefde gaat door de maag.* 2012.
14. Kahn-Marshall, J.L. and M.P. Gallant, *Making Healthy Behaviors the Easy Choice for Employees: A Review of the Literature on Environmental and Policy Changes in Worksite Health Promotion.* Health Education & Behavior, 2012. 39(6): p. 752-776.
15. Lassen, A.D., *et al., Effectiveness of offering healthy labelled meals in improving the nutritional quality of lunch meals eaten in a worksite canteen.* Appetite, 2014. 75: p. 128-34.
16. Lachat, C., *et al., Eating out of home and its association with dietary intake: a systematic review of the evidence.* Obes Rev, 2012. 13(4): p. 329-46.
17. Kjollesdal, M.R., G. Holmboe-Ottesen, and M. Wandel, *Frequent use of staff canteens is associated with unhealthy dietary habits and obesity in a Norwegian adult population.* Public Health Nutr, 2011. 14(1): p. 133-41.
18. Vandevijvere, S., *et al., Eating out of home in Belgium: current situation and policy implications.* Br J Nutr, 2009. 102(6): p. 921-8.
19. Young, L.R. and M. Nestle, *The contribution of expanding portion sizes to the US obesity epidemic.* Am J Public Health, 2002. 92(2): p. 246-9.
20. Rolls, B.J., *et al., Increasing the portion size of a packaged snack increases energy intake in men and women.* Appetite, 2004. 42(1): p. 63-69.
21. Rolls, B.J., L.S. Roe, and J.S. Meengs, *Larger portion sizes lead to a sustained increase in energy intake over 2 days*. J Am Diet Assoc, 2006. 106(4): p. 543-9.
22. Rolls, B.J., *et al., Increasing the portion size of a sandwich increases energy intake.* J Am Diet Assoc, 2004. 104(3): p. 367-72.
23. Steenhuis, I.H. and W.M. Vermeer, *Portion size: review and framework for interventions.* Int J Behav Nutr Phys Act, 2009. 6: p. 58.
24. Engbers, L.H., *et al., The effects of a controlled worksite environmental intervention on determinants of dietary behavior and self-reported fruit, vegetable and fat intake.* BMC Public Health, 2006. 6: p. 253.
25. Steenhuis, I.H.M., P. Van Assema, and K. Glanz, *Strengthening environmental and educational nutrition programmes in worksite cafeterias and supermarkets in the Netherlands.* Health Promotion International, 2001. 16(1): p. 21-33.
26. Steenhuis, I., *et al., The impact of educational and environmental interventions in Dutch worksite cafeterias.* Health Promot Int, 2004. 19(3): p. 335-43.

27. Vermeer, W.M., *et al., Small portion sizes in worksite cafeterias: do they help consumers to reduce their food intake?* Int J Obes (Lond), 2011. 35(9): p. 1200-7.
28. Engbers, L.H., M.N.M. van Poppel, and W. van Mechelen, *Modest effects of a controlled worksite environmental intervention on cardiovascular risk in office workers.* Preventive Medicine, 2007. 44(4): p. 356-362.
29. Vyth, E.L., *et al., Influence of placement of a nutrition logo on cafeteria menu items on lunchtime food Choices at Dutch work sites.* J Am Diet Assoc, 2011. 111(1): p. 131-6.
30. Bandoni, D.H., F. Sarno, and P.C. Jaime, *Impact of an intervention on the availability and consumption of fruits and vegetables in the workplace.* Public Health Nutr, 2011. 14(6): p. 975-81.
31. Lowe, M.R., *et al., An intervention study targeting energy and nutrient intake in worksite cafeterias.* Eat Behav, 2010. 11(3): p. 144-51.
32. Schwartz, J., *et al., Inviting consumers to downsize fast-food portions significantly reduces calorie consumption.* Health Aff (Millwood), 2012. 31(2): p. 399-407.
33. Vanderlee, L. and D. Hammond, *Does nutrition information on menus impact food choice? Comparisons across two hospital cafeterias.* Public Health Nutr, 2014. 17(6): p. 1393-402.
34. Webb, K.L., *et al., Menu Labeling Responsive to Consumer Concerns and Shows Promise for Changing Patron Purchases.* Journal of Hunger & Environmental Nutrition, 2011. 6(2): p. 166-178.
35. Wilson, A.L., S. Bogomolova, and J.D. Buckley, *Lack of efficacy of a salience nudge for substituting selection of lower-calorie for higher-calorie milk in the work place.* Nutrients, 2015. 7(6): p. 4336-44.
36. Mhurchu, C.N., L.M. Aston, and S.A. Jebb, *Effects of worksite health promotion interventions on employee diets: a systematic review.* BMC Public Health, 2010. 10.
37. Marteau, T.M., *et al., Judging nudging: can nudging improve population health?* British Medical Journal, 2011. 342.
38. Thaler, R.H. and C.R. Sunstein, *Nudge: Improving decisions about health, wealth and happiness.* 2008: New Haven: Yale University Press.
39. Baumeister, R.F., *et al., Ego depletion: is the active self a limited resource?* J Pers Soc Psychol, 1998. 74(5): p. 1252-65.
40. Inzlicht, M. and B.J. Schmeichel, *What Is Ego Depletion? Toward a Mechanistic Revision of the Resource Model of Self-Control.* Perspectives on Psychological Science, 2012. 7(5): p. 450-463.
41. Kleef van, E., K. Otten, and H. Trijp van, *Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices.* BMC Public Health, 2012. 12(1072).
42. French, J., *et al., Social marketing and public health Theory and practice.* 2010, United States: Oxford University Press.
43. Stead, M., *et al., A systematic review of social marketing effectiveness.* Health Education, 2007. .107(2): p. pp.
44. Carins, J.E. and S.R. Rundle-Thiele, *Eating for the better: a social marketing review* (2000-2012). Public Health Nutr, 2014. 17(7): p. 1628-39.
45. Guidelines Healthier Canteens factsheet. 2014, Netherlands Nutrition Centre: The Hague.
46. Wansink, B. and A.S. Hanks, *Slim by design: serving healthy foods first in buffet lines improves overall meal selection.* PLoS One, 2013. 8(10): p. e77055.
47. *Dietary Reference Intakes: energy, proteins, fats and digestible carbohydrates.* 2001, Health Council of the Netherlands: The Hague.
48. *Guidelines food choices.* 2011, Netherlands Nutrition Centre: The Hague.
49. *Methodology for the evaluation of the evidence for the Dutch dietary guidelines 2015* - Background document Dutch dietary guidelines 2015. 2015, Health Council of the Netherlands: The Hague.
50. van Rossum CTM, F.H., Verkaik-Kloosterman J, Buurma-Rethans EJM, Ocke MC, *Dutch National Food Consumption Survey 2007-2010 : Diet of children and adults aged 7 to 69 years.* 2011.
51. Strijk, J.E., *et al., Wat is vitaliteit en hoe is het te meten? What is vitality and how can it be measured? The core dimensions of vitality and the Dutch Vitality Questionnaire.* 2015.
52. Twisk, J.W., *Applied Multilevel Analysis: A Practical Guide for Medical Researchers. Practical Guides to Biostatistics and Epidemiology.* 2006: Cambridge University Press.
53. de Boer, M.R., *et al., Testing for baseline differences in randomized controlled trials: an unhealthy research behavior that is hard to eradicate.* Int J Behav Nutr Phys Act, 2015. 12: p. 4.
54. Skov, L.R., *et al., Choice architecture as a means to change eating behaviour in self-service settings: a systematic review.* Obes Rev, 2013. 14(3): p. 187-96.
55. Keller, C., F. Markert, and T. Bucher, *Nudging product choices: The effect of position change on snack bar*

*choice.* Food Quality and Preference, 2015. 41: p. 41-43.
56. Jeffery, R.W., *et al., An environmental intervention to increase fruit and salad purchases in a cafeteria.* Prev Med, 1994. 23(6): p. 788-92.
57. Blanck, H.M., *et al., Factors influencing lunchtime food choices among working Americans.* Health Education & Behavior, 2009. .36(2): p. pp.
58. Hanks, A.S., *et al., Healthy convenience: nudging students toward healthier choices in the lunchroom.* J Public Health (Oxf), 2012. 34(3): p. 370-6.
59. Daniels, M.C. and B.M. Popkin, *Impact of water intake on energy intake and weight status: a systematic review.* Nutrition Reviews, 2010. 68(9): p. 505-521.
60. Rozin, P., *et al., Nudge to nobesity I: Minor changes in accessibility decrease food intake. Judgment and Decision Making*, 2011. 6(4): p. 323-332.
61. Burns, R.J. and A.J. Rothman, *Offering Variety: A Subtle Manipulation to Promote Healthy Food Choice Throughout the Day.* Health Psychology, 2015. 34(5): p. 566-570.
62. Engbers, L.H., *et al., Worksite health promotion programs with environmental changes: a systematic review.* Am J Prev Med, 2005. 29(1): p. 61-70.
63. French, S.A., *Pricing effects on food choices*. J Nutr, 2003. 133(3): p. 841S-843S.
64. Powell, L.M., *et al., Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand and body weight outcomes.* Obesity Reviews, 2013. 14(2): p. 110-128.
65. Andreyeva, T., M.W. Long, and K.D. Brownell, *The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food.* Am J Public Health, 2010. 100(2): p. 216-22.
66. An, R.P., *Effectiveness of subsidies in promoting healthy food purchases and consumption: a review of field experiments.* Public Health Nutrition, 2013. 16(7): p. 1215-1228.
67. Dayan, E. and M. Bar-Hillel, *Nudge to nobesity II: Menu positions influence food orders.* Judgment and Decision Making, 2011. 6(4): p. 333-342.
68. Wansink, B., J. Painter, and K. van Ittersum, *How descriptive menu labels influence attitudes and repatronage.* Advances in Consumer Research, Volume Xxix, 2002. 29: p. 168-172.

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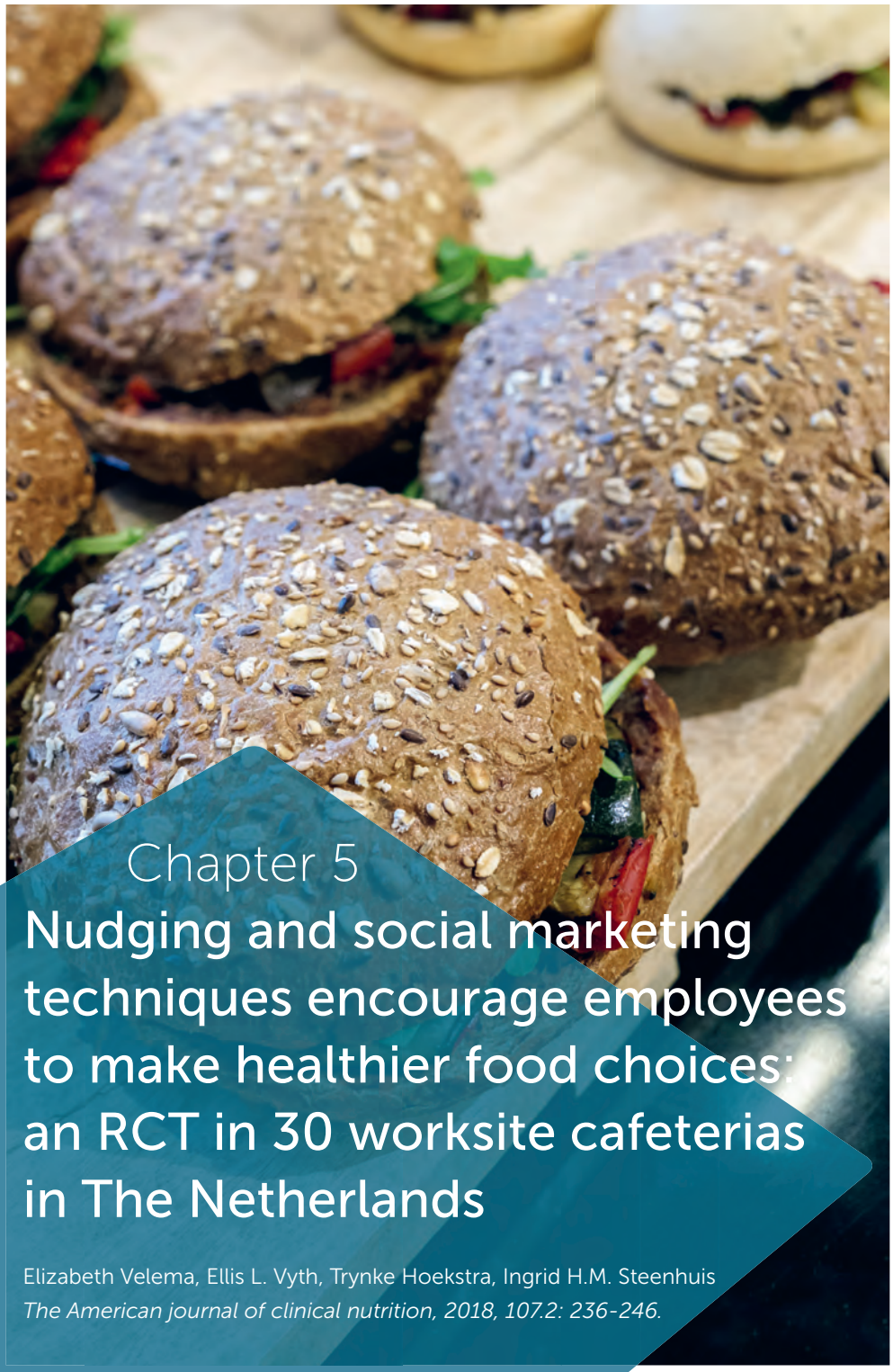

Chapter 5

# Nudging and social marketing techniques encourage employees to make healthier food choices: an RCT in 30 worksite cafeterias in The Netherlands

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## Abstract

*Background*

Currently, many studies focus on how the environment can be changed to encourage healthier eating behaviour, referred to as choice architecture or 'nudging'. However, to date, these strategies are not often investigated in real-life settings, such as worksite cafeterias, or are only done so on a short-term basis.

*Objective*

The objective of this study is to examine the effects of a healthy worksite cafeteria, *The worksite cafeteria 2.0* (WC 2.0) intervention on Dutch employees' purchase behaviour over a 12 week period.

*Design*

We conducted a randomised controlled trial in 30 worksite cafeterias. Worksite cafeterias were randomised to either the intervention or control group. The intervention aimed to encourage employees to make healthier food choices during their daily worksite cafeteria visits. The intervention consisted of 14 simultaneously executed strategies based on nudging and social marketing theories, involving product, price, placement, and promotion.

*Results*

Adjusted multilevel models showed significant positive effects of the intervention on purchases for three of the seven studied product groups: healthier sandwiches, healthier cheese as a sandwich filling and the inclusion of fruit. The elevated sales of these healthier meal options were constant throughout the 12 week intervention period.

*Conclusions*

This study shows that the way worksite cafeterias offer products affects purchase behaviour. Situated nudging and social marketing–based strategies are effective in promoting healthier choices and aim to remain effective over time. Some product groups only indicated an upward trend in purchases. Such an intervention could ultimately help prevent and reduce obesity in the Dutch working population.

## Keywords

Food choice behaviour, nudging, overweight, randomised controlled trial, social marketing

## Introduction

Most food choices are made automatically.[1-3] However, currently, the 'obesogenic environment' makes it very difficult not to succumb to the temptations of highly caloric and palatable foods and, as a result, makes it difficult not to consume more than the body requires.[4] Despite the awareness of this health threat and the presence of interventions to enhance people's lifestyles[5-9], the worldwide prevalence of excessive body weight, including in European countries such as The Netherlands, is high. For example, in 2016, 50.2 % of Dutch adults were classified as overweight.[10] In addition to targeting individuals who are willing to change their behaviour, another approach is to redesign the food environment in such a way that it encourages people to automatically make healthy food choices. This could have a longer-lasting effect, because it does not require self-control or cognitive capacity[11] and has the advantage of reaching more people than when recruiting for specific interventions.[12]

A food environment qualifying for the study on the effects of such adaptations is the worksite cafeteria. The worksite cafeteria is a typical setting where people seem to have 'freedom of choice', because there is no set menu, but where the products offered, combined with impulsive human food choice behaviour, are very determining for what customers choose. Most of these decisions are not based on prolonged deliberation, but on quick and automatic heuristic processing.[13-17] Furthermore, many people visit a worksite cafeteria daily during their working life, which means that even small changes will ultimately affect people's diets positively.[18] For example, a switch from white bread to whole-wheat bread during the average working life of 39.9 years [19] can contribute to one's health by lowering the risk of high blood pressure, stroke, and coronary artery disease.[20] Redesigning a food environment, such as a worksite cafeteria, can be referred to as choice architecture or 'nudging' (21), the purpose of which is to provoke the desired purchasing behaviour by making it more attractive and easier. An example of this is to give more prominence to the placing of healthier snack options than unhealthy snack options.[13,21]

A recent systematic review of 42 studies on the effectiveness of nudging in changing dietary choices of adults toward healthier choices showed that nudging strategies resulted in an average increase of 15.3 % in healthy nutritional choices.[22] However, it must be noted that most of the included studies were conducted in laboratories and were of short duration, often 4 weeks [23,24], and are thus not widely generalizable. For example, most study settings were in laboratories (48 %) and only 17 % were in canteens. Logically, there is a need for an intervention in a real-life food environment setting, such as worksite cafeterias as previously indicated. To develop the most effective intervention, it is important to know the target audience. Responding to what moves and motivates them is crucial to elevating the chances for the intervention to be successful.[25] Social marketing is a method that translates the researchers' insights into the target audience to a mix of strategies. These strategies can be subdivided into the so-called

4 P's (product, place, price, and promotion), which categorise strategies according to the target they affect, and coincide with nudging strategies. On the basis of these nudging and social marketing techniques, we developed an intervention called *The worksite cafeteria 2.0* (WC 2.0) described in figure 1 and elsewhere.[32] WC 2.0 aims to improve the purchasing rate of healthier options, and accordingly the eating behaviour, of Dutch employees when visiting their worksite cafeteria. Our study assessed the effect of the WC 2.0 intervention on the purchasing behaviour of Dutch employees. The research question guiding this study is as follows: can nudging and social marketing techniques encourage healthier purchases in worksite cafeterias?

## Methods

### Study design

A randomised controlled trial involving 30 worksite cafeterias in The Netherlands was conducted from March to June 2016. The trial contained two research arms: the WC 2.0 intervention and the control condition (i.e. no changes to the cafeteria offerings). The development of the intervention and the design of the study have been described previously.[32] The measurements in the worksite cafeterias started in mid-March 2016, and lasted for 15 weeks. In the first three weeks, baseline measurements were performed (baseline phase). The intervention was executed during the subsequent 12 weeks (intervention phase). We selected worksite cafeterias of companies who outsource catering to a contract catering company. All of the participating catering companies are members of Veneca, the Trade Association for Dutch Catering Companies. This project is a collaboration between Vrije Universiteit (VU) Amsterdam and Veneca. The trial was registered at the Dutch Trial Register (NTR5372), and the Medical Ethics Committee of VU Medical Center Amsterdam confirmed that this study does not apply to the Medical Research Involving Human Subjects Act (WMO), due to the nature of the measurements (sales data and anonymous questionnaires distributed among adults).



### Inclusion criteria

Inclusion criteria for worksite cafeterias are

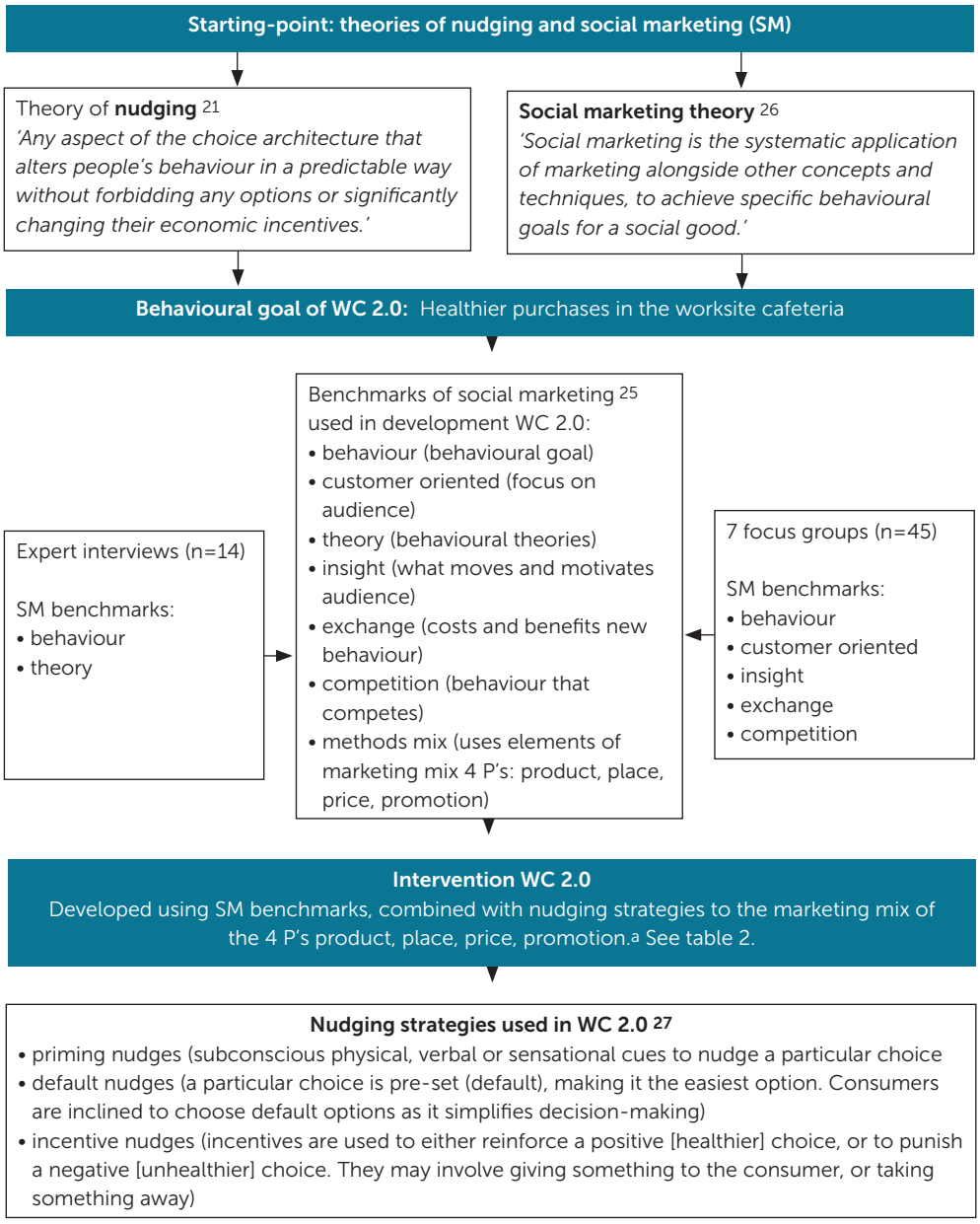
1. a minimum of 100 lunch customers per day, to ensure sufficient sales,
2. a cash desk system that can register separate products, in order to measure sales shifts within products groups,
3. cash desks are staffed or all products must be scanned, to ensure accurate registration,
4. the worksite cafeteria or the company will not organise active nutritional or health campaigns from January 2016 until August 2016, because it could interfere with the effect of the intervention,
5. the company gives permission to change the selection of products for 12 weeks during the experiment,

6. the company gives permission to change the routing in the restaurant for 12 weeks during the experiment,
7. the company gives permission to change the price of products for 12 weeks during the experiment,
8. the company gives permission to change the promotion of products and menu for 12 weeks during the experiment,
9. the company gives permission for measuring sales data during the study,
10. the company gives permission to conduct a questionnaire among their employees.

Two inclusion criteria were changed during the inclusion phase to ensure the inclusion of a sufficient number of cafeterias. Criterion 1, 'a minimum of 100 lunch customers per day', was changed to a minimum of 80 lunch customers per day. Furthermore, in terms of criterion 3, two worksite cafeterias with partly self-scanning cash registers, which could result in errors (e.g., missing products), were included. This was due to the high accuracy of registration by customers, compared with registration by cashiers, which was derived from purchase and sales equations. This means that very few items were not charged or deliberately registered as another product, as opposed to when this was done by cash register staff. The information about the accuracy was provided by the account managers, derived from purchase and sales data.

### Recruitment

Recruitment started at the end of 2014 by providing all nine catering companies that were members of the Trade Association for Dutch Catering Companies with information about the study. In June 2015, an article calling for participating worksite cafeterias was published in a hotel and catering industry magazine, and an appeal on a radio station and at a conference for human resource managers was made. 62 companies expressed interest, of which 47 were visited by one of the researchers (EV) and the account manager of their catering company to inform them about the study protocol. Ultimately, all 31 worksite cafeterias included were run by one of five Veneca members. Figure 2 shows the flowchart of the inclusion. During an intake meeting in the cafeteria, all of the inclusion criteria were checked. Baseline characteristics of participating companies, such as the type of employees (white or blue collar) and the number of daily visitors of the cafeteria, are shown in table 1. Account managers provided this information during the intake meeting before randomization. Elizabeth Velema randomly assigned worksite cafeterias to the intervention or control group (controlled by ELV) in blocks, stratified for size (≥500 or < 500 visitors/d), by using a Random Number Generator in Microsoft Excel (Microsoft Corporation). Participating companies varied from chemical (6), automotive (1), electronic (5), power engineering (1), food (2), and finance and insurance (5) industries to government institutions (7) and facility and entertainment industries (3). The companies were located across The Netherlands, with most companies (n = 18) located in the more urban western area.




a. The 4 P's (product, place, price and promotion) categorise strategies according to the target they affect, and coincide with nudging strategies. For instance, above mentioned the strategy of placing healthier snack options more prominently fits in the category of 'placement' strategies. Furthermore, by using social marketing, the strategy of changing the price can be added. Not all price strategies meet with the conditions of nudging, because a price increase violates freedom of choice by removing an option. Price is however a strong determinant for food purchase behaviour, and thereby an important strategy. [26,28-31]

**Figure 1. Intervention development and theory.**

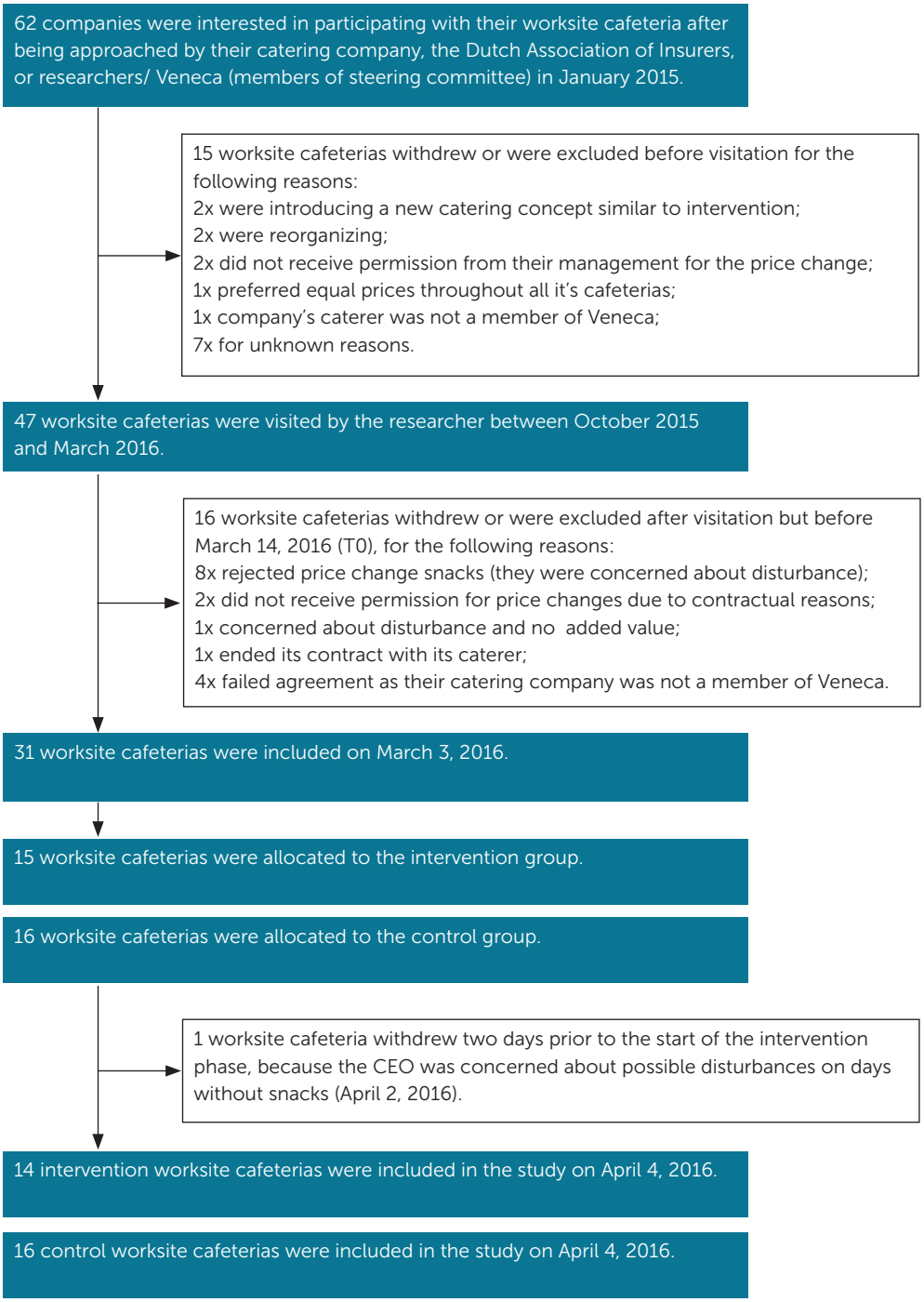



**Figure 2. Flowchart of inclusion of worksite cafeterias.**

## Intervention

*The Worksite Cafeteria 2.0* intervention consisted of 14 strategies (see table 2) and was designed to result in the purchasing of healthier food options. The intervention was optimised through focus groups and expert interviews to obtain actual insights into the target audience. This helped us understand the possible effectiveness and feasibility of strategies useful for encouraging the purchasing of healthier options. A detailed description of the emergence and support of this selection of strategies is described elsewhere [32], and figure 1 shows a schematic overview of the theory and emergence of the intervention. The strategies can be divided into the 4 P's of social marketing (product, place, price, and promotion) that categorise strategies according to the factor on which they have an effect. For instance, the P of 'product' comprises strategies affecting the proportion of healthier options available. 'Place' strategies involve the placement and the order of food products in the worksite cafeteria. See table 2 for all strategies. Within all of the intervention worksite cafeterias, new increased prices (snacks) and decreased prices (healthier 'better choice' sandwiches, healthier 'better choice' salads, and combo deals) were derived from the regular prices. Price increases and decreases comprised 25 % of the baseline prices. The combo deal consisted of a combination of a healthier 'better choice' sandwich (or in some cafeterias a healthier 'better choice' salad), low-fat milk, and a piece of fruit. This combo deal was available daily and had an overall price discount of 25 %. The sandwich or salad was also sold separately at a 25 % discount.

**Table 1. Baseline characteristics of the worksite cafeterias.**

| Characteristic | | Intervention group worksite cafeterias (N=14) | Control group worksite cafeterias (N=16) |
|---|---|---|---|
| Daily visitors [a], *number* | (mean) | 235 (range 90- 850) | 247 (range 80-1000) |
| Daily visitors [b], *percentage* | (mean %) | 36.5 | 47.4 |
| White collar [c] | (mean %) | 82 | 77 |
| Other eating locations in walking distance [d] | | | |
| very few | | 8 (57.1 %) | 7 (43.8 %) |
| reasonable | | 4 (28.6 %) | 6 (37.5 %) |
| a lot | | 2 (14.3 %) | 3 (18.8 %) |
| Price sandwich | (mean €) | 2.66 (range 1.95-3.49) | 2.54 (range 1.75-3.25) |
| Price fried snack | (mean €) | 0.99 (range 0.50-1.52) | 1.09 (range 0.55-1.75) |
| Price soup | (mean €) | 0.81 (range 0.42-1.29) | 0.76 (range 0.40-1.12) |
| Expenditure per customer | (mean, sd €) | 3.12 (0.26) | 3.12 (0.45) |

a. Mean number of daily visitors of the worksite cafeteria.
b. Daily visitors of the worksite cafeteria as a percentage of all employees working in the company building with this worksite cafeteria.
c. Percentage of white collar workers versus blue collar workers.
d. Distance reachable by foot within 10 minutes walking.

**Table 2. Intervention strategies 26.**

| | |
|---|---|
| | **Product** |
| 1. | In every product category, at least one product of 'better choice' [a] is visibly offered. |
| 2. | A warm lunch meal is also offered in a smaller portion. |
| 3. | Fruit and vegetables are offered. |
| 4. | Water is offered for free. |
| 5. | The visible share of healthy ('better choice') products is at least 60%. |
| 6. | Warm snacks [b] are offered up to three days a week. |
| | **Place** |
| 7. | Healthy products are at the beginning of the route. These products are: salads, fruit & vegetables, bread, bread topping and healthier sandwiches [c,d]. |
| 8. | Of every product group the 'better choice' [a] product or presentation of this product is most visible (at the front at eye level). |
| 9. | In case of a shelf at the cash register it is partly filled with fruit & vegetables. Fruit & vegetables are on top or at the front. |
| | **Price** |
| 10. | A relatively cheap combo-deal is offered with milk [e] /coffee/tea/vegetable juice, a healthier sandwich [c,d], and fruit with a price comparable with the average price of a sandwich in the same cafeteria. |
| 11. | Prices of warm snacks [b] (e.g. chicken nuggets) are increased by 25% and prices of healthier sandwiches [c,d] are decreased by 25%. |
| | **Promotion** |
| 12. | There is only promotion of food products in the 'better choice' [a] category (or the Choice criteria for combined meals). |
| 13. | When a healthy product is promoted is has a recognizable, permanent spot in the cafeteria. |
| 14. | On the menu, e.g. on displays or intranet the healthy products are named first. |

a. 'Better choice' is a product classified as most healthy (relative healthiness), in one out of three categories within its product group. The classification is based on the levels of saturated fat and trans fat, added sugar, salt, dietary fiber and overall energy density [20, 27, 28].
b. Snacks contain all fried snacks like fries, chicken nuggets, or spring rolls, but also puff pastry snacks like, sausage rolls and cheese rolls.
c. 'Healthier' sandwiches meet the criteria of the Choice logo [28].
d. This can also be a salad that meets the criteria of the Choice logo [28]. In collaboration with dietitians of all catering companies a list with products is formed.
e. This can also be buttermilk or a semi-skimmed milk drink without added sugar.

Table 3. Products groups and criteria.

| Product group | Detailed description product group and criteria |
|---|---|
| **Snacks** | Deep fried snacks and puff pastry snacks (e.g. croquette, French fries, chicken nuggets, spring rolls, sausage rolls of puff pastry) |
| **Fruit** | Single pieces of unpeeled fruit and vegetables and portions of snack vegetables |
| **Pre-packaged snacks** | Chocolate bars, cookies, muffins, granola bars, bags of candy, chips |
| **Healthier ('better choice') sandwich** | Sandwiches meeting the guidelines for 'better choice' products [a] |
| **Healthier ('better choice') salad** | Salads meeting the guidelines for 'better choice' products [a] |
| **Healthier ('better choice') cheese** | Types of cheese meeting the guidelines for 'better choice' products [a] (e.g. 20+ cheese, 30+ cheese, cottage cheese, dairy spread, 30+ cheese spread) |
| **Healthier ('better choice') meat** | Meat products meeting the guidelines for 'better choice' products [a] (e.g. ham, chicken breast, roast beef) |

a. According to the Guidelines Food Choices. [28]

## Measurements

This project used three data collection methods: sales data, a worksite cafeteria scan, and an online questionnaire. All of the measures were quantitative and were performed similarly in both the intervention and control companies. Primary outcome measures were sales data of sandwiches, sandwich fillings, salads, fruit and snack vegetables, snacks, and prepackaged snacks. Sales of these product groups were a direct derivative of the intervention strategies and were objectively measured by obtaining cash register outputs. Over the 15 weeks (3 weeks before and 12 weeks during the intervention), we collected sales data on 30 worksite cafeterias in The Netherlands. Cash register outputs provided data on all products sold per day (between 1130 and 1400) and the number of customers that day (between 1130 and 1400).

We derived secondary outcome measures from the worksite cafeteria scan (hereafter referred to as the 'scan'). The scan is a checklist to objectively measure the degree to which the intervention was executed correctly (correct: 1 point; partial: 0.5 points; not executed: 0 points). In the case of the control groups, the scan measures the extent to which the worksite cafeteria already applies the 14 strategies that form part of the bundle of strategies from the WC 2.0 intervention. Both a researcher (Elizabeth Velema) and one trained research assistant executed these measurements. The assistant's first scans were performed together with the researcher to ensure reliability. Furthermore, interscanner reliability was ensured by using detailed instructions on how to score the execution. For example, for strategy 5 (table 2), all products were counted, and for

every product group it was measured if ≥60 % of all products within this product group was a healthier ('better choice') option. When not all product groups, but more than half, reached 60 %, this strategy was scored as 'partially' executed. Furthermore, the researchers discussed all initial scans they performed alone, and discussed scores until there was agreement. During the 12 week intervention phase, a scan was executed unannounced every three weeks in the intervention cafeterias. The control cafeterias were instructed not to change anything during the intervention phase.

The questionnaire obtained secondary outcomes from data on the employees visiting the worksite cafeteria. All of the employees were asked to anonymously complete the questionnaire, which was based on validated concepts (vitality is defined based on three dimensions: energy, motivation and resilience, and was measured with Vita-16 [35], during the baseline phase (March 2016) and at the end of the intervention phase (June 2016). Participation was voluntary. Satisfaction of the employees with the worksite cafeteria was gauged by scoring an overall mark (1–10) and by answering questions about factors such as products and prices. Examples of these questions are 'What do you think of the range of products offered in the worksite cafeteria?' and 'What do you think of the price of the products offered in the worksite cafeteria?' These characteristics were measured on a 5-point Likert scale in line with the question. Answer options were as follows: very good, good, neutral, poor, very poor and very cheap, cheap, not expensive/not cheap, expensive, very expensive, or 'I don't know'. In addition, the purchase or use of some products targeted by the intervention was monitored by questions, including 'Does the worksite cafeteria offer free drinking water? If so, how often do you take a glass of water?' Self-reported demographic variables were also collected. These included age (years), sex (male or female), body weight (kilograms), height (centimeters), level of education [primary school or basic vocational education (low educational level), secondary vocational education or high school degree (medium educational level), or higher vocational education or university degree (high educational level)], household size (number of adults and children), frequency of having lunch at the worksite cafeteria (1, 2, 3, 4, or 5 times/week; <1 time/week; or never), and the proportion of lunch purchased in the worksite cafeteria (whole lunch, part of lunch, or nothing).

## Statistical analysis

### Sales

We collected sales data for all of the worksite cafeterias and recorded them in Excel files (Microsoft Corporation). In these records, all products were recoded into product categories. For instance, the products banana', 'apple', and 'orange' were grouped together in the 'single piece of fruit' product category. All of the products in assigned product categories as analyzed in this study are shown in table 3. These product groups were chosen because prepared sandwiches, snacks, and bread combined with separate toppings or fillings, such as cheese, are common lunch items in Dutch worksite cafete-

rias.[36] The composition of a Dutch lunch differs from American lunches in that bread, rather than a hot meal, is mostly consumed. Furthermore, the intervention strategies also targeted healthy products, such as fruit, and unhealthy products, such as prepackaged snacks like candy. In table 2, strategy 10 (i.e., a 'combo deal') was introduced to the intervention cafeterias. When the total combination of products included in the combo deal was purchased, it was registered as a combo deal. The separate sales of the 'healthier choice sandwich' and 'healthier choice salad' that could also be purchased within the combo deal are represented in the sales of the product groups healthier (better choice) sandwich and healthier (better choice) salad'. After allocating all of the products to product categories, sales numbers were merged. In SPSS (IBM SPSS Statistics 23), zeros were added to the data set where no sale took place. Daily sales data of all product groups were calculated into weekly sales, divided by the number of customers during that week, and multiplied by 100 to determine sales per 100 customers/wk. To evaluate the intervention effect, we performed a multi-level regression analysis (MLwiN version 2.36) for each primary outcome measure. We used multilevel analysis because of the hierarchical structure of the data (i.e., weekly measures were clustered within a worksite cafeteria, and worksite cafeterias were clustered within catering companies). We analyzed data according to the intention-to-treat principle (instead of a per-protocol analysis) and used a linear mixed model analysis with 3 levels: 'i', time (n = 15 measuring points, 1 for each week); 'j', worksite cafeterias (n = 30), and 'k', catering companies (n = 5).

Repeated measures (15 wk) were clustered within cafeterias (n = 30), and cafeterias were clustered within catering companies (n = 5). For all levels, the inclusion of a random intercept was considered on the basis of the likelihood ratio test (37).

A significance level of 0.05 was maintained for all analyses, two-sided. For the combo deal, no regression analysis was performed because the control cafeterias did not introduce a combo deal.



### Scan

For all 14 strategies, it was recorded whether they were executed correctly (correctly: 1 point; partial: 0.5 points; not executed: 0 points). The mean score of correctly executed strategies from those applicable are presented to give insight into the degree of implementation of the intervention. Given the short time slots to perform scans (i.e., just before lunchtime, 1130), control cafeterias were not visited during the intervention phase. They were, however, instructed not to change anything in the worksite cafeteria. The account manager of the catering company monitored whether anything was changed in the control cafeterias during the intervention period. We used SPSS version 23 to analyze these data.

### Questionnaire

Differences in demographic variables between the intervention and control employees at baseline were tested with chi-square tests and t tests with SPSS version 23. At the end of the intervention phase, t tests were used to explore differences in the scores of satisfaction between the employees of the intervention and the control companies.

## Results

### Results sales data

Table 4 shows the mean number of products sold per 100 customers for the intervention group and the control group separately. When corrected for baseline differences, significant differences between intervention and control worksite cafeterias during the intervention phase were noted for sales of healthier sandwiches, healthier cheese, and fruit.

During the intervention, a significantly higher number of healthier ('better choice') sandwiches were sold in the intervention cafeterias than in the control cafeterias (i.e., mean ± SD: 3.3 ± 3.1 compared with 0.9 ± 2.2, respectively) per 100 customers. However, the purchases of regular sandwiches decreased (from 14.2 ± 7.8 to 11.3 ± 7.1) in the intervention cafeterias. In the control group, the sales of this product per 100 customers remained constant (from 13.0 ± 9.3 to 13.4 ± 9.1) (data not shown). The difference in sales of regular sandwiches between the groups was also significant.

For the cheese product group, we observed a significant increase in the purchasing of the 'better choice' (low-fat) cheese in the intervention group during the intervention phase compared with the control group (from 1.3 ± 1.7 to 4.8 ± 3.5 compared with 2.3 ± 4.3 to 3.3 ± 7.1, respectively).

The results show that consumers in the intervention group bought an additional 0.7 pieces of fruit per 100 consumers compared with the control group. This difference was significant after correction for baseline differences.

For the 3 product groups showing significant differences between intervention and control cafeterias, we performed further analyses to test for an interaction effect over time. We found no difference in effect between the two cafeteria types for healthier choice sandwiches, healthier choice cheese, or fruit. Figure 3 shows the sales per 100 customers of healthier ('better choice') sandwiches over time. Figure 4 shows the same for healthier cheese toppings, and Figure 5 shows the sales for fruit. Figures 3-5 indicate that the effect of the intervention, as seen in elevated sales, stayed constant over the intervention period.

As shown in table 4, no significant differences between cafeteria types were noted for snacks, prepackaged snacks, healthier 'better choice' salads, and healthier 'better choice' meat products for bread toppings. During the intervention, a mean ± SE of 1.5 ± 1.4 combo deals per 100 customers was sold (see table 2, price strategy 10). There was no decrease in the number of customers visiting the intervention cafeterias during

**Table 4. Crude and adjusted intervention effect on sales of product groups and the strategies applied per product group [a].** *Primary outcome measure products sold per 100 customers*

| | Control group Mean (SD) | Inter-vention group Mean (SD) | Crude Beta (SE) | Adjusted [b] Beta (SE) | Lower 95% CI of Adjust. | Upper 95% CI of Adjust. |
|---|---|---|---|---|---|---|
| **Snacks** | | | | | | |
| Baseline phase [c] | 26.7 (22.3) | 28.3 (10.6) | | | | |
| Intervention phase [d] | 25.3 (20.4) | 23.7 (14.3) | | | | |
| Overall effect | | | -1.64 (6.04) | -3.00 (2.76) | -8.40 | 2.40 |
| *Strategies from table 2 applied: 1, 5, 6, 8, 11, 12* | | | | | | |
| **Fruit [e]** | | | | | | |
| Baseline phase [c] | 9.1 (9.2) | 6.8 (4.6) | | | | |
| Intervention phase [d] | 8.7 (8.4) | 9.4 (5.6) | | | | |
| Overall effect | | | 0.60 (2.49) | 2.70* (0.6) | 1.52 | 3.88 |
| *Strategies from table 2 applied: 1, 3, 7, 9, 10, 12, 13, 14.* | | | | | | |
| **Pre-packaged snacks** | | | | | | |
| Baseline phase [c] | 3.4 (3.7) | 2.4 (2.0) | | | | |
| Intervention phase [d] | 3.4 (5.2) | 2.5 (3.8) | | | | |
| Overall effect | | | -0.52 (1.12) | 0.15 (0.57) | -0.97 | 1.26 |
| *Strategies from table 2 applied: 1, 8, 9, 12.* | | | | | | |
| **Healthier ('better choice') sandwich** | | | | | | |
| Baseline phase [c] | 1.3 (2.7) | 0.2 (0.5) | | | | |
| Intervention phase [d] | 0.9 (2.2) | 3.3 (3.1) | | | | |
| Overall effect | | | 2.49* (0.83) | 3.13* (0.73) | 1.70 | 4.55 |
| *Strategies from table 2 applied: 1, 5, 7, 8, 10, 11, 12, 13, 14* | | | | | | |
| **Healthier ('better choice') salad** | | | | | | |
| Baseline phase [c] | 0.3 (0.6) | 0.1 (0.3) | | | | |
| Intervention phase [d] | 0.5 (1.5) | 1.2 (2.3) | | | | |
| Overall effect | | | 0.68 (0.57) | 0.68 (0.57) | -0.43 | 1.80 |
| *Strategies from table 2 applied: 1, 5, 7, 8, 10, 11, 12, 13, 14.* | | | | | | |
| **Healthier ('better choice') cheese** | | | | | | |
| Baseline phase [c] | 2.3 (4.3) | 1.3 (1.7) | | | | |
| Intervention phase [d] | 3.3 (7.1) | 4.8 (3.5) | | | | |
| Overall effect | | | 1.52 (2.05) | 2.76* (1.15) | 0.51 | 5.01 |
| *Strategies from table 2 applied: 1, 5, 7, 8.* | | | | | | |
| **Healthier ('better choice') meat** | | | | | | |
| Baseline phase [c] | 7.5 (7.0) | 6.8 (4.5) | | | | |
| Intervention phase [d] | 8.6 (10.7) | 9.2 (4.7) | | | | |
| Overall effect | | | 0.65 (3.07) | 1.40 (1.63) | -1.80 | 4.61 |
| *Strategies from table 2 applied: 1, 5, 7, 8.* | | | | | | |

a. Results are from multilevel analysis (n=30). Mean sales of product groups for intervention (n=14) and control (n=16) worksite cafeterias during pre-intervention baseline phase and intervention phase and crude and adjusted intervention effect; and the strategies applied per product group.
b. Adjusted model is corrected for baseline sales data of that product group.
c. Mean sales data of 3 weeks prior the intervention.
d. Mean sales data of 12 weeks of intervention.
e. Fruit is the sum of all single pieces of fruit sold, snack vegetables and the pieces of fruit incorporated in the combo-deal.

* P<0.05

**Table 5. Results of scan data at baseline T0 (week 1-3) and during intervention (T1).**

| Time of measuring | | T0 (week 1-3) | | T1A (week 4-6) | | T1B (week 7-9) | | T1C (week 10-12) | | T1D (week 13-15) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean (SD) of correctly[a] executed strategies of eligible strategies | Intervention Cafeterias (n=14) | 3.1 (1.0) | of 13.6 (0.6) | 10.5 (1.3) | of 13.6 (0.6) | 10.6 (1.2) | of 13.4 (0.7) | 10.4 (1.5) | of 13.4 (0.8) | 10.3 (1.3) | of 13.4 (0.8) |
| | Control Cafeterias (n=16) | 3.2 (1.0) | of 13.4 (0.6) | | - | | - | | - | | - |

a. Correctly executed strategies scored 1 point; partly correctly executed strategies scores 0.5 points. For example, strategy #5 'The visible share of healthy ('better choice') products is at least 60%' was sometimes correct for almost all product groups, but not all of them. In that case 0.5 points were given.

the baseline phase (mean ± SD: 785.8 ± 356.3) compared with the intervention phase (772.0 ± 313.0) [t(14) = 0.608, P = 0.553]. Regression analysis showed that the mean difference in the number of customers between the baseline and intervention phase (between the intervention and control groups) was not significant, corrected for baseline mean customer number.

## Scan: compliance with the intervention protocol

Table 5 shows the scores from the scan data at baseline for both the intervention and control cafeterias. It shows the mean number of correctly executed strategies of the mean number of eligible strategies (≤ 14; see table 2). Table 5 also shows the results of the scan during the intervention phase in the intervention cafeterias and shows that 77 % of the eligible strategies were conducted correctly in the intervention cafeterias. This compliance rate remained stable over the intervention period.

## Questionnaire

Results of the questionnaire (T0: n = 904; T1: n = 657; T0: 53.2 % men; T1: 49.3 % men) showed only a significant difference between intervention and control group at baseline for the diversity of products offered. Employees in the intervention cafeterias were slightly more positive at baseline than those in the control cafeterias (mean ± SD: 3.70 ± 0.74 compared with 3.58 ± 0.79; P <0.05). After the intervention, no significant difference was found between the 2 groups (3.55 ± 0.82 and 3.47 ± 0.77 for the intervention and control group, respectively).

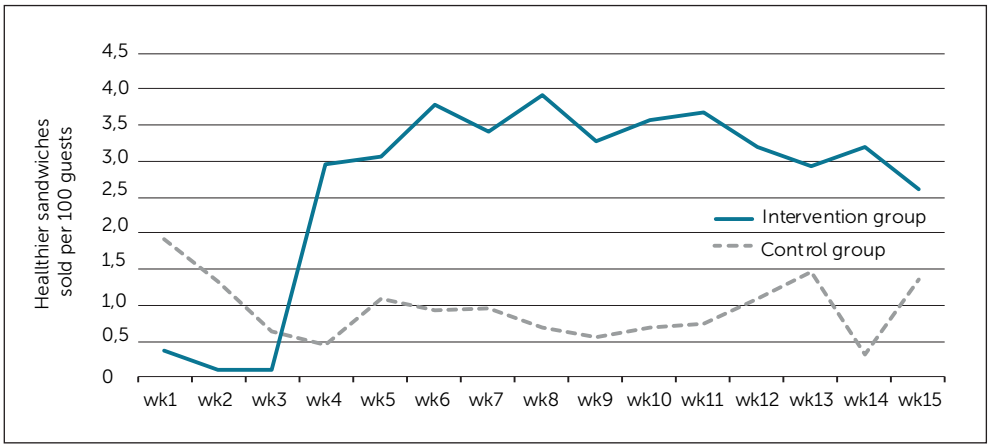



**Figure 3. Sales of healthier ('better choice') sandwiches over time.**

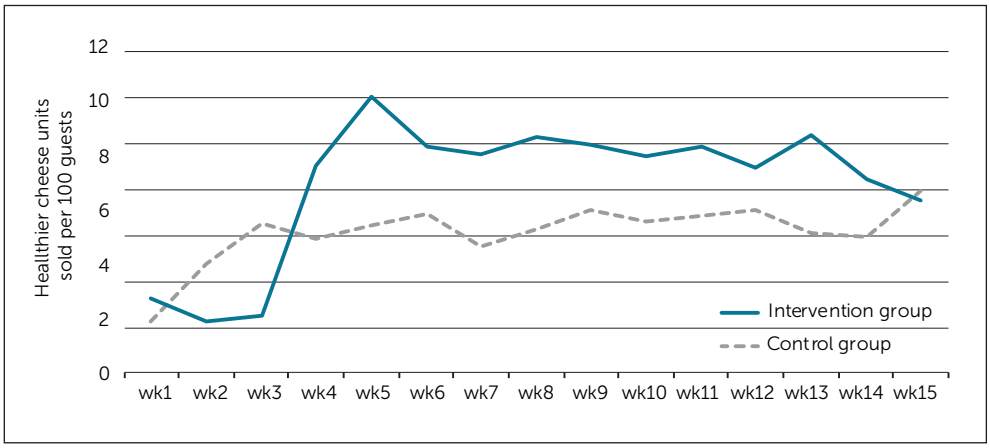



**Figure 4. Sales of healthier ('better choice') cheese over time.**



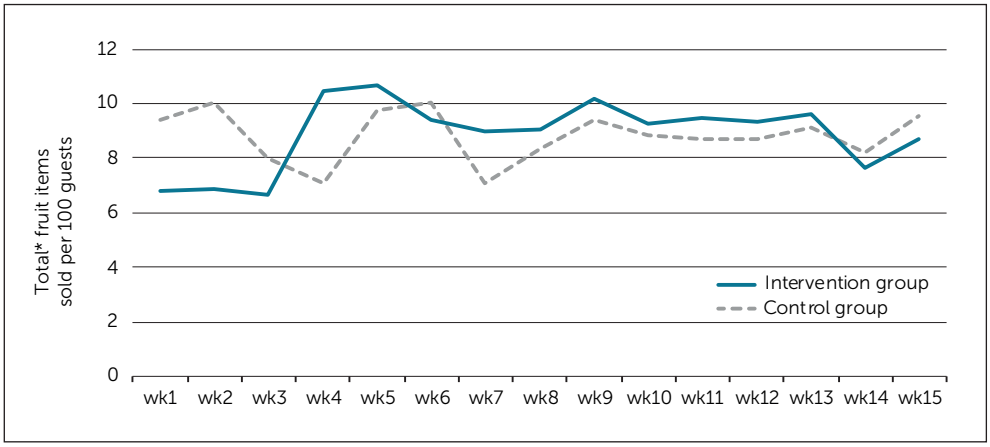



**Figure 5. Sales of fruit over time.** Fruit is the sum of single pieces of fruit, snack vegetables and combo-deals which also contained a single piece of fruit.

Furthermore, the intervention group was marginally less satisfied with the type and diversity of products in the cafeterias after the intervention (mean ± SD: T1 compared with T0—3.77 ± 0.64 and 3.70 ± 0.74 at T0 compared with 3.66 ± 0.66 and 3.47 ± 0.77 at T1, respectively; $P < 0.05$).

## Discussion

The WC 2.0 intervention was designed to encourage employees to make healthier choices during their daily worksite cafeteria visits. By conducting 14 nudging and social marketing strategies (77 % of which were executed as intended), we aimed to promote the purchasing of healthier lunch products. We found significantly positive effects of the intervention on purchases for 3 of the 7 studied product groups: healthier sandwiches, healthier cheese as sandwich fillings, and fruit. The elevated sales per 100 customers of these healthier food options were constant throughout the 12 week intervention period. Despite growing consensus that nudging strategies are promising intervention methods to increase healthy food purchases [13,22,38,39], real-life investigations of such interventions are scarce and, to date, the methodologic quality and reporting of these studies have not been optimal.[39-41]

To our knowledge, this is the first randomised controlled trial to investigate the effectiveness of a combination of nudging and social marketing strategies exposed to real-life worksite cafeteria customers on a daily basis, thus strengthening its ecological validity. We found that healthier sandwiches were purchased to a greater extent than regular sandwiches, possibly influenced by the extent and range of multiple strategies targeting this product. Healthier sandwiches were displayed more prominently than regular sandwiches, and were promoted as the 'sandwich of the day' without explicitly advertising it's 'healthiness.' In addition, price discounts further promoted these sandwiches and likely contributed to the success of the sale of these sandwiches, because price is a determining factor in purchasing behaviour.[28-31] For example, a recent review showed that a 10 % discount on healthy products resulted in a 12 % purchase increase.[42] Slightly increased sales of healthier cheese suggest that consumers do not consider the fat content or taste when purchasing cheese. We found that consumers are more greatly influenced by the proportion of visually offered products (60 % healthier cheese compared with 40 % regular cheese), especially because the price had not been changed. In addition, display placement could have influenced purchases (i.e., healthier cheeses were placed more prominently, at eye level). However, evidence of this is mixed.[43,44]

In addition, more fruit (sold separately as well as in combo deals) was sold in the intervention cafeterias than in the control cafeterias during the intervention period. This difference became significant after adjusting for unexplained differences at the baseline. The combo deal discount and prominent placement of fruit at the cash registers may have caused this effect. It must be noted that the effects for all product groups, with the exception of prepackaged snacks, were as expected. For prepackaged snacks, a lack of

effect could be a result of these being purchased at times other than at lunchtime. Furthermore, in most participating companies, vending machines with prepackaged snacks were also present. Applying the strategies to vending machines could be advantageous, because their content is easy to adapt.

For snacks, the 25 % price increase was not substantial enough to prevent customers from purchasing them. This is in contrast to the findings of the previously mentioned review, which reported a 3 % decrease in fast-food sales as a result of a 10 % price increase.[42] That was, however, the result of only three studies in fast-food cafeterias. In worksite cafeterias, snacks are relatively inexpensive compared with prepared products, resulting in a small absolute price increase, and snacks are still a cheap option. Furthermore, offering snacks only three days a week could have resulted in a change in days on which people buy snacks: those who usually buy two snacks in a week could still do so, for example. This justifies improving on this strategy by only offering snacks once a week.

The first strength of this study is the length of the intervention (i.e., 12 weeks). In many experiments, the exposure to nudge strategies is too short to draw conclusions about the sustainability of the effects.[13,45] Second, the real-life setting is also considered a strength. In laboratory settings, by contrast, only one-time choices are studied. However, exposure to choice-determining factors in the worksite cafeteria is a recurring phenomenon. Other mechanisms could also play a role, because repeated exposure evokes automatic and habitual behaviour.[1] A real-life setting also provides a realistic view of implementation, increasing the chance of implementation for health promotion. Third, the considerable number of 30 participating worksite cafeterias is an innovation in studies of this type. Finally, the design is an asset due to the presence of a control group, allowing control for external influences.

The first limitation is that we only assessed food purchased and not actual dietary intake, which could differ. Sales data are, however, a more objective measure than food-frequency questionnaires because no items are forgotten.[46] Measuring actual intake by means of 24-hours dietary recalls or photographing food and leftovers would have been a better strategy, because it gives information about possible compensational behaviour. Nevertheless, this could have caused bias because consumers would have known that they were being studied. Furthermore, because the health aspects of the strategies were not communicated explicitly, we do not expect employees to compensate for their healthier purchases. A second limitation is the lack of significant differences that could have resulted from smaller than expected effects. Some of the included worksite cafeterias offer a large variety of food products (e.g., warm meals, snacks, prepared salads and sandwiches, salad from bars, bread and toppings, soups, and yogurt). Therefore, the effects were smaller in cafeterias with a diverse range of options. In addition, healthier salads could only be offered in cafeterias that already served complete salads, resulting in customers being offered less than expected. Third,

we cannot distinguish between the effects of the individual strategies. Finally, not monitoring the control cafeterias during the intervention is a limitation. We have no proof of whether the participating cafeterias implemented any of the strategies, despite their assurances. We also did not address whether intervention cafeterias changed cafeteria costs or revenues, which is important to study for potential future strategy adoption. However, participating catering companies expressed their interest in cooperating due to the changing demands of customers and employers with regard to healthier options. Considering the small changes to purchases, the clinical relevance of this intervention is a topic for discussion. Substituting a slice of regular cheese with low-fat cheese will not solve the problem of excess weight. This decrease of 25 kcal (based on a 30 gram package of 109 kcal compared with 84 kcal) could hypothetically 'save' 5000 kcal/y (40 wk × 5 d), which, on its own, most likely will not overcome obesity. However, the consistently elevated sales of healthier cheese indicate that permanent implementation could affect employees' daily food intake, because it appears that the strategies remain effective independent of their novelty. It is therefore proof of the mechanism shaping people's choices and will be useful in future health promotions.

From our findings, we can formulate several recommendations. For example, some strategies should be sharpened (e.g., offering fried snacks < 3 times/wk). With regard to facilitating the implementation in practice, the unique cooperation with caterers resulted in extensive expertise and support, making the realization easier. Furthermore, the caterers' positive experiences (e.g., the fact that customers did not complain) resulted in caterers and employers being more willing to cooperate. We recommend that caterers benefit from these experiences by conducting pilot studies, for example. We also recommend having a catering manager trained to execute the strategies. Our compliance rate of 77 % of strategies executed as intended is reasonable but can be improved. A tool to monitor strategy implementation (e.g., a digital application) would also be useful. Our study shows that the way products are offered in the worksite cafeteria affects purchase behaviour. Strategies based on nudging and social marketing executed in a real-life setting are effective in encouraging healthier food purchases by employees and aim to remain effective over time.

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revised the manuscript. Trynke Hoekstra supervised the statistical analyses. All authors read and approved the final manuscript.
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## References


1. Strack, F. and R. Deutsch, *Reflective and impulsive determinants of social behavior.* Pers Soc Psychol Rev, 2004. 8(3): p. 220-47.
2. Marteau, T.M., G.J. Hollands, and P.C. Fletcher, *Changing human behavior to prevent disease: the importance of targeting automatic processes.* Science, 2012. 337(6101): p. 1492-5.
3. Sheeran, P., *Intention—Behavior Relations: A Conceptual and Empirical Review.* European Review of Social Psychology, 2002. 12(1): p. 1-36.
4. Swinburn, B., G. Egger, and F. Raza, *Dissecting obesogenic environments: the development and application* of a framework for identifying and prioritizing environmental interventions for obesity. Prev Med, 1999. 29(6 Pt 1): p. 563-70.
5. Pearson, E.S., *Goal setting as a health behavior change strategy in overweight and obese adults: a systematic literature review examining intervention components.* Patient Educ Couns, 2012. 87(1): p. 32-42.
6. Neve, M., *et al.*, *Effectiveness of web-based interventions in achieving weight loss and weight loss maintenance in overweight and obese adults: a systematic review with meta-analysis.* Obes Rev, 2010. 11(4): p. 306-21.
7. Guthrie, J., L. Mancino, and C.-T.J. Lin, *Nudging consumers toward better food choices: Policy approaches to changing food consumption behaviors.* Psychology & Marketing, 2015. .32(5): p. pp.
8. Brown, T., *et al.*, *Systematic review of long-term lifestyle interventions to prevent weight gain and morbidity in adults.* Obes Rev, 2009. 10(6): p. 627-38.
9. Hutchesson, M.J., *et al.*, *eHealth interventions for the prevention and treatment of overweight and obesity in adults: a systematic review with meta-analysis.* Obes Rev, 2015. 16(5): p. 376-92.
10. Statistics Netherlands, *Lengte en gewicht van personen, ondergewicht en overgewicht; vanaf 1981*. 2016, Statistics Netherlands, The Hague.
11. Marteau, T.M., *et al.*, *Judging nudging: can nudging improve population health?* British Medical Journal, 2011. 342.
12. Brug, J., P. Assema van, and L. Lechner, *Gezondheidsvoorlichting En Gedragsverandering*. Vol. 5th ed., 81. 2007: Assen, Van Gorcum.
13. Bucher, T., *et al.*, Nudging consumers towards healthier choices: a systematic review of positional influences on food choice. Br J Nutr, 2016. 115(12): p. 2252-63.
14. Skov, L.R., *et al.*, *Choice architecture as a means to change eating behaviour in self-service settings: a systematic review.* Obes Rev, 2013. 14(3): p. 187-96.
15. Engbers, L.H., *et al.*, *Worksite health promotion programs with environmental changes: a systematic review.* Am J Prev Med, 2005. 29(1): p. 61-70.
16. Dijksterhuis, A., *et al.*, *The unconscious consumer: Effects of environment on consumer behavior.* Journal of Consumer Psychology, 2005. 15(3): p. 193-202.
17. Kahneman, D., *Thinking fast and slow*. 2012, London: Penguin books Ltd.
18. Smedslund, G., *et al.*, *The effectiveness of workplace smoking cessation programmes: a meta-analysis of recent studies.* Tob Control, 2004. 13(2): p. 197-204.
19. Eurostat, *Duration of working life annual data*. 2017.
20. *Methodology for the evaluation of the evidence for the Dutch dietary guidelines 2015 Background document Dutch dietary guidelines 2015*. 2015, Health Council of the Netherlands: The Hague.
21. Thaler, R.H. and C.R. Sunstein, *Nudge: Improving decisions about health, wealth and happiness*. 2008: New Haven: Yale University Press.
22. Arno, A. and S. Thomas, *The efficacy of nudge theory strategies in influencing adult dietary behaviour: a systematic review and meta-analysis.* BMC Public Health, 2016. 16: p. 676.
23. Steenhuis, I., *et al.*, *The impact of educational and environmental interventions in Dutch worksite cafeterias.* Health Promot Int, 2004. 19(3): p. 335-43.
24. Rolls, B.J., *et al.*, *Increasing the portion size of a sandwich increases energy intake.* J Am Diet Assoc, 2004. 104(3): p. 367-72.
25. Andreasen, A.R., *Marketing social marketing in the social change marketplace.* Journal of Public Policy & Marketing, 2002. 21(1): p. 3-13.
26. French J, Blair-Stevens C. Social marketing national benchmark criteria. London: UK National Social Marketing Centre; 2006. 20.
27. Blumenthal-Barby JS, Burroughs H. Seeking better health care outcomes: the ethics of using the "nudge". Am J Bioethics 2012; 12:1–10.
28. Patsch AJ, Smith JH, Liebert ML, Behrens TK, Charles T. Improving healthy eating and the bottom line:

impact of a price incentive program in 2 hospital cafeterias. Am J Health Promot 2016;30:425–32.
29. Waterlander WE, de Boer MR, Schuit AJ, Seidell JC, Steenhuis IHM. Price discounts significantly enhance fruit and vegetable purchases when combined with nutrition education: a randomized controlled supermarket trial. Am J Clin Nutr 2013;97:886–95.
30. Epstein LH, Jankowiak N, Nederkoorn C, Raynor HA, French SA, Finkelstein E. Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review. Am J Clin Nutr 2012;95:789–809.
31. Block JP, Chandra A, McManus KD, Willett WC. Point-of-purchase price and education intervention to reduce consumption of sugary soft drinks. Am J Public Health 2010;100:1427–33
32. Velema, E., E.L. Vyth, and I.H. Steenhuis, *Using nudging and social marketing techniques to create healthy work*site cafeterias in the Netherlands: intervention development and study design. BMC Public Health, 2017. 17(1): p. 63.
33. *Dietary Reference Intakes: energy, proteins, fats and digestible carbohydrates*. 2001, Health Council of the Netherlands: The Hague.
34. *Guidelines food choices*. 2011, Netherlands Nutrition Centre: The Hague.
35. Thorndike, A.N., *et al.*, *Traffic-light labels and choice architecture: promoting healthy food choices.* Am J Prev Med, 2014. 46(2): p. 143-9.
36. Patsch, A.J., *et al.*, *Improving Healthy Eating and the Bottom Line: Impact of a Price Incentive Program in 2 Hospital Cafeterias.* Am J Health Promot, 2016. 30(6): p. 425-32.
37. Waterlander, W.E., *et al.*, *Price discounts significantly enhance fruit and vegetable purchases when combined with nutrition education: a randomized controlled supermarket trial.* American Journal of Clinical Nutrition, 2013. 97(4): p. 886-895.
38. Epstein, L.H., *et al.*, *Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review.* Am J Clin Nutr, 2012. 95(4): p. 789-809.
39. Block, J.P., *et al.*, *Point-of-Purchase Price and Education Intervention to Reduce Consumption of Sugary Soft Drinks.* American Journal of Public Health, 2010. 100(8): p. 1427-1433.
40. Allan J, Querstret D, Banas K, de Bruin M. Environmental interventions for altering eating behaviours of employees in the workplace: a systematic review. Obes Rev 2016; 18:214–26.
41. Thorndike AN, Riis J, Sonnenberg LM, Levy DE. Traffic-light labels and choice architecture: promoting healthy food choices. Am J Prev Med 2014;46:143–9.
42. Afshin, A., *et al.*, *The prospective impact of food pricing on improving dietary consumption: A systematic review and meta-analysis.* PLoS One, 2017. 12(3): p. e0172277.
43. Keller, C., F. Markert, and T. Bucher, *Nudging product choices: The effect of position change on snack bar choice.* Food Quality and Preference, 2015. 41: p. 41-43.
44. van Kleef, E., K. Otten, and H.C. van Trijp, *Healthy snacks at the checkout counter: a lab and field study on the impact of shelf arrangement and assortment structure on consumer choices.* BMC Public Health, 2012. 12: p. 1072.
45. Marchiori, D., *et al.*, *Promoting healthy product choices among (aware) cafeteria customers.* European Health Psychologist, 2016. 18(S): p. 820.
46. Prentice, R.L., *et al.*, *Evaluation and comparison of food records, recalls, and frequencies for energy and protein assessment by using recovery biomarkers.* Am J Epidemiol, 2011. 174(5): p. 591-603.g

Chapter 6

# Vitality of Dutch employees: a cross-sectional study

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*Submittted*

## Abstract

*Objective*

Health and well-being of employees and its association with work related outcomes have become more important as a result of an ageing workforce. Employers show interest in Workplace Health Promotion Programs (WHPPs) for increasing sustainable employability. Vitality of employees is associated with health, productivity and related costs. For the development of an effective intervention aimed at increasing vitality, obtaining insights in the vitality of employees and characteristics associated with vitality is useful.

*Design*

A cross-sectional study with Dutch employees (n = 786) was conducted using online questionnaires. Vitality as well as personal characteristics and work related behaviours like work performance and purchases in the worksite cafeteria were measured.

*Results*

Participating employees had a higher vitality compared to norm scores of the Dutch population. Significant positive associations were found between vitality and self-reported salad purchase and between vitality and subjective work performance. The employees with the lowest vitality scores ('very low' and 'low') had a higher BMI and lower subjective performance than employees with higher vitality scores.

*Conclusion*

It is possible to identify a target group of employees who could benefit the most from improving their vitality scores. In theory, such tailored interventions on vitality could have the greatest impact on sustainable employability.



**Keywords**

Vitality, sustainable employability, employees.

## Introduction

Like many European countries, the population in the Netherlands is ageing. To keep public pensions affordable, the dominant response in most OECD countries has been to attempt to extend older people's working lives through active ageing policies, starting with reforms that reduced early retirement incentives, followed by raising pension eligibility ages and the introduction of flexible retirement.[1] With regard to an ageing workforce, there are growing organizational and societal reasons to ensure 'sustainable performance at work'[2], also referred to as sustainable employability (SE).[3] Van der Klink *et al.* (2016) described SE as a multidimensional concept, including an individual's health and well-being as well as attitudinal and motivational aspects. Furthermore, SE points to the importance of employee and work characteristics, as well as the longitudinal nature of the issue.

The growing importance of improving SE has been more recently expressed with the introduction of *sustainable* Human Resource Management (HRM).[4] Traditionally, HRM is a strategic approach to maximize employee performance in the service of their employer's strategic objectives. However, *sustainable* HRM includes, for example, a long-term orientation towards employees and their care [4], that also ensures employee well-being.[5,6] The improvement of employees' mental well-being can be achieved by ensuring a good work-life balance, employee growth and development, and the prevention of work overload.[7] In addition to the psychological determinants of well-being, unhealthy lifestyle behaviours and poor health or self-perceived poor health are also important due to their association with productivity loss and sick leave.[8-16]

Besides HR managers, a range of stakeholders share an interest in workplace health promotion programmes (WHPP), such as insurance companies, occupational physicians, various government departments and labour unions.[17] WHPPs aim at improving employee lifestyle and consequently improving health and work-related outcomes.[18] In addition to psychological elements, many programmes focus on increasing physical activity [19-21] or the healthiness of the food offered at work, with the latter receiving increasing attention.[22] For employers, these WHPPs have emerged as a popular strategy to realise health and cost benefits [23, 24] and some have shown promising results in relation to factors such as work performance, sickness absence and vitality.[25]

Vitality is a construct consisting of both a physical and a psychological component and is seen as an indicator of personal health and well-being.[26, 27] One definition of vitality at work is: 'high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties'.[28] This is reflected in three sub-dimensions of energy, motivation and resilience, which together form the construct of vitality. Vitality functions as a mediator between lifestyle factors and the long-term or not directly visible effects of various lifestyle factors on health, health care and productivity-related costs.[25,29,30] Consistent with the literature, a study with a representative sample of over 4,000 Dutch adults showed that a healthy lifestyle

(reflected in physical activity, fruit and vegetable intake, BMI and smoking behaviour) is related to vitality.[31] In addition, vitality was related to healthcare costs and productivity-related costs.[31]

As a result of the positive effects of increased vitality on health, productivity and its related costs, several studies have investigated the effect of interventions that aim to increase the vitality of Dutch employees.[25,32,33] For example, as a result of a 5-months multilevel WHPP, including vitality training sessions, workshops, individual coaching, and intervision employees' vitality, work performance, sickness absence, and self-management significantly improved.[25] However, the 6-month 'Vital@work' intervention, including yoga and weekly physical workouts, did not show a significant effect on vitality, work engagement, productivity and sick leave.[32] In summary, the interventions introduced in Dutch companies have not all been effective, although they all show potential.

For the development of a tailor-made approach to increase employees' vitality, it is useful to start by determining how vital Dutch employees are and by identifying the specific characteristics of the most vital and the least vital employees. Such characteristics associated with the vitality of employees could be used for intervention development and to target a specific group, thereby enhancing effectiveness. In addition to investigating possible associations of personal characteristics, vitality could also be related to other lifestyle behaviours at work, such as the purchase of healthy or unhealthy food products in the worksite cafeteria. Excess dietary intake of products high in saturated fat, sugar and salt and overconsumption of calories in general, are an underlying cause in the development of chronic diet-related diseases including obesity, hypertension, type 2 diabetes, cardiovascular diseases and some cancers.[34]

By eating healthier, Dutch adults could lower their risk of chronic diseases.[35] One way to intervene in food choice behaviour is by making changes in the food environment at work.[22,36-41] If the purchase behaviour of vital Dutch employees in the worksite cafeteria differs from that of less vital employees, this could provide indications for the development of a targeted worksite intervention.

When searching for specific characteristics linked to vitality, also work performance, which reflects a person's productivity in a job [42], is interesting to investigate. De Jonge and Peeters (2019) emphasized the need for more insight into determinants of vitality at work and concluded that there are still many gaps, specifically in understanding the pathways linking employee vitality to sustainable work performance.[2]

In summary, gaining further insight into the vitality of Dutch employees and the characteristics of the least vital sub-group is relevant to intervention development and will contribute to reducing the research gap. Therefore, the first research question is:

1a. 'How vital are Dutch employees compared to the reference group of average Dutch adults?' This is reflected in differences in overall scores, as well as the scores on the sub-dimensions of vitality: energy, motivation to achieve goals and resilience.
1b. 'How vital are Dutch employees compared to the reference group of average Dutch adults on the sub-dimensions of vitality?'

The second research question concerns associations between vitality and personal characteristics:

2a. 'What is the association between vitality and age, sex, body mass index (BMI) and educational level?'
2b. 'What is the association between sub-dimensions of vitality and age, sex, body mass index (BMI) and educational level?'

And the third research question is about associations between vitality and work related behaviours of Dutch employees.

3a. 'What are the associations between vitality and self-perceived work performance and purchase behaviour at the worksite cafeteria of Dutch employees?' and
3b. 'What are the associations between the sub-dimensions of vitality and self-perceived work performance and purchase behaviour at the worksite cafeteria of Dutch employees?'

## Methods

### Study population and recruitment

Thirty Dutch companies were approached and asked to take part in this cross-sectional study. The companies were already participating in an RCT that was studying the effect of an intervention in worksite cafeterias. Details of the recruitment of the 30 companies are described in Velema *et al.* (2018).[43] A questionnaire was used as a baseline measurement in that study, but it was not analysed or reported on separately. The questionnaire was handed out to employees in March 2016, four weeks prior to the intervention. Employees were not aware of the planned intervention in the worksite cafeteria. Of the 30 companies, 20 agreed to invite their employees to complete an online questionnaire by means of placing a link on their intranet, or an invitation in a newsletter or email. The reasons for not handing out the questionnaire differed. Four companies took too long to respond to the researchers; for the other six, the reasons were: the employees were not adequately educated to fully understand the questionnaire; employees receive too many questionnaires; the protocol on approaching employees did not allow it; or no reason was given. The 20 participating companies differed in size (120-1800 employees), type of business (blue collar, white collar) and geographical location in the Netherlands (11 in metropolitan regions/largest Dutch cities and 9 in non-urban areas of medium-sized or small municipalities). Of all the companies, 15 consisted of all white-collar workers and 5 consisted of both white and blue-collar workers. The questionnaire was introduced to employees as a survey to determine their level of satisfaction with several

facilities at work, including the worksite cafeteria. Filling in the questionnaire was anonymous. Since links to the questionnaire were distributed in many different ways, we were not able to calculate a response rate. The number of respondents per company ranged from 6 to 131. The total number of questionnaires completed was 786.

*Inclusion and exclusion*
Inclusion criteria for participants were determined in the context of the intervention in the worksite cafeteria and were, therefore, not all relevant to this study. The criteria were:
1. having a lunch break during the working day at least once a week;
2. having ever been to the worksite cafeteria for lunch;
3. being older than 18;
4. agreeing on and signing the informed consent.

## Questionnaire

Table 1 presents the elements of the questionnaire and the range of answers. Vitality was measured with the Vita-16, a valid and reliable measure. The Vita-16 consists of 16 questions divided over the three sub-dimensions of energy, motivation and resilience, and it contains norm scores for general vitality and for the three sub-dimensions for the Dutch adult population.[32,44] The questions describe situations or statements like 'I'm bursting with energy' or 'I can deal with setbacks'. Answer categories in a Likert scale (1 to 7) were *'almost never', 'sometimes', 'now and then', 'regularly', 'usually', 'almost always'* and *'always'*. Separate scores were calculated for the three sub-dimensions and the overall score was calculated according to the instructions for the weighting of the sub-dimension scores. Scores could be classified into five categories, ranging from *'very low', low', 'average', 'high'* to *'very high'*, using the cut-off values. Several demographic questions (i.e. on age, sex, height and body weight, activity level at work, education) were asked. BMI was calculated based on self-reported height and weight. Self-assessed work performance was derived from the World Health Organization's Health and Work Performance Questionnaire (WHO-HPQ) and translated into Dutch.[8,42] The question, 'On a scale of 1 to 10, where 1 is the worst performance anyone could have at your job and 10 is the performance of a top worker, how would you rate your overall performance over the last 28 days?', was given a separate score and was compared to how the respondent would rate the average performance of someone with this job.
The frequency of choosing sandwiches, salads, deep fried snacks, puff pastry snacks and candy sales per week was obtained. These products were chosen for being either relatively unhealthy (deep fried snacks, puff pastry snacks and candy), or being relatively healthy (salads, water) and/or representing the general options available and the large share in sales in Dutch worksite cafeterias (sandwiches).

**Table 1 topics of the questionnaire.**

| Subject | Sub-subject | Measures (range) |
|---|---|---|
| **Vitality** | | |
| Vitality (Vita-16) | Overall vitality | 1-7* (16 items) |
| | Dimension Energy | 1-7* (5 items) |
| | Dimension Motivation | 1-7* (6 items) |
| | Dimension Resilience | 1-7* (5 items) |
| **Personal characteristics** | | |
| Age | | Years |
| Sex | | M/F |
| BMI | | $kg/m^2$ |
| Educational level | | Primary school or basic vocational education (low educational level)<br>Secondary vocational education or high school degree (medium educational level)<br>Higher vocational education or university degree (high educational level) |
| **(Self-perceived) Behavioural characteristics work related** | | |
| Subjective Work Performance | | 0-10 |
| Subjective Work Performance of average person with this job | | 0-10 |
| Type of work (physically active) | | Seated, standing and walking, walking and lifting |
| **Behavioural characteristics lunch related** | | |
| Food choice frequency | Sandwiches, salads, deep fried snacks, puff pastry snacks and candy, free water | 0 t/m 5 x per week |

*) 1 = almost never, 2 = sometimes, 3 = now and then, 4 = regularly, 5 = usually, 6 = almost always, 7 = always.

## Statistical analysis

*1a & 1b Vitality compared to norm*

To answer the first research question regarding the vitality of the participants, we used a one sample t-test to compare their mean vitality with the norm score derived from over 8000 Dutch adults. We also conducted three, one-sample t-tests to compare the vitality sub-dimensions *energy, motivation* and *resilience* with their norm scores.

*2a & 2b Vitality and personal characteristics*

To address the second research question, we looked for possible associations between vitality and several characteristics namely, age, sex, BMI and educational level. We conducted independent sample t-tests for the association between vitality and gender. We used multiple linear regression analyses with vitality as the outcome and age, sex

and BMI as the independent variables. For age and BMI, the increase in vitality was calculated per unit increase in the predictive variable after adjustment for all other variables. We conducted an ANCOVA to look for differences in vitality scores between the educational levels, adjusted for age, sex and BMI. Subsequently, we conducted all of these analyses for the three sub-dimensions of vitality separately. Finally, we also analysed differences between employees with a low and a high vitality score. Therefore we combined the two lowest categories 'very low' and 'low' for the overall vitality score and for each dimension separately. We performed a Chi-square for sex and educational level (low versus middle and high), and an independent sample t-test for age and BMI.

*3a & 3b Vitality and behavioural characteristics*

To address the third research question, in relation to the variable of self-reported food choice, we chose to use weekly purchases of salads and deep fried snacks to represent relatively healthy (salads) and relatively unhealthy food choice (deep fried snacks). Because of the skewed distribution, we made self-reported snack purchase and salad purchase binary: respondents buying a snack once a week or more were considered snack buyers, while those who bought a snack less than once a week or never were considered non-snack buyers. A binary variable was also made for self-reported salad purchase: salad buyer (1) versus never salad buyer (0). We conducted independent sample t-tests to determine the association between vitality and deep fried snack purchase and with vitality and salad purchase. We used a linear regression analysis to determine the association between vitality and subjective work performance, adjusted for sex, age, BMI and educational level. We also performed these analyses for all sub-dimensions of vitality. Finally, we conducted analyses to study possible differences in work performance and self-reported food choice between employees with a low and a high vitality. We performed a Chi-square for analyzing associations between vitality and deep fried snack and salad purchase and an independent sample t-test for subjective work performance.

Data from the questionnaire were downloaded separately from the online survey program for all companies and were merged in SPSS. A variable for company number and name was added. Statistical analyses were performed using the SPSS 25.0 statistical package and a significance level of 0.05.



## Results

Table 2 presents the demographics and mean scores of the participating Dutch employees. Of the participants (N = 786), 46.8% were female. The mean age was 44.6 years (SD = 10.53), 61.4% had a high educational level, and 12.1% a lower educational level. Mean BMI was 25.25 kg/m$^2$ (SD = 3.71, range 17.63–46.71). Of all the participants, 37.0% were overweight (25.00≤ BMI < 30.00) and 10.4% had obesity (BMI≥30.00). Most work was done seated (92.5%) and subjective work performance was 7.90 (SD = .92).

**Table 2. Personal characteristics and behavioural aspects of participating Dutch employees having lunch at work.**

| Vitality and dimensions (N = 786) | | % | Mean (SD) | Range (min-max) |
|---|---|---|---|---|
| Vita-16 weighted | | | 4.87 (0.88) | 1.75-7.00 (norm mean (SD) = 4.42 (1.07)) |
| | Very low | 0.9 | | |
| | Low | 9.1 | | |
| | Medium | 50.0 | | |
| | High | 32.5 | | |
| | Very High | 7.5 | | |

| Personal characteristics (N = 786) | | % | Mean (SD) | Range (min-max) |
|---|---|---|---|---|
| Age | | | 44.61 (10.53) | 20-66 |
| Sex | Male | 53.2 | | |
| BMI | | | 25.25 (3.71) | 17.63-46.71 |
| Educational level (*N = 778, missing 8)* | | | | |
| | Low | 12.1 | | |
| | Medium | 26.5 | | |
| | High | 61.4 | | |

| Behavioural characteristics work related (N = 786) | % | Mean (SD) | Range (min-max) |
|---|---|---|---|
| Subjective Work Performance | | 7.90 (.99) | 2-10 |
| Subjective Work Performance of general employee in this job | | 7.47 (.97) | 0-10 |
| Type of work (physically active) | | | |
| Seated | 92.5 | | |
| Standing and walking | 6.2 | | |
| Walking and lifting | 1.3 | | |

| Behavioural characteristics lunch related | % | Mean (SD) | Range (min-max) |
|---|---|---|---|
| Deep fried snacks purchase frequency *(N = 662, missing 124)* | | | |
| < 1x wk or never (non-snack buyer) | 68.6 | | |
| ≥1x wk (snack-buyer) | 31.4 | | |
| Salad purchase frequency *(N = 662, missing = 124)* | | | |
| < 1x wk or never (non-salad buyer) | 60.3 | | |
| ≥1x wk (salad-buyer) | 39.7 | | |

*1a & 1b Vitality compared to norm*

Figure 1 presents all four mean vitality scores (overall and the three sub-dimensions). All mean vitality scores of our cohort were significantly higher than the norm scores of the Dutch population in general.

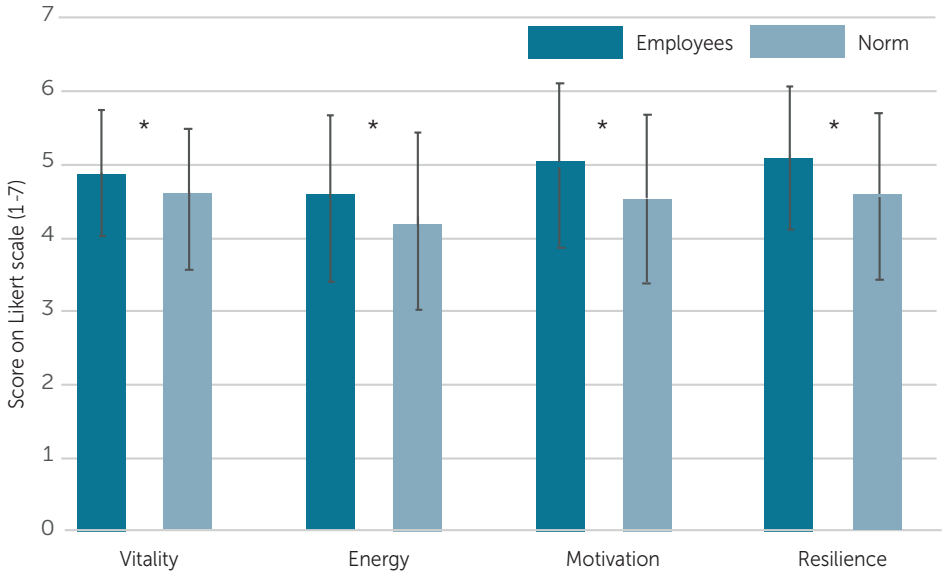



**Figure 1. Scores on vitality and sub-dimensions of Dutch employees (N = 786) and norm scores from Dutch adults (N = 8015). Error bars represent Standard Deviation. Asterisks indicate significant differences between mean score of employees versus the norm score, $p < .05$.**



*2a & 2b Vitality and personal characteristics*

The analyses for associations between vitality and personal characteristics: sex, age, BMI and educational level only showed a significant negative association between vitality and BMI (corrected for sex, age and educational level); for every extra point increase in BMI, vitality decreased with .028 points. $F$ (6,775) = 2.42, $p$ = .025. However, BMI accounted for 1.8% of variance in vitality scores.

For the sub-dimension of *energy* we found significant associations with sex and BMI. Men scored higher on energy compared to women: M = 4.67 (SD = 1.08) versus M = 4.49 (SD = 1.15); t (784) = -2.32, $p$ = .021. Moreover, the linear regression revealed that for every extra point in BMI, energy decreased by 0.34. F (6,765) = 2.83, $p$ = .01. BMI accounted for 2.1% of explained variance in sub-dimension energy scores.

For the sub-dimension of *motivation*, we found significant associations with sex, age, BMI and educational level. Women scored higher on motivation: M = 5.18 (SD = 1.02) for woman and M = 4.94 (SD = 1.06) for men; t (784) = 3.34, $p$ = .001. Age and BMI were significantly negatively associated with motivation, the explained variance was respectively

5.3% and 5.9% (corrected for sex and educational level). Finally, high educated participants had a higher motivation compared to middle and lower educated participants. M = 4.90 (SD = 1.10) for low and middle educated versus M = 5.16 (SD = 1.00) for high educated: t (589.17) = -3.33, *p* = .001.
For the sub-dimension *resilience,* significant associations were found for sex, with men being more resilient: M = 5.18 (SD = .93) for men versus M = 4.98 (SD = 1.01) for women; t (784) = -2.84, *p* = .005.

*3a & 3b Vitality and behavioural aspects*
Regarding associations between vitality and behavioural aspects, the mean overall vitality was significantly higher for salad buyers (M = 5.04, DS = .86) than for non-salad buyers (M = 4.80, SD = .89); t (660) = -3.36, *p* = .001. The regression analyses for vitality and subjective work performance showed a significant association with vitality (adjusted for age, sex, BMI and educational level). For every point extra in work performance, vitality increased by .37 or the other way around, for every extra point in vitality, the work performance increased with .41: *F* (7,774) = 22.25, *p* = .000. Vitality accounted for 15.6% of variance in performance scores.
For the sub-dimension of *energy*, we found significant associations with salad purchase and subjective work performance. Salad buyers scored higher on energy than non-salad buyers: M = 4.75 (SD = 1.10) versus M = 4.52 (SD = 1.12); t (660) = -2.71, *p* = .007. Moreover, the linear regression (adjusted for age, sex, BMI and educational level) revealed that for every extra point on work performance, the energy score increased by 0.45, F (7,774) = 21.32, *p* = .000. 16.2% of the variance in energy was explained by work performance.
For the dimension *motivation* we found significant associations with salad purchase and work performance. Salad buyers score higher on motivation than non-salad buyers, M = 5.25 (SD = 1.01) M = 4.98 (SD = 1.07); t (660) = -3.08, *p* = .002. The regression with work performance (adjusted for age, sex, BMI and educational level) was F (7, 774) = 16.69, *p* = .000. For every point extra on work performance the motivation increased with .31. 13.1% of variance in motivation was explained by work performance.
For the sub-dimension of *resilience,* significant associations were found for salad purchase and work performance. Salad buyers were more resilient with M = 5.22 (SD = .95) for salad buyers versus M = 5.04 (SD = .98) for non-salad buyers, t (660) = -2.69, *p* = .000. Work performance was positively associated with resilience; for every point extra on performance, the resilience increased by 0.32. F (7,774) = 13.04, *p* = .000, (adjusted for age, sex, BMI and educational level). 10.8% of the variance in resilience was explained by work performance.

*Low vitality group and associated characteristics*

To focus on the subgroups low in vitality we separated the participants into two groups: those with 'very low' and 'low' vitality scores (10.0%) and those with 'middle', 'high' and 'very high' vitality scores (90.0%). The lower vitality group had a significantly higher BMI compared to the higher vitality group; BMI (M = 26.72, SD = 5.03) for the lower vitality group versus (M = 25.09, SD = 3.51) for the higher vitality group; t (86) = -2.62, $p$ = .011. Furthermore, people with a low vitality gave themselves a significantly lower work performance score: M = 7.17 (SD = 1.25) versus M = 7.98 (SD = 1.93); t (74.75) = -5.55 $p$ = .000. This was adjusted for age, sex, BMI and educational level. No significant differences were found between low and high vitality group in age, sex, or educational level.

## Discussion

We undertook this study to gain insight into the vitality of Dutch employees and the associated characteristics because of its relevance to intervention development and as a further contribution to reducing the research gap.

Overall, the vitality and sub-dimension scores of our participants were higher than the norm scores. We found some significant associations between vitality and characteristics which would be useful for intervention development or in targeting specific sub-groups; namely, employees with a higher vitality bought more salads and reported higher subjective performance and had a lower BMI, although the explained variance was very small. The employees with the lowest vitality scores ('very low' and 'low') had a higher BMI and lower subjective performance than employees with higher vitality scores.

### Vitality compared to the norm

The analysis undertaken to address the first question showed that our participants had significantly higher vitality compared to the norm score. In addition, they also scored significantly higher on all three sub-dimensions of energy, motivation and resilience. One explanation for this could be that our sample was not completely representative for the average Dutch adult population which was used for the norm scores. The first element in this is the fact that our participants actually all had paid work which could be an explanation for the higher vitality score compared to the norm of average Dutch adults, some of whom were not employed. To illustrate, both unemployment and the impact of job insecurity have found to pose a comparable threat to health.[45,46] For example, a study to the possible effects of job insecurity and unemployment on the risk for the onset of depressive symptoms showed that both perceived job insecurity and unemployment constitute significant risks of increased depressive symptoms.[47] During the measures, the Netherlands had 8.3 million working adults versus 4.4 million unemployed, with 14% of that group being unemployed unintentionally.[48] In our sample 100% of adults was employed. Probably the higher level of employment can partly

explain the higher vitality in our sample. However, we do not know the percentage of job insecure employees (anticipating joblessness while having work) in our sample as compared to the average level in Dutch adults.
A second explanation could be found in the higher educational level in our sample compared to Dutch adults in general.[49] In the Netherlands, the percentage of highly educated adults is about 30%, whereas, the percentage in our sample was 61.4%. We did not find significant differences of vitality between higher and lower educated participants and did not find studies that explicitly investigated the associations between vitality and educational level. However, since vitality is a reflection of one's health and well-being, more research is needed to entangle possible mechanisms. Unhealthy lifestyle behaviours and poor (self-perceived) health are more prevalent among lower educated individuals than among higher educated persons.[50-52] In addition, workers with a low education or working in lower occupational social classes have a higher risk of disability retirement and sick leave.[53-55] Robroek *et al.* (2013) concluded that both work-related and lifestyle-related factors, such as physical activity, fruit and vegetable intake and BMI do play a role in the mechanisms through which socioeconomic position affects sick leave.[56] While we do not know if our participants were more physically fit than average in the Netherlands, it has been shown that higher educated people are more physically active than lower educated groups.[57]

### Vitality and behavioural characteristics

We found that salad buyers had a higher score on vitality. When looking at vitality as a construct that correlates with healthy lifestyle the link with healthy food choices does not seem surprising. Because our study used a cross-sectional design, we cannot, however suggest a causal pathway. Perhaps vital employees eat more salad because it suits their lifestyle. Or employees become vital as a result of eating salads. Vitality is a construct composed of energy, motivation and resilience.[44] While these elements are not directly related to eating behaviour, a study by Wang *et al.* (2013) in overweight and obese participants (mean BMI 34.01) showed a significant negative association between barriers to healthy eating and vitality (measured as a domain of the SF-36 v2) and a positive association between cholesterol-lowering diet self-efficacy and vitality.[58] This demonstrates that for people with overweight, there is an association between vitality and factors linked to eating healthily (e.g. eating salads). We found a significant negative association between vitality and BMI, but the percentage of variance in vitality explained by BMI was very small. However, Wimmelman *et al.* (2018) found a significant negative association between vitality and weight change for adults gaining weight, but not for adults maintaining or losing weight.[59] Furthermore, in the low vitality group we found a higher BMI. This is in line with literature.[31] We were however not able to detect any causal pathway. It is possible that employees with low vitality are not very physically active, which results in a higher BMI, or that having a high BMI makes a person feel less

vital. Further research is needed to disentangle the mechanism between vitality and weight related aspects.
Subjective work performance was significantly positively associated with vitality, with 15.6% of variance in self-reported performance scores explained by vitality. When looking at the construct of vitality, defined as 'high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties', it seems logical that an individual with high vitality classifies their performance as better compared to those who are less vital. Although there is little research in the association between vitality and work performance [2] our findings can be fitted with the one study of Hendriksen *et al.* showing effect of a WHPP in both vitality as work performance.[25] Moreover, our results showed that the lower self-perceived work performance was related to a low vitality and was still significant when corrected for sex, age, BMI and educational level. This supports the investment of employers in their employees by means of offering WHPP targeting vitality.

### Strengths & limitations

A few strengths and limitations of the present study should be mentioned. The first limitation concerns the representativeness of the respondents. When recruiting respondents, the share of companies with low educated employees was relatively small and some of those companies did not distribute the questionnaire to their employees because they believed it was too difficult. The mean educational level in our sample is therefore higher compared to Dutch adults in general.[49] In the Netherlands self-perceived health is lower and overweight rates are higher among lower educated groups.[51,60,61] Future research should thus be executed in a representative group. The second limitation concerns the possibility of recall bias, as we asked about food purchases over the previous month. When recalling diet, unhealthy food is overlooked relatively more often compared to healthy foods.[62] This could have distorted the results, if occurred in our sample. Despite these limitations, one strength of the present study is that we had a fairly large sample, with a broad representation of the behaviour of Dutch employees and normally distributed over the age groups of the working population.
A second strength is that we measured the construct of vitality by using a valid and reliable instrument, the Vita-16. The Vita-16 is a relatively new measuring instrument, but explicitly validated for Dutch adults.[44]



### Implications for future research

This study found that within the target group of Dutch employees associations exist between vitality and food choice in the worksite cafeteria and some other specific characteristics. Employees with higher vitality bought more salads, reported higher self-perceived work performance and had a lower BMI. The employees with the lowest vitality scores ('very low' and 'low') showed no differences in sex, age and educational level, but

had a higher BMI and reported lower self-perceived work performance compared to employees with higher vitality scores. This underlines the importance of WHPP aimed at increasing vitality. The identification of a specific target group when developing such intervention, could make the intervention more effective. This study shows that regarding age, sex and educational level a broad group should be targeted. However, in addition to targeting a broad group, given the vulnerable groups, employers could provide WHPPs with extra focus on weight management. This should however be offered to everyone to prevent stigma. Increasing vitality could be attempted by interventions targeting mental and physical components, but an intervention could also focus on increasing healthy food intake, for example, by using environmental strategies in the worksite cafeteria. Overall, insights that further identify the characteristics of the target group are needed to develop the most effective interventions. Thus, in addition to targeting a specific group, we recommend for future research that the effectiveness of a combination of environmental as well as personal elements should be studied. This is in agreement with a report by the Dutch Health Council, advising the Dutch Government to focus on worksite health promotion interventions. The Dutch Health Council also recommended improvement of its implementation and emphasized that this requires a tailored approach, since there is a large diversity in health among older workers, and particularly between lower and higher educated people.[63] In addition, our study does not show these differences in age and educational level for vitality.

In summary, future research should focus on identifying vulnerable groups low in vitality and associated characteristics, to support them by means of tailored interventions. Both environmental as well as personal approaches should be studied.

## Conclusions

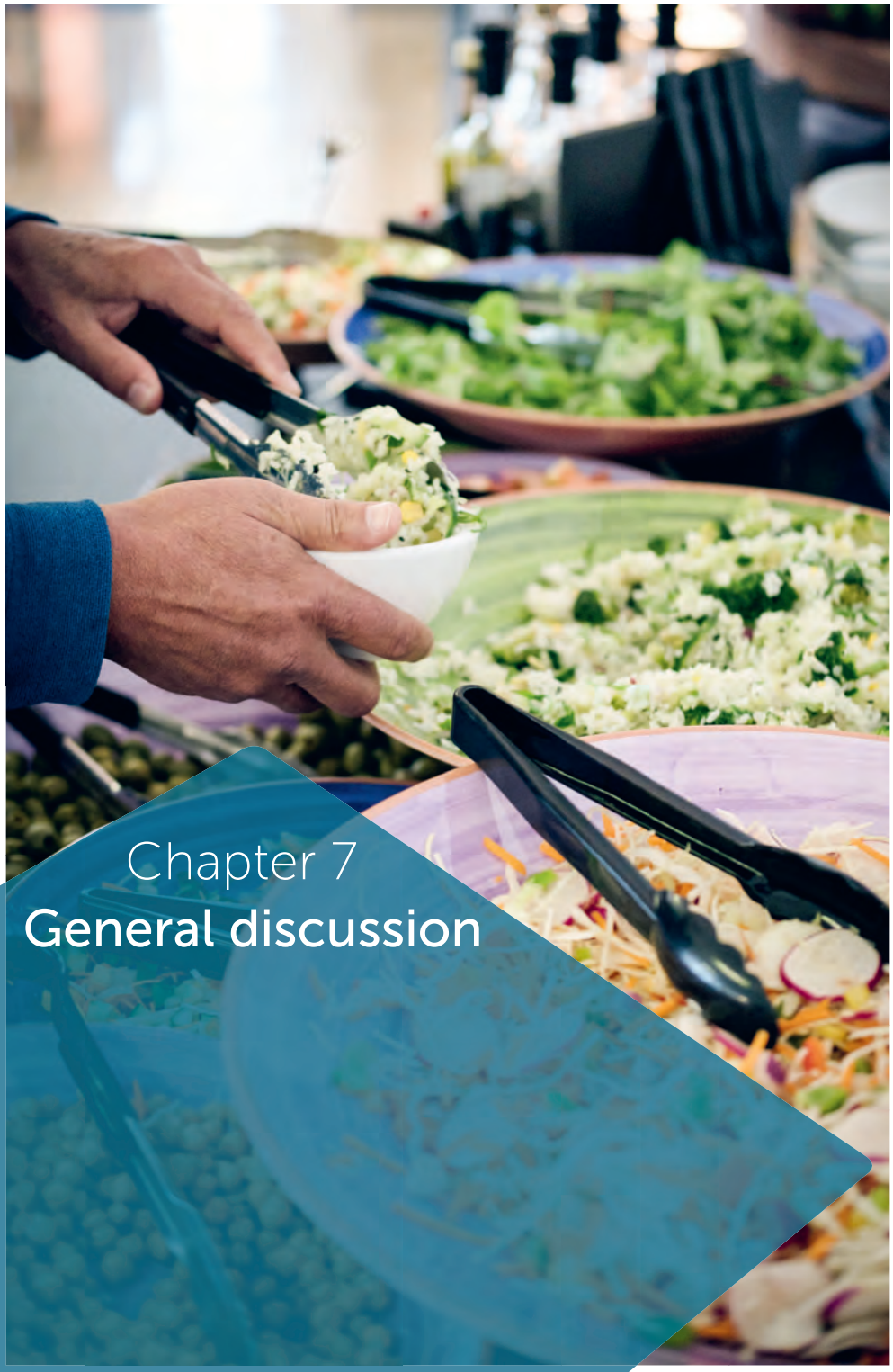
This study found that the vitality of the investigated sample of Dutch employees was relatively high. Nevertheless, we revealed some interesting associations between vitality and specific individual characteristics. Employees with higher vitality bought more salads, reported higher self-perceived work performance and had lower BMI. The employees with the lowest vitality scores ('very low' and 'low') had higher BMI and reported lower self-perceived work performance, but no significant differences for sex, age or education were seen. As a result of the cross-sectional design, we cannot draw any conclusions about causal relationships. We emphasize however, that identifying a target group of employees who could benefit the most from improving their vitality scores is possible and important. However, this must be done very carefully to prevent stigma. In theory, such tailored interventions aimed at increasing vitality could also have the greatest impact on sustainable employability.

## References


1. OECD, *Pensions at a Glance 2017*. 2017.
2. de Jonge, J. and M.C.W. Peeters, *The Vital Worker: Towards Sustainable Performance at Work.* Int J Environ Res Public Health, 2019. 16(6).
3. van der Klink, J.J., *et al.*, *Sustainable employability--definition, conceptualization, and implications: A perspective based on the capability approach.* Scand J Work Environ Health, 2016. 42(1): p. 71-9.
4. Stankevičiūtė, Ž. and A. Savanevičienė, *Designing Sustainable HRM: The Core Characteristics of Emerging Field.* Sustainability, 2018. 10(12): p. 4798.
5. Kowalski, T.H.P. and W. Loretto, *Well-being and HRM in the changing workplace. Introduction.* International Journal of Human Resource Management, 2017. 28(16): p. 2229-2255.
6. Litchfield, P., *et al.*, *Work and Wellbeing in the 21st Century.* International Journal of Environmental Research and Public Health, 2016. 13(11): p. 1065.
7. Day, A. and K. Nielsen, *What Does Our Organization Do 16 to Help Our Well-Being? Creating Healthy Workplaces and Workers.* An introduction to work and organizational psychology: An international perspective, 2017: p. 295.
8. Bernaards, C.M., K.I. Proper, and V.H. Hildebrandt, *Physical activity, cardiorespiratory fitness, and body mass index in relationship to work productivity and sickness absence in computer workers with preexisting neck and upper limb symptoms.* J Occup Environ Med, 2007. 49(6): p. 633-40.
9. Neovius, K., *et al.*, *Obesity status and sick leave: a systematic review.* Obes Rev, 2009. 10(1): p. 17-27.
10. van Duijvenbode, D.C., *et al.*, *The relationship between overweight and obesity, and sick leave: a systematic review.* Int J Obes (Lond), 2009. 33(8): p. 807-16.
11. Gates, D.M., *et al.*, *Obesity and presenteeism: the impact of body mass index on workplace productivity.* J Occup Environ Med, 2008. 50(1): p. 39-45.
12. Laaksonen, M., *et al.*, *Health-related behaviours and sickness absence from work.* Occup Environ Med, 2009. 66(12): p. 840-7.
13. Pronk, N.P., *et al.*, *The association between work performance and physical activity, cardiorespiratory fitness, and obesity.* J Occup Environ Med, 2004. 46(1): p. 19-25.
14. Robroek, S.J., *et al.*, *The role of obesity and lifestyle behaviours in a productive workforce.* Occup Environ Med, 2011. 68(2): p. 134-9.
15. Schultz, A.B. and D.W. Edington, *Employee health and presenteeism: a systematic review.* J Occup Rehabil, 2007. 17(3): p. 547-79.
16. Berg, J.M., J.E. Dutton, and A. Wrzesniewski, *What is job crafting and why does it matter.* Retrieved form the website of Positive Organizational Scholarship on April, 2008. 15: p. 2011.
17. van Berkel, J., *et al.*, *Ethical considerations of worksite health promotion: an exploration of stakeholders' views.* BMC Public Health, 2014. 14: p. 458.
18. Rongen, A., *et al.*, *Workplace Health Promotion A Meta-Analysis of Effectiveness.* American Journal of Preventive Medicine, 2013. 44(4): p. 406-415.
19. Malik, S.H., H. Blake, and L.S. Suggs, *A systematic review of workplace health promotion interventions for increasing physical activity.* Br J Health Psychol, 2014. 19(1): p. 149-80.
20. Pereira, M.J., *et al.*, *The impact of onsite workplace health-enhancing physical activity interventions on worker productivity: a systematic review.* Occup Environ Med, 2015. 72(6): p. 401-12.
21. Commissaris, D.A., *et al.*, *Interventions to reduce sedentary behavior and increase physical activity during productive work: a systematic review.* Scand J Work Environ Health, 2016. 42(3): p. 181-91.
22. Allan, J., *et al.*, *Environmental interventions for altering eating behaviours of employees in the workplace: a systematic review.* Obes Rev, 2017. 18(2): p. 214-226.
23. Holmqvist, M., *Corporate social responsibility as corporate social control: The case of work-site health promotion.* Scandinavian Journal of Management, 2009. 25(1): p. 68-72.
24. WHO/WEF, *The Workplace Wellness Alliance - Making the Right Investment: Employee Health and the Power of Metrics*. 2013, World Economic Forum.
25. Hendriksen, I.J.M., *et al.*, *Effectiveness of a Multilevel Workplace Health Promotion Program on Vitality, Health, and Work-Related Outcomes.* Journal of Occupational and Environmental Medicine, 2016. 58(6): p. 575-583.
26. Ryan, R.M. and C. Frederick, *On energy, personality, and health: subjective vitality as a dynamic reflection of well-being.* J Pers, 1997. 65(3): p. 529-65.
27. Strijk, J.E., *et al.*, *The Vital@Work Study. The systematic development of a lifestyle intervention to improve older workers' vitality and the design of a randomised controlled trial evaluating this intervention.* BMC

Public Health, 2009. 9: p. 408.
28. van Scheppingen, A.R., *et al.*, *Vitality at work and its associations with lifestyle, self-determination, organizational culture, and with employees' performance and sustainable employability.* Work, 2015. 52(1): p. 45-55.
29. Goldgruber, J., D. Ahrens, and B.J. Guntert, *Organizations and their readiness for workplace health promotion.* European Journal of Public Health, 2010. 20: p. 265-265.
30. Oakman, J., *et al.*, *Workplace interventions to improve work ability: A systematic review and meta-analysis of their effectiveness.* Scand J Work Environ Health, 2018. 44(2): p. 134-146.
31. Hartman, L., *et al.*, *The Role of Vitality in the Relationship Between a Healthy Lifestyle and Societal Costs of Health Care and Lost Productivity: A Mediation Analysis.* Am J Health Promot, 2016. 30(6): p. 465-74.
32. Strijk, J.E., *et al.*, *Effectiveness of a worksite lifestyle intervention on vitality, work engagement, productivity, and sick leave: results of a randomized controlled trial.* Scand J Work Environ Health, 2013. 39(1): p. 66-75.
33. Coffeng, J.K., *et al.*, *Effectiveness of a combined social and physical environmental intervention on presenteeism, absenteeism, work performance, and work engagement in office employees.* J Occup Environ Med, 2014. 56(3): p. 258-65.
34. (WHO), W.H.O., *Global Action Plan for the Prevention and Control of NCDs 2013-2020*. 2013.
35. Geurts, M., *et al.*, *Food consumption in the Netherlands and its determinants : Background report to 'What is on our plate? Safe, healthy and sustainable diets in the Netherlands.'*, in *Voedselconsumptie in Nederland en de determinanten hiervan : Achtergrondrapport bij 'Wat ligt er op ons bord? Veilig, gezond en duurzaam eten in Nederland.'*. 2017, Rijksinstituut voor Volksgezondheid en Milieu RIVM.
36. Engbers, L.H., *et al.*, *The effects of a controlled worksite environmental intervention on determinants of dietary behavior and self-reported fruit, vegetable and fat intake.* BMC Public Health, 2006. 6: p. 253.
37. Bucher, T., *et al.*, *Nudging consumers towards healthier choices: a systematic review of positional influences on food choice.* Br J Nutr, 2016. 115(12): p. 2252-63.
38. Hendren, S. and J. Logomarsino, *Impact of worksite cafeteria interventions on fruit and vegetable consumption in adults A systematic review.* International Journal of Workplace Health Management, 2017. **10**(2): p. 134-152.
39. Chen, H.J., *et al.*, *The application of traffic-light food labelling in a worksite canteen intervention in Taiwan.* Public Health, 2017. 150: p. 17-25.
40. Thorndike, A.N., J. Riis, and D.E. Levy, *Social norms and financial incentives to promote employees' healthy food choices: A randomized controlled trial.* Preventive Medicine, 2016. 86: p. 12-18.
41. Fitzgerald, S., *et al.*, *A cost-analysis of complex workplace nutrition education and environmental dietary modification interventions.* BMC Public Health, 2017. 17(1): p. 49.
42. Kessler, R.C., *et al.*, *The world health organization health and work performance questionnaire (HPQ).* Journal of Occupational and Environmental Medicine, 2003. 45(2): p. 156-174.
43. Velema, E., *et al.*, *Nudging and social marketing techniques encourage employees to make healthier food choices: a randomized controlled trial in 30 worksite cafeterias in The Netherlands.* Am J Clin Nutr, 2018.
44. Strijk, J.E., *et al.*, *Wat is vitaliteit en hoe is het te meten? [What is vitality and how can it be measured? The core dimensions of vitality and the Dutch Vitality Questionnaire* 2015.
45. Kim, T.J. and O. von dem Knesebeck, *Is an insecure job better for health than having no job at all? A systematic review of studies investigating the health-related risks of both job insecurity and unemployment.* BMC Public Health, 2015. 15: p. 985.
46. De Witte, H., J. Pienaar, and N. De Cuyper, *Review of 30 years of longitudinal studies on the association between job insecurity and health and well-being: is there causal evidence?* Australian Psychologist, 2016. 51(1): p. 18-31.
47. Kim, T.J. and O. von dem Knesebeck, *Perceived job insecurity, unemployment and depressive symptoms: a systematic review and meta-analysis of prospective observational studies.* Int Arch Occup Environ Health, 2016. 89(4): p. 561-73.
48. Statistics Netherlands, *Employed labor force and unemployment*. 2018, Statistics Netherlands, The Hague.
49. Centraal Bureau voor de Statistiek, *Inhabitants; educational level; sex, age and migration background*. 2018.
50. Hu, Y., *et al.*, *Trends in socioeconomic inequalities in self-assessed health in 17 European countries between 1990 and 2010.* J Epidemiol Community Health, 2016. 70(7): p. 644-52.
51. Statistics Netherlands, *Perceived health by education*. 2017, Statistics Netherlands, The Hague.
52. Mackenbach, J.P., *et al.*, *Socioeconomic inequalities in health in 22 European countries.* N Engl J Med, 2008.

358(23): p. 2468-81.
53. Beemsterboer, W., *et al.*, *A literature review on sick leave determinants (1984-2004).* Int J Occup Med Environ Health, 2009. 22(2): p. 169-79.
54. Duijts, S.F., *et al.*, *A meta-analysis of observational studies identifies predictors of sickness absence.* J Clin Epidemiol, 2007. 60(11): p. 1105-15.
55. Leinonen, T., *et al.*, *Occupational social class and disability retirement among municipal employees--the contribution of health behaviors and working conditions.* Scand J Work Environ Health, 2011. 37(6): p. 464-72.
56. Robroek, S.J., F.J. van Lenthe, and A. Burdorf, *The role of lifestyle, health, and work in educational inequalities in sick leave and productivity loss at work.* Int Arch Occup Environ Health, 2013. 86(6): p. 619-27.
57. Statistics Netherlands and N.l.f.P.H.a.t. Environment, *Meeting the physical activity norms*, 2017, Statistics Netherlands, The Hague.
58. Wang, J., *et al.*, *Factors associated with health-related quality of life among overweight or obese adults.* J Clin Nurs, 2013. 22(15-16): p. 2172-82.
59. Wimmelmann, C.L., *et al.*, *Prospective Associations of the Short Form Health Survey Vitality Scale and Changes in Body Mass Index and Obesity Status.* J Obes, 2018. 2018: p. 3671953.
60. Statistics Netherlands, *Self-perceived health*. 2018, Statistics Netherlands, The Hague.
61. Statistics Netherlands, *Health Monitor Adults and Elderly*, 2018, Statistics Netherlands, The Hague.
62. Prentice, R.L., *et al.*, *Evaluation and comparison of food records, recalls, and frequencies for energy and protein assessment by using recovery biomarkers.* Am J Epidemiol, 2011. 174(5): p. 591-603.
63. van der Mark-Reeuwijk, K.G., *et al.*, *Health and prolonging working lives: an advisory report of the Health Council of The Netherlands.* Scand J Work Environ Health, 2019.



# Chapter 7
# General discussion

## Outline

The purpose of this thesis was to develop and evaluate the effectiveness of the intervention *The healthy worksite cafeteria.* The aim of *The healthy worksite cafeteria* is to encourage Dutch employees to purchase healthier lunch items as an effect of nudging and social marketing strategies. For the intervention development, we started with conducting two qualitative studies described in chapter 2 and 3. Chapter 2 issued the target population, namely Dutch employees and their food choice behaviour in general and at work. In chapter 3, the key stakeholders associated with the implementation of a worksite cafeteria intervention were consulted. Subsequently we developed *The healthy worksite cafeteria* intervention and determined the study design presented in chapter 4. We then evaluated the effects of *The healthy worksite cafeteria* by means of an RCT in chapter 5. In the last study, the vitality of the target population and its implications were described (chapter 6). In this closing chapter I give a summary of the main findings and put the results in a broader perspective. Finally, I suggest implications for further research, policy and practice.

## Summary of the main findings

**Motives for food choice in the worksite cafeteria can differ from food choice in general.**

In chapter 2, we obtained insight into motivations regarding food choices of Dutch employees, especially when visiting the worksite cafeteria. Qualitative analyses from seven focus groups revealed that this group of Dutch employees mentioned **healthiness**, **price** and **taste** as important factors of food selection in general. However, healthiness played a less important role in making food choices in the worksite cafeteria than when making food choices in general. The participating employees generally visit the worksite cafeteria to have a break from their work setting. Reasons for buying unhealthy food items in the worksite cafeteria were: being tempted and the feeling to 'deserve' it after having worked hard. In order to support people to choose healthier foods, employees suggested a bigger offer of healthy food options, providing knowledge, changing prices (i.e., raising prices of unhealthy options and lowering prices of healthy options) and placing healthy foods prominently. This focus group study showed that drivers for food selection can differ per situation; health is important for food choice in general, but seems less important in the worksite cafeteria.

**Key stakeholders will adopt and continuously implement a healthy worksite cafeteria intervention with nudging strategies as long as freedom of choice and profitability are guaranteed.**

In chapter 3 we presented the opinion of 14 stakeholders regarding the factors that would facilitate or hinder the adoption and continued implementation of a healthy worksite cafeteria intervention with nudging strategies. Qualitative analyses showed that

important factors for adoption are guaranteeing freedom of choice, profitability and availability of attractive healthy options. Executing *The healthy worksite cafeteria* intervention with nudging strategies seems compatible with caterers' values, goals and way of working, is not overly complex and is a unique selling point to caterers' client, the employer. Furthermore, successful implementation could be enhanced by explaining the aim of the intervention to all executing professionals and by convincing the client to shift towards a healthy worksite cafeteria by demonstrating its proven effectiveness, for example on vitality. We recommended that implementation tools should aim at ways for caterers to convince their client to choose a healthy worksite cafeteria, for example by showing customer satisfaction and by showing ways to introduce a healthier offer while maintaining freedom of choice.

**Development of *The healthy worksite cafeteria* intervention**

In chapter 4 we described the development of an intervention to encourage healthier purchase behaviour in Dutch worksite cafeterias, called *The worksite cafeteria 2.0* (working title during the experiment) and the study design of the randomised controlled trial (RCT) to evaluate the effectiveness of the intervention. We developed the intervention in four phases: collecting strategies from literature, qualitative face to face expert interviews, qualitative focus group interviews with employees of different Dutch companies and a feasibility pilot study. The intervention consisted of a combination of possible effective nudging and social marketing strategies.

***The healthy worksite cafeteria* intervention is partly effective in nudging customers towards healthier choices**

Chapter 5 contained the main effect study of this thesis in which we evaluated *The healthy worksite cafeteria* intervention by means of an RCT with 30 worksite cafeterias, with sales data as main outcome measure. The intervention, which was called *The worksite cafeteria 2.0* during the experiment, being more neutral in the sense of revealing the goal, was designed to encourage employees to make healthier choices during their daily worksite cafeteria visits. This was done by simultaneously conducting 14 nudging and social marketing strategies for 12 weeks (77% of which were executed as intended). Strategies included a bigger share in healthier food products offered, price strategies and the prominent placing of healthier food products. We found significantly positive effects of the intervention on purchases for 3 of the 7 studied product groups: healthier sandwiches, low fat cheese as sandwich fillings, and fruit. This study showed that the strategies of *The healthy worksite cafeteria* were partly effective to encourage healthier purchase behaviour.

**Vitality of Dutch employees is associated with self-reported work performance and salad purchase in the worksite cafeteria**

The final study described in chapter 6 showed the vitality of our target group of Dutch employees. As a result of an aging workforce there is a growing importance of 'sustainable employability'. Vitality is associated with lifestyle and healthcare and productivity-related costs. Quantitative analyses with almost eight hundred Dutch employees revealed that they are more vital compared to the average Dutch adult population. Results showed that employees with a higher vitality bought more salad, had a higher self-reported work performance and had a lower BMI. The employees with lowest vitality scores ('very low' and 'low') had a higher BMI and lower self-reported work performance. We emphasized that future research should focus on specific sub-groups of employees, for example those with low vitality. This could result in developing more effective worksite health promotion programs (WHPPs). A tailored approach could show the way how to improve strategies. A combination of environmental and personal strategies possibly is more effective than only adjusting the worksite cafeteria environment.

## Conclusions

The main findings from this thesis can be summarised as follows: a healthy worksite cafeteria with nudging and social marketing strategies is feasible and partly effective in stimulating healthier food choices of Dutch customers. To possibly have more effect on food choices and subsequently on sustainable performance at work, some strategies should be intensified and additional efforts on specific target groups should be made.

## Reflection and interpretation



In the following part I will reflect on and interpret our findings on consumer food choice in the worksite cafeteria. I will discuss the benefits and (potential) disadvantages of nudging and social marketing strategies. Furthermore, I will evaluate our findings in relation to other worksite intervention studies as a prelude to the recommendations in the following part.

**In the worksite cafeteria more support for healthy food choices is needed.**

In our RCT we found that healthier food choices in the worksite cafeteria can be realised by changing the food offer such as introducing relatively healthy products and offering a bigger share of those healthier options and by changing its price and presentation. Such strategies are a form of choice architecture. However, in order to be more effective we also stated that some of these strategies should be sharpened, for example by further increasing the share of healthier options, giving a bigger price discount on healthy items or offering (deep fried) snacks on even fewer days. From our focus group study we know that motives for food choices in the worksite cafeteria differ from food

choices motives in general. It seemed that the overall motive to eat healthy needs extra support when one is in the worksite cafeteria. This support could include a wider choice of healthy options, preferably tasty and priced well. In addition, participants of the focus groups indicated that they would appreciate that support. To illustrate, in the worksite cafeteria often the unhealthy snacks are the most tempting and sometimes people choose them while they actually did not intend to. Compared to when being in the supermarket or on the go, being at work introduces the feeling of deserving a snack as a reward for working hard. This is a phenomenon that specifically occurs when at work: not intending to snack but being triggered in the worksite cafeteria by a combination of the availability of tempting unhealthy snacks and this feeling of having deserved it.

**To alter food choice besides nudging, boosting is important.**
Situational cues trigger conceptualizations, such as habits, impulses, hedonic goals, or stereotypical situations which can guide behaviour automatically. Changing such automatic effects can be tried by changing situational cues such as priming and nudging, as executed in our intervention.[1] Alternatively, behaviour change interventions could also try to change these underlying situated conceptualizations through training interventions, such as a training to increase health literacy or to develop implementation intentions. In other words, the behaviour of buying a snack in the worksite cafeteria (represented by the quote 'I've worked so hard, I deserve a snack in the worksite cafeteria'.[2]) could be changed by either the presence of healthier tempting food items and less prominently offered unhealthy snacks, but could also be changed by encouraging people's competence or self-regulation. The latter is called 'boosting'.[3] The focus of boosting is on interventions that make it easier for people to exercise their own agency (the realization of desires, making plans, and carrying out actions) by improving existing competences or learning new ones.[4]

**Differences between nudging and boosting.**
Hertwig and Grüne-Yanoff (2017) stated that nudges and boosts differ in the target of the intervention and the causal pathways taken to prompt behaviour change. Nudges target the behaviour directly by co-selecting one's (internal) cognitive and motivational processes and designing the (external) choice architecture. Boosts, in contrast, target the individuals' competences to bring about behaviour change. Boosts aim to improve decision making and its outcomes either by training the functional processes or by adapting to the environment in which decisions are made or by doing both.[4] Therefore, the use of boosts in combination with nudging has the advantage of being more prone to achieve a sustainable behaviour change. For example, offering smaller portions nudges and learning people to choose a smaller portion boosts. We must note that adding boosts to nudges cancels the unconscious character of some nudges and therefore may result in other reactions such as reactance. Disclosure about nudges

is however not necessarily counter effective. In their study Kroese *et al.* (2016) show that awareness of nudging not always cancels out the effect. In the study, researchers disclosed the intended outcome of an intervention at the kiosk of a train station with a sign placed prominently on the counter stating 'We are helping you to make healthy choices'.[5] The researchers observed that the sign did not impact the effectiveness of a repositioning nudge aimed to increase healthy food choices.
In line with this finding is the experience of Sunstein, who mentioned that the nudge of automatic enrollment even works better when enclosing to people that they have been automatically enrolled, but have the freedom to opt out.[6] Adding boosts to nudges could possibly function in some situations as a catalyst and increase the effect on food choice.

**The ethics of manipulation through nudging: does or doesn't nudging violate autonomy?**

Compared to boosting, nudging could be seen as manipulation. Boosts respond to cognitive and motivational competences, whereas nudges adapt choice architecture to these cognitive and motivational processes leaving them unaltered. Since the introduction and growing popularity of nudging, there has been a debate about its ethics. Wilkinson (2012) asked the questions: 'Is it not manipulation to take advantage of people's predictable deviations from economic rationality? And if it is manipulation, how can the nudging be libertarian?'[7] Manipulation, in a broad sense, can perhaps be understood as 'intentionally causing or encouraging people to make the decisions one wants them to make by actively promoting those decisions resulting in people making the decisions in ways that rational persons would not want to make their decisions'.[8] Primarily wrong about manipulation is therefore that it violates autonomy. Manipulation could also be wrong for other reasons, for instance because it causes us to act against our interests. However, manipulation is assessed as objectionable at first sight, even if someone is objectively better off. Because the concept of manipulation in itself is difficult to formulate and apply, whether and when nudging is manipulative is therefore a question not easily answered. People can be manipulated or nudged when they go shopping, sign contracts, vote, study at school, or donate money for charity. When your roommate puts a bowl of crisps on the table, you are being nudged. Sunstein confirms this view by stating that choice architecture cannot be avoided. 'Nature itself nudges; so does the weather; so do customs and traditions; so do spontaneous orders and invisible hands. The private sector inevitably nudges, as does the government. It is reasonable to worry about nudges by government and to object to particular nudges, but not to nudging in general.'[9] Hereby he counters the view of nudging as unethical manipulation as a whole. Instead, nudging is a form of manipulation and we are manipulated, that is to say, our behaviour gets influenced all day, but as long as freedom of choice is preserved it can be called nudging.

*Different views exist regarding the effects on autonomy*

The former paragraph showed that nudging can be seen as manipulation since it alters someone's behaviour. Furthermore, it can be considered as manipulative by violating autonomy. Opposite to the idea or belief that nudging is manipulative by violating autonomy, Griffiths and West stated that nudging increases autonomy.[10] They have an alternative view on the widely cited *Intervention Ladder* of the Nuffield Council on Bioethics (figure 1 original *Intervention Ladder*; figure 2 an alternative *Balanced Intervention Ladder*) that structurally embodies the assumption that personal autonomy is maximized by non-intervention ('Do nothing or simply monitor the current situation').

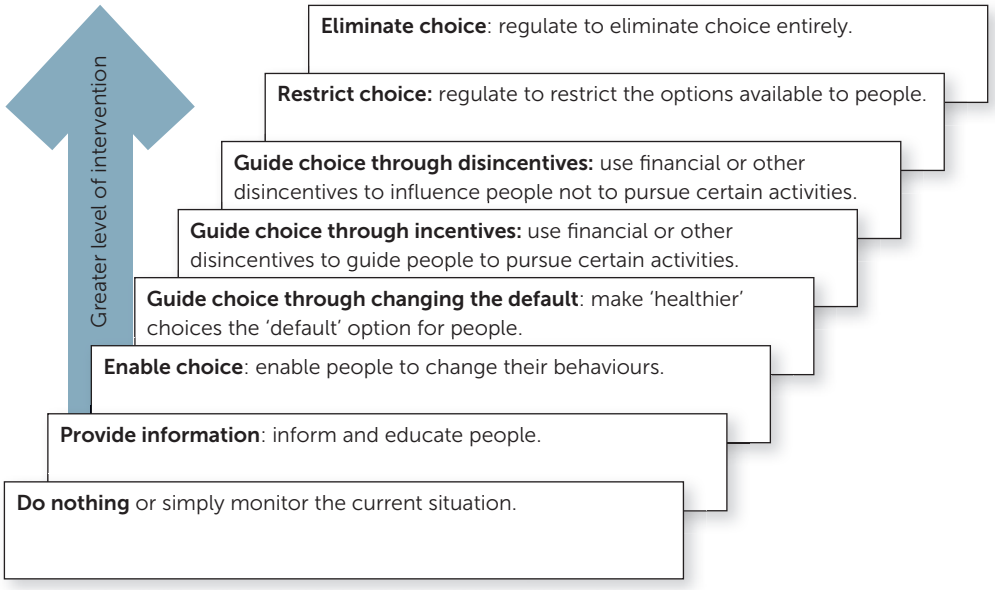



**Figure 1. Nuffield Intervention Ladder.[11]**

In the Nuffield Intervention ladder, the higher on the ladder, the more intrusive and autonomy limiting the intervention gets. Nudging can be placed midway on the ladder, reducing ones autonomy to a certain extent. However, Griffith and West show in their two-sided 'Balanced Intervention Ladder' that an intervention can either enhance or diminish autonomy (figure 2). A nudge like 'ensuring a bigger share of the healthier food items' (strategy 1 and 5 in *The healthy worksite cafeteria* intervention) is presented as autonomy-increasing, scoring +4 points on the Balanced Intervention Ladder. Because a larger share of the healthy options enables someone, motivated to eat healthier, to choose a healthy food product more easily. This provides a more positive view at nudging strategies, possibly helpful in tackling reactance. In accordance with this posi-

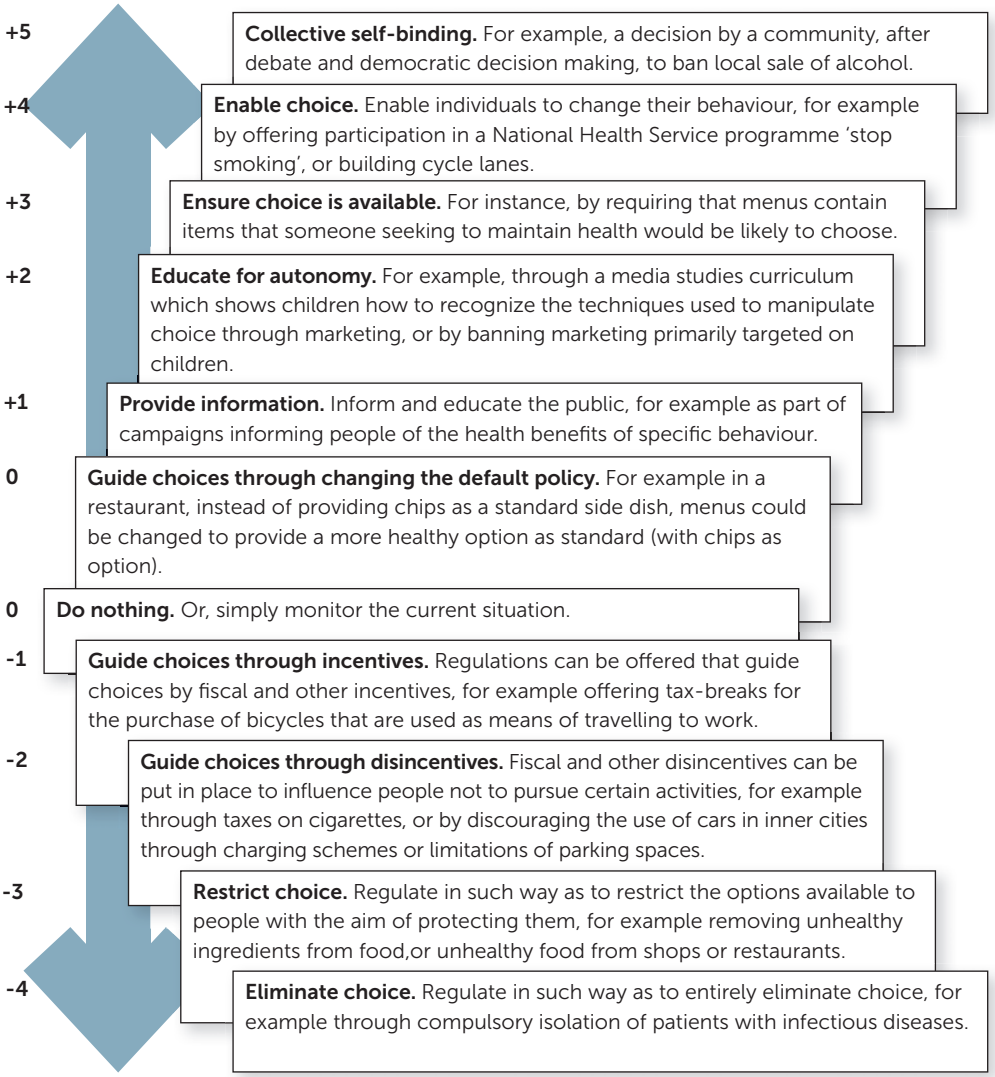



**Figure 2. Balanced Intervention Ladder by Griffiths and West (2015).[10]**
A balanced intervention ladder. The options available to government and policy makers to improve health may either enhance (+) or diminish (–) autonomy. No special justification is required for interventions that simultaneously enhance health and autonomy. For autonomy diminishing interventions, the health benefits to individuals and society should be weighed against this cost. In both cases, economic costs and benefits need be taken into account alongside health costs and benefits.

tive view is the study of Van Gestel *et al.* (2018) showing customers' positive reaction to a nudging intervention at the kiosk at the train station. When the researchers disclosed to customers that they were being nudged to purchase fruit, 90% of the customers responded to appreciate it to be nudged in making a healthier food choice.[12] In addi-

tion, for the more general situation of being targeted at work, a study with approximately 700 Dutch employees showed that most employees agree with the importance of Workplace Health Promotion Programs (WHPP).[13] This positive attitude corresponds to results of a study showing moderate to high levels of people's approval of being nudged to promote healthy eating. Nonetheless, approval was highly dependent on the degree of perceived intrusiveness of the nudge and on the degree of trust put in the choice architect implementing the intervention. Nudges implemented by experts and industry (marketing), as opposed to policy makers, were more approved of and approval was higher when perceived intrusiveness was low.[14] These findings are positive regarding our intervention *The healthy worksite cafeteria* being implemented by experts and industry (catering companies). The level of intrusiveness is however doubtful since *The healthy worksite cafeteria* includes nudges being in between non-intrusive nudges such as offering water for free, and intrusive nudges, such as providing a preselected option as the default.[14] All in all, these insights are very useful in creating support for nudging in all kinds of settings. Especially framing nudging as autonomy enhancing is useful for convincing people who have a fair influence on a food environment, such as a worksite cafeteria. However, the level of intrusiveness should be taken into account especially for nudging by the government.

**How many benchmarks are needed for a social marketing approach?**

In the previous paragraphs I reflected on some aspects of nudging for being an important substantive component of the intervention; 12 of the 14 included strategies are nudging strategies. However, in the process of developing the intervention, in other words, when compiling the nudging strategies, some elements of social marketing played a prominent role. Social marketing has the aim to change behaviour of a target audience by triggering elements that moves and motivates them. In the situation of the worksite cafeteria: changing food choice behaviour of customers through their drivers. The difference between social marketing and other approaches for social change such as legislation and education was argued by Andreasen (2002) as its emphasis of *voluntary behaviour change*. He proposed the six benchmarks for identifying a genuine social marketing approach (figure 3).[15]

1. Behaviour change is the benchmark used to design and evaluate interventions.
2. Audience research is undertaken to (i) assess the needs of the target group (ii) pre-test the programme materials and ideas and (iii) monitor the ongoing implementation of the programme.
3. Segmentation principles are applied.
4. The intervention strategy creates attractive motivational exchanges with the target group.
5. The intervention strategy attempts to use all four Ps of the traditional marketing mix.
6. Careful attention is paid to the competition faced by the desired behaviour.

**Figure 3. Andreasen's Benchmark criteria for a genuine social marketing programme, adapted from Andreasen 2002.[15]**

As a result of the growth in interest in social marketing, in 2006 Gordon *et al.* reviewed the effectiveness of social marketing interventions designed to improve diet. They identified social marketing as a promising health behaviour intervention approach for different settings and target groups.[16] In regard to the exact definition of a social marketing approach, Andreasen argued that it is unreasonable to expect interventions to provide strong evidence of all six benchmarks.[15] It was however unclear under what conditions an intervention – not meeting all benchmarks – could still be seen as a social marketing approach.[17] We especially used the insights of involving the target audience, in our case the employees purchasing lunch in the worksite cafeteria and key stakeholders, like facility managers and catering managers. The importance of the target audience is reflected in five out of the eight benchmarks (two were added) of social marketing: **behaviour**, **customer orientation**, **insight**, **exchange** and **competition**.[18] Furthermore, we included the **benchmark theory** and **marketing mix**, but did not use the benchmark of segmentation. In short, we used seven of eight benchmarks. Using almost all benchmarks was in line with findings of the review of Carins *et al.* (2013). Concerning interventions using social marketing to improve eating behaviour they showed that of sixteen included studies the mean number of benchmark criteria identified was five (from the total of six of Andreasen's criteria (2002)). The researchers found positive change to healthy eating behaviour in 14 of 16 studies. Their definition of socal marketing was: 'Systematic studies which sought to change behaviour through tailored solutions (e.g. use of marketing tools beyond communication was clearly evident) that delivered value to the target audience'. The sixteen studies that met the definition of social marketing used significantly more of Andreasen's (2002) criteria and were more effective in achieving behavioural change than a subset of studies without consumer orientation, but identifying themselves as social marketing.[19] They concluded that social marketing offers the potential to change eating behaviour when employed to its full extent.



**Social marketing emphasizes the drivers of the target audience.**

Regarding the insight in the target group, we learned from our focus groups (**customer orientation**) that the feeling of being entitled to a reward makes it difficult to resist unhealthy temptations in the worksite cafeteria (**insights**). However, identification of important drivers cannot always be converted to an appropriate and effective intervention strategy. In this situation, for example, coming up with a healthy temptation as a substitute (**exchange** and **competition**) is quite challenging. However, therefore we used the benchmark: **marketing mix**. The marketing mix addresses the elements of Product, Place, Promotion that overlap with nudging strategies in our intervention. The fourth P of Price however, enabled us to make healthy options more attractive price-wise. Strictly speaking price interventions are not nudging strategies, because one cannot really avoid a price increase. However, the strong effect of price as a trigger in

food choice can strengthen the behaviour change which is the goal of the intervention. The importance of price also emerged from our focus groups. Participants stated that they would be more likely to choose healthier options in the worksite cafeteria when those products would be relatively low priced. For example, a low-fat dairy drink of 250ml was seen as unattractively priced when the price was equal to a liter package in the supermarket. We were however able to add two price strategies to the 12 nudging strategies. The intervention worksite cafeterias gave a discount on some healthy products and increased the price of unhealthy snacks. To summarise, social marketing looks for the factors that can trigger the desired behaviour of the target group in the most optimal way. An advantage is that it has value for the target group as well as an overall social value and has a great change of being effective. A disadvantage is that the social marketing approach is quite labor intensive. In our study we used insight in behavioural triggers of our target group (price is an important factor) and the elements of the marketing mix for the intervention, namely increasing prices of unhealthy snacks, and lowering prices of healthy products, which seemed to have contributed to the intervention effect.

**Nudging and social marketing are not the silver bullet...**

As a conclusion of chapter 5 we emphasized that altering food choice in the worksite cafeteria by changing the food environment in its own, is only partly effective. Tightening the strategies, such as selling fried snacks on even fewer days than during the experiment, is the first option to possibly increase the effects. Furthermore, combining nudging and social marketing strategies, like price strategies, with elements that target conscious food choice behaviour is probably more effective in changing food choice. The 'boosting' part as it is mentioned earlier.

Apart from adding boosts to nudges, it is necessary to intervene in more ways. I would like to state that nudging and some small and selective (social marketing) price strategies are 'just' one way to cause a change in food choice behaviour. It is particularly useful for situations wherein individuals, especially the ones with less self-regulation skills, want to or need to be supported to make healthier choices. However, to bring Dutch overweight rates back to the levels of 1990, as stated in the aim of the Dutch National Prevention Pact (aimed at reducing alcohol consumption, smoking and overweight) [20] nudging and boosting is not enough. Adding other types of interventions seem necessary to achieve the goal of altering overweight levels. This means, simultaneously executing different strategies to alter food choice behaviour. Not only nudging, but also changing prices in wider range of food categories, for example. The World Health Organization (WHO) states 'Governments can take a number of actions to improve availability and access to healthy foods and have a positive influence on the food people choose to consume.' In the bulletin of the WHO, Thow *et al.* (2018) concluded that well designed taxes and subsidies can change the prices, purchase and

consumption of target foods, however, the effects on overall diet and health are less clear.[21] In the Dutch National Prevention Pact a variety of stakeholders made commitments of achieving goals to contribute to reducing obesity levels. A lot of emphasis is on improving the food environment, by means of increasing availability of healthy foods and making it easier to choose for, merely by nudging. For example, governmental worksite cafeterias are now required to implement nudging strategies of the Guidelines Healthier Canteens [22] quite similar to the strategies studied in current thesis. Another strategy included however in the National Prevention Pact is the reformulation of food products by reducing levels of sugar, salt or saturated fat. Although more research into the effects of several policies and interventions like nudging is needed, the positive effects of *The healthy worksite cafeteria* intervention indicates that we should not wait with implementing these in all worksite cafeterias. It will contribute to the health in all policies-approach like (fiscal) rules and regulations rules recommended by WHO.[23-25]

***The healthy worksite cafeteria* intervention versus other worksite RCT's.**

In the former paragraphs I elaborated on the various aspects of nudging and social marketing we used in our RCT. In the following paragraph I will place our RCT in the perspective of other workplace health promotion programs (WHPP) RCTs. Multiple reviews show that WHPP targeting physical activity (PA) [26,27], but also both PA and diet, are among other things effective in preventing weight-related risk factors.[28,29] Regarding worksite interventions specifically aimed at improving employees diets, like our intervention, Ni Mhurchu *et al.* (2010) and Geaney *et al.* (2013a) concluded in their reviews that in general, worksite interventions are associated with moderate improvement in dietary intake (an increase in fruit and vegetable intake and a decrease in total fat intake).[30,31] Our study is consistent with these results. However, most studies differed with our intervention in types of strategies used (i.e. providing nutrition education) and number of strategies executed simultaneously (i.e. single strategies like free servings of fruit). The randomised intervention study of Bandoni *et al.* (2011) did involve several aspects, including menu planning, food presentation and motivational strategies, but only aimed at increasing fruit and vegetable consumption.[32] Also in contrast to our intervention, previous studies using multiple strategies often included an educational programme.[33-37]

To our opinion, the 'Food choice at work' intervention by Geaney *et al.* (2013b) is most comparable to our intervention as it combined multiple similar nudges simultaneously in worksite cafeterias. However, it also included an educational component. The Food choice at work study had 'the aim to assess the comparative effectiveness of a workplace environmental dietary modification intervention and a nutrition education intervention both alone and in combination versus a control workplace'.[38,39] Their environmental dietary modification included five elements: (a) menu modification: restriction of saturated fat, sugar and salt, (b) increase in fibre, fruit and vegetables, (c) price discounts

for whole fresh fruit, (d) strategic positioning of healthier alternatives and (e) portion size control, all also included in *The healthy worksite cafeteria* intervention. For example, repositioning of certain healthy foods within the worksite cafeteria like the replacement of confectionary products with healthy snacks (fresh fruit, dried fruit, natural nuts) by the cash registers was similar to ours. However, we did not intervene in the vending machines. Another difference was that our intervention also included price increases of unhealthy fried snacks. Again very similar was the way the intervention was developed, namely with consulting stakeholders. During intervention development Geaney *et al.* were advised by catering and human resource stakeholders. In contrast, we also consulted the target audience and other key stakeholders like insurance experts. Striking is the similarity in discussing the amount of days without deep fried products with the catering stakeholders. Geaney *et al.* for example, suggested three days without chips but two days without chips was agreed upon, whereas we included two days free of all deep fried snacks including chips and discussed about which days. A substantial difference was the educational element of their intervention. It was hypothesised by Geaney *et al.* that the combined intervention (environmental dietary modification, comparable to our environmental nudging intervention and nutrition education) would be more effective than either intervention alone, in promoting positive changes in employees' dietary intakes, nutrition knowledge and health status outcomes. In line with their hypothesis, the intervention did show effects for the combined intervention. For the solely environmental intervention, effects were smaller and in general non-significant. Finally, they found an improvement of off-duty dietary intakes in the combined intervention group.[40] The extended reach of a worksite cafeteria to other settings needs further research, but is a promising element of worksite cafeteria interventions.

## Methodological issues

### Strengths

The first strength of this thesis is that we used different methods to develop the intervention, including the insights in drivers of the target group and the consultation of experts regarding implementation. This meets the appeal of Carins *et al.* (2016) who argue the need for multiple methods in formative research to obtain a more in depth understanding of behaviour change compared to only obtain insights from an audience's perspective.[41] Furthermore, we also conducted a pilot study in two worksite cafeterias to explore the feasibility of the intervention and obstacles to resolve for executing the RCT. A second strength lies also in the study design, namely the randomization of worksites to the experimental or the control group. RCTs are considered the golden standard within experimental studies, because confounding variables can be neutralised.[42] Regarding methodology of worksite cafeteria interventions it is emphasized that the quality of studies until 2009 has frequently been sub-optimal. Not all were randomised controlled trials and a significant risk of bias was caused by self-reported

methods of dietary assessment.[30,31] Third, our objective outcome measure, sales data is a strength. Whereas self-reported measures have the change of recall bias, our study avoided this problem. In a review by Hendren *et al.* (2017) the self-reported measure was still a concern.[43] Our objective measure of sales data is an improvement in that regard. A fourth strength is the implementation of the intervention in a real life situation, making the outcome more relevant for practice and policy recommending such interventions as a measure. The relatively large number of worksite cafeterias made it fairly generalizable for the Dutch situation of employees having lunch at work and can therefore be considered a fifth strength. Whereas the relatively high 'exposure' to a worksite cafeteria in a lifetime advocates to intervene here. A sixth strength is that the length of 12 weeks for the intervention being this comprehensive is quite unique. In many experiments, the exposure to nudging strategies is too short to draw conclusions about the sustainability of the effects.[44,45] Some interventions are implemented for a period shorter than 12 weeks.[12,46,47] Studies with longer follow-up are often interventions with less strategies or less outcome measures, for example only fruit and vegetable intake.[31] Ideally strategies are implemented and measured over several months and measures for example by using customer loyalty cards.

### Limitations

This thesis also has some limitations, related to the study design, study population and measurements. The first limitation is that we did not conduct a systematic review for collecting all possible effective nudging strategies to incorporate in the intervention. As a result of sufficient availability of studies presenting the overview of nudging strategies, we decided to conduct a desk research instead of a more thorough review. We therefore did not conduct all guidelines of a systematically approach such as the PRISMA checklist.[48] However, by combining the outcomes of the desk research with the insights in the target audience and key stakeholders' knowledge and experience regarding implementation, the intervention development was still thorough.

As a second limitation we can mention that we did not measure the possible prolonged effects as a result of improved food purchases in the worksite cafeteria. Sufficiently long periods of follow-up to determine long-term effects of programs on, for example, employee health, absenteeism and productivity, healthcare utilisation and cost-effectiveness are needed.[30,49] Such study would take ideally a follow-up of several years, with a minimum of 1-year.[50] Furthermore, food purchases could differ from actual dietary intake and we did not measure possible effects on consumption the rest of the day. However, since the health goal of the worksite cafeteria intervention was not explicitly communicated anywhere we don't expect employees to have compensated for their healthier purchases.

A third limitation concerning the overall design lies in the timing and use of the questionnaire of chapter 6. Combining the questionnaire with the qualitative studies would

have given the opportunity to target at a specific (vulnerable) group in the intervention. In the light of social marketing benchmarks this would have been a way to incorporate the benchmark segmentation.[15] A disadvantage is then that the targeted group is much smaller than the group that needs to lower bodyweight, which is half of the adults in the Netherlands.[51]

A fourth limitation is the fact that we included mainly white collar companies. We therefore do not know to what extend our intervention will have similar effects in worksite cafeterias of companies with more blue collar workers. Looking at the higher prevalence of overweight in groups with low socioeconomic status (SES) [51], we could argue that the group with low SES needs more support in reducing overweight. When recruiting companies it appeared to be harder to convince companies with a high number of low educated employees. Reasons given by managers were among others their fear for negative reactions of the employees as a result of the unavailability of deep fried snacks for two days a week. Some even mentioned this could lead to a strike, which had also happened a few years prior to this study due to comparable changes in the worksite cafeteria. The possibility of a strike would logically be too much of a financial risk. However, this also says something about the norm of what a worksite cafeteria should look like for certain specific target groups. When deep fried snacks are this much important food items in the total offer in the worksite cafeteria, one could consider these cafeterias are the most important to tackle.

In this thesis we used a variety of measures. A last limitation lies in the use of sales data to reflect food choice behaviour. For food choice behaviour sales data can be considered an objective measure. Extending food choice behaviour to actual consumption must be done with caution. We cannot be sure that all food items bought are actually consumed. Furthermore, with the use of solely sales data a complete picture of an employee's lunch cannot be made in the situations when certain food items are derived from other places (i.e. home, supermarket nearby the company). However, compared to self-reported food intake, there is no occurrence of recall bias, which is an advantage.[52]

## Recommendations for research, policy and practice

Based on our findings and reflections, I now formulate some recommendations for future research, policy and practice regarding the steering of food choices, in particular by changing food environments, such as worksite cafeterias.

### Recommendations for research

As discussed in chapter 5, we can define some methodological challenges for future nudging research that we can supplement with recommendations from chapter 6 and the thesis as a whole. Three topics for future research we like to address are *long-term effectiveness*, *combined interventions* (nudging and boosting) and *specific target groups*.

First, evaluating the long-term effect of nudging strategies is necessary.[53] To illustrate, in the context of current nudging research our intervention of 12 weeks can be considered long-term.[54] Although an effect of habituation could occur after 12 weeks, for example for priming nudges ('placing healthier options most prominent'), examining effects of a longer exposure to nudges seems necessary. According to the Transtheoretical Model (TTM) or the Stages of Change Model, learning a new habit can take between 3 and 6 months.[55] However, a study measuring the time it took for an eating, drinking or activity behaviour to become automatic ranged from 18 to 254 days.[56] Therefore I would recommend to implement nudging strategies for at least six months, ideally ayear. Furthermore, it is also interesting to investigate the possibility of the nudge becoming invisible as a result of long-term implementation. The nudge could lose its effect by employees getting used to it. On the other hand, a new healthy behaviour could also spill over to the food choice behaviour outside the worksite cafeteria. Second, also more research is needed concerning the combination of changing the food environment, together with training personal knowledge and skills, like food literacy or implementation intentions (boosting) and the effect on food choice. Altering the food environment by introducing nudges combined with boost could support ones consciously intended healthy food choices. A third recommendation is to get more insights in the effect of nudging and other approaches for specific target groups. In the light of the increasing socioeconomic inequalities in health it is important to focus on vulnerable groups.[57] To illustrate, employees with lower socioeconomic status were underrepresented in our study. This could however be a group needing more support since being overrepresented in the group of adults with overweight.[51]

**Recommendations for policy and practice**



Recommendations for policy and practice of our intervention are *sharpening the nudges*, *upscaling* and *developing implementation tools*. First, in chapter 5 we emphasized on the possible larger effectiveness when sharpening the nudges, for example increasing the amount of days on which fried snacks are not offered. A second recommendation from this thesis concerning practice, is that emphasis should be on the upscaling of nudging interventions in worksite cafeterias and subsequently on developing implementation tools to support this. In order to structurally roll out this intervention in many more companies, a start is to get more caterers to learn how to exploit a healthier worksite cafeteria. Like we concluded in chapter 3, caterers should also be instructed how to convince employers about the importance of having a heathier worksite cafeteria for their employees. This could also be enhanced by informing employer associations about the importance of employees eating healthy at work. A way to achieve upscaling is ensuring the embedding of the nudging strategies in the so-called formulas of caterers. For example, by being trained by nudging experts combined with implementation experts or by using an implementation tool. Employers should be

informed about the low costs of these type of interventions, which could lower the barriers for implementation. In a recent study Fitzgerald *et al.* (2017) compared the costs of an intervention with environmental modifications comparable to ours (menu modifications, fruit discounts, strategic positioning of healthier alternatives and portion size control) with the cost for nutrition education or a combination of both. They found that the incremental cost-effectiveness ratio of this environmental intervention (€101.37/quality-adjusted life-year), when compared with the control, is less than the nationally accepted ceiling ratio.[58] Although their study is fairly similar to *The healthy worksite cafeteria* intervention, cost-effectiveness of worksite interventions in general is hard to conclude due to methodological issues.[50]

Recommendation concerning the *combined interventions* (nudging and boosting) and *specific target groups* I mentioned in the last paragraph also has implications for policy and practice. For employers with low educated employees I would recommend to check with the employees if there is a need for extra support. Besides adjusting the worksite cafeteria, also programs to increase health or food literacy could be helpful. Health literacy is defined as the 'knowledge, motivation and competencies of people to access, understand, appraise, and apply health information in order to make judgments and make decisions in everyday life concerning healthcare, disease prevention and health promotion, to maintain or improve quality of life during the life course'.[59]

A review of Michou *et al.* (2018) showed that low levels of health literacy are associated with excess body weight. They also state that initiatives to improve health literacy levels could be a useful tool in the management of the obesity epidemic.[60]

Besides facilitating the practical implementation of an integrated approach for improving the food environment mentioned in the paragraph above, I like to recommend that policy makers, alongside researchers, should gain insights in the opinion of the target group about being nudged. Nowadays, the fear of being patronizing, disrupting autonomy or being manipulative is used by stakeholders who could influence the food environment, such as policy makers, as an argument not to intervene by nudging. There is little evidence on whether citizens of various societies support nudges and nudging. However, Reisch and Sunstein found strong majority support for nudges of the sort that have been adopted, or under serious consideration, in democratic nations.[61,62]

Evers *et al.* (2018) showed that there is moderate to high level of approval for nudges when the level of intrusiveness is low and the trustworthiness of the source high. In general, nudges implemented by experts received more approval than those by policy makers.[14] And even giving disclosure is an option, because nudges can survive transparency.[5,63] Therefore, besides gaining insights in the opinion of the ones being nudged, I also recommend to incorporate nudging strategies in policies together with the explanations of what strategies are implemented. Referring to the experts consulted could be useful.

## General conclusions

This thesis showed that a healthy worksite cafeteria with nudging and social marketing strategies is feasible, and partly effective in stimulating healthier food choices of Dutch employees. The key elements of the intervention *The healthy worksite cafeteria* were the bigger share of healthier options visibly available, the low prices for healthier products, the prominent placement of these products and the combination of multiple strategies applied at one group of healthier products. In future research, investigating the additional effect of increasing the level of personal knowledge and skills, such as (elements of) food literacy and its contribution to healthier food choices at work is interesting. Furthermore, future research should emphasize on targeting most vulnerable groups. Increasing vitality of employees by enhancing eating behaviour could be beneficial for lifestyle and could consequently improve health and work-related outcomes. In the light of an aging workforce it is important for employers to create a work environment supporting their workers' health and well-being. Nudging is a suitable strategy to be used in the worksite cafeteria and possible in other food environments. It is a valuable contribution to an integrated approach alongside governmental interventions such as taxes and subsidies, with the aim to evoke sufficient changes in the average Dutch eating pattern. Finally, this thesis provided enough reason for future research to investigate the long-term effects of a healthy worksite cafeteria with nudging and social marketing strategies on health and work-related outcomes.

## References


1. Papies, E.K., *Situating interventions to bridge the intention-behaviour gap: A framework for recruiting non-conscious processes for behaviour change.* Social and Personality Psychology Compass, 2017. 11(7).
2. Velema, E., E.L. Vyth, and I.H.M. Steenhuis, *'I've worked so hard, I deserve a snack in the worksite cafeteria': A focus group study.* Appetite, 2019. 133: p. 297-304.
3. Grune-Yanoff, T. and R. Hertwig, *Nudge Versus Boost: How Coherent are Policy and Theory?* Minds and Machines, 2016. 26(1-2): p. 149-183.
4. Hertwig, R. and T. Grune-Yanoff, *Nudging and Boosting: Steering or Empowering Good Decisions.* Perspectives on Psychological Science, 2017. 12(6): p. 973-986.
5. Kroese, F.M., D.R. Marchiori, and D.T. de Ridder, *Nudging healthy food choices: a field experiment at the train station.* J Public Health (Oxf), 2016. 38(2): p. e133-7.
6. Sunstein, C.R., *Nudges and Nudging: Past, present, and future*. 2019: Amsterdam.
7. Wilkinson, T.M., *Nudging and Manipulation.* Political Studies, 2013. 61(2): p. 341-355.
8. Hill Jr, T.E., *Autonomy and self-respect*. 1991, Cambridge: Cambridge University Press. .
9. Sunstein, C.R., *The Ethics of Nudging.* Yale Journal on Regulation, 2015. 32(2): p. 413-450.
10. Griffiths, P.E. and C. West, *A balanced intervention ladder: promoting autonomy through public health action.* Public Health, 2015. 129(8): p. 1092-1098.
11. *Public Health: ethical issues*. 2007, Nuffield Council on Bioethics: London.
12. Van Gestel, L.C., F.M. Kroese, and D.T.D. De Ridder, *Nudging at the checkout counter A longitudinal study of the effect of a food repositioning nudge on healthy food choice.* Psychol Health, 2018. 33(6): p. 800-809.
13. Robroek, S.J., *et al.*, *Moral issues in workplace health promotion.* Int Arch Occup Environ Health, 2012. 85(3): p. 327-31.
14. Evers, C., *et al.*, *Citizen approval of nudging interventions promoting healthy eating: the role of intrusiveness and trustworthiness.* BMC Public Health, 2018. 18(1): p. 1182.
15. Andreasen, A.R., *Marketing social marketing in the social change marketplace.* Journal of Public Policy & Marketing, 2002. 21(1): p. 3-13.
16. Gordon, R., *et al.*, *The effectiveness of social marketing interventions for health improvement: what's the evidence?* Public Health, 2006. 120(12): p. 1133-9.
17. McDermott, L., M. Stead, and G. Hastings, *What Is and What Is Not Social Marketing: The Challenge of Reviewing the Evidence.* Journal of Marketing Management, 2005. 21(5-6): p. 545-553.
18. French, J. and C. Blair-Stevens, *Social marketing national benchmark criteria*. 2006, UK National Social Marketing Centre: London.
19. Carins, J.E. and S.R. Rundle-Thiele, *Eating for the better: a social marketing review (2000-2012).* Public Health Nutr, 2013: p. 1-12.
20. Ministry of Health, W.a.S., *National Prevention Pact*. 2018, Ministry of Health, Welfare and Sport: The Hague, The Netherlands.
21. Thow, A.M., *et al.*, *Fiscal policy to improve diets and prevent noncommunicable diseases: from recommendations to action.* Bull World Health Organ, 2018. 96(3): p. 201-210.
22. *Guidelines Healthier Canteens factsheet*. 2014, Netherlands Nutrition Centre: The Hague.
23. Peeters, A., *Obesity and the future of food policies that promote healthy diets.* Nat Rev Endocrinol, 2018. 14(7): p. 430-437.
24. Mozaffarian, D., *et al.*, *Role of government policy in nutrition-barriers to and opportunities for healthier eating.* BMJ, 2018. 361: p. k2426.
25. WHO, *EUR/RC64/14 European Food and Nutrition Action Plan 2015–2020*. 2014, World Health Organization: Copenhagen, Denmark.
26. Malik, S.H., H. Blake, and L.S. Suggs, *A systematic review of workplace health promotion interventions for increasing physical activity.* Br J Health Psychol, 2014. 19(1): p. 149-80.
27. Abraham, C. and E. Graham-Rowe, *Are worksite interventions effective in increasing physical activity? A meta-analytic review.* Psychology & Health, 2009. 24: p. 71-71.
28. Proper, K.I. and S.H. van Oostrom, *The effectiveness of workplace health promotion interventions on physical and mental health outcomes - a systematic review of reviews.* Scand J Work Environ Health, 2019.
29. Engbers, L.H., *et al.*, *Worksite health promotion programs with environmental changes: a systematic review.* Am J Prev Med, 2005. 29(1): p. 61-70.
30. Mhurchu, C.N., L.M. Aston, and S.A. Jebb, *Effects of worksite health promotion interventions on employee diets: a systematic review.* Bmc Public Health, 2010. 10.
31. Geaney, F., *et al.*, *The effectiveness of workplace dietary modification interventions: a systematic review.* Prev

Med, 2013. 57(5): p. 438-47.
32. Bandoni, D.H., F. Sarno, and P.C. Jaime, *Impact of an intervention on the availability and consumption of fruits and vegetables in the workplace.* Public Health Nutr, 2011. 14(6): p. 975-81.
33. Steenhuis, I., *et al.*, *The impact of educational and environmental interventions in Dutch worksite cafeterias.* Health Promot Int, 2004. 19(3): p. 335-43.
34. Sorensen, G., *et al.*, *Increasing fruit and vegetable consumption through worksites and families in the Treat-well 5-a-Day study.* American Journal of Public Health, 1999. 89(1): p. 54-60.
35. Braeckman, L., *et al.*, *Effects of a low-intensity worksite-based nutrition intervention.* Occupational Medicine-Oxford, 1999. 49(8): p. 549-555.
36. Aldana, S.G., *et al.*, *The effects of a worksite chronic disease prevention program.* Journal of Occupational and Environmental Medicine, 2005. 47(6): p. 558-564.
37. Emmons, K.M., *et al.*, The Working Healthy Project*: A worksite health-promotion trial targeting physical activity, diet, and smoking.* Journal of Occupational and Environmental Medicine, 1999. 41(7): p. 545-555.
38. Geaney, F., *et al.*, *The food choice at work study: effectiveness of complex workplace dietary interventions on dietary behaviours and diet-related disease risk study protocol for a clustered controlled trial.* Trials, 2013. 14.
39. Geaney, F., *et al.*, *The effect of complex workplace dietary interventions on employees' dietary intakes, nutrition knowledge and health status: a cluster controlled trial.* Preventive Medicine, 2016. 89: p. 76-83.
40. Fitzgerald, S., *et al.*, *The impact of a complex workplace dietary intervention on Irish employees' off-duty dietary intakes.* Health Promot Int, 2019.
41. Carins, J.E., S.R. Rundle-Thiele, and J.J.T. Fidock, *Seeing through a Glass Onion: broadening and deepening formative research in social marketing through a mixed methods approach.* Journal of Marketing Management, 2016. 32(11-12): p. 1083-1102.
42. Begg, C., *et al.*, *Improving the quality of reporting of randomized controlled trials. The CONSORT statement.* JAMA, 1996. 276(8): p. 637-9.
43. Hendren, S. and J. Logomarsino, *Impact of worksite cafeteria interventions on fruit and vegetable consumption in adults A systematic review.* International Journal of Workplace Health Management, 2017. 10(2): p. 134-152.
44. Bucher, T., *et al.*, *Nudging consumers towards healthier choices: a systematic review of positional influences on food choice.* Br J Nutr, 2016. 115(12): p. 2252-63.
45. Marchiori, D., *et al.*, *Promoting healthy product choices among (aware) cafeteria customers.* European Health Psychologist, 2016. 18(S): p. 820.
46. Kleef van, E., K. Otten, and H. Trijp van, *Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices.* BMC Public Health, 2012. 12(1072).
47. Lassen, A., *et al.*, *Successful strategies to increase the consumption of fruits and vegetables: results from the Danish '6 a day' Work-site Canteen Model Study.* Public Health Nutrition, 2004. 7(2): p. 263-270.
48. Moher, D., *et al.*, *Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement.* PLoS Med, 2009. 6(7): p. e1000097.
49. Lutz, N., *et al.*, *Cost-effectiveness and cost-benefit of worksite health promotion programs in Europe: a systematic review (vol 29, cky269, 2019).* European Journal of Public Health, 2019. 29(2): p. 380-380.
50. van Dongen, J.M., *et al.*, *Systematic review on the financial return of worksite health promotion programmes aimed at improving nutrition and/or increasing physical activity.* Obes Rev, 2011. 12(12): p. 1031-49.
51. Statistics Netherlands and N.I.f.P.H.a.t. Environment, *Gezondheidsmonitor Volwassenen en Ouderen, GGD'en, CBS en RIVM*, 2018, Statistics Netherlands, The Hague.
52. Prentice, R.L., *et al.*, *Evaluation and comparison of food records, recalls, and frequencies for energy and protein assessment by using recovery biomarkers.* Am J Epidemiol, 2011. 174(5): p. 591-603.
53. Marteau, T.M., *et al.*, *Judging nudging: can nudging improve population health?* British Medical Journal, 2011. 342.
54. Venema, T.A.G., F.M. Kroese, and D.T.D. De Ridder, *I'm still standing: A longitudinal study on the effect of a default nudge.* Psychol Health, 2018. 33(5): p. 669-681.
55. Prochaska, J.O., C.C. Diclemente, and J.C. Norcross, *In Search of How People Change Applications to Addictive Behaviors.* American Psychologist, 1992. 47(9): p. 1102-1114.
56. Lally, P., *et al.*, *How are habits formed: Modelling habit formation in the real world.* European Journal of

Social Psychology, 2010. 40(6): p. 998-1009.
57. Claassen, M.A., *et al.*, *A systematic review of psychosocial explanations for the relationship between socio-economic status and body mass index.* Appetite, 2019. 132: p. 208-221.
58. Fitzgerald, S., *et al.*, *A cost-analysis of complex workplace nutrition education and environmental dietary modification interventions.* BMC Public Health, 2017. 17(1): p. 49.
59. Velardo, S., *The Nuances of Health Literacy, Nutrition Literacy, and Food Literacy.* J Nutr Educ Behav, 2015. 47(4): p. 385-9 e1.
60. Michou, M., D.B. Panagiotakos, and V. Costarelli, *Low health literacy and excess body weight: a systematic review.* Cent Eur J Public Health, 2018. 26(3): p. 234-241.
61. Reisch, L.A. and C.R. Sunstein, *Do Europeans like nudges?* Judgment and Decision Making, 2016. 11(4): p. 310-325.
62. Sunstein, C.R., *Do People Like Nudges?* Administrative Law Review, 2016. 68(2): p. 177-232.
63. Loewenstein, G., *et al.*, *Warning: You are about to be nudged.* Behavioral Science & Policy, 2015. 1(1): p. 35-42.

7

# Verleid worden om **gezonder** te lunchen op het werk

## **Factsheet onderzoek** *Het gezonde bedrijfsrestaurant*

In het bedrijfsrestaurant is vaak veel keuze. Soep, salades, broodjes, warme gerechten; de mate van gezondheid van producten verschilt. Deze plek waar we dagelijks lunchen speelt een aanzienlijke rol in ons eetpatroon en daarmee onze gezondheid. Maar hoe kun je mensen verleiden om gezonder te eten? Om bij te kunnen dragen aan de gezondheid van Nederlanders heeft Veneca de Vrije Universiteit Amsterdam benaderd om dit te onderzoeken.

**DIT ONDERZOEK IS UITGEVOERD DOOR**

Professor Ingrid Steenhuis

Gezondheids-wetenschapper Liesbeth Velema

Gezondheids-wetenschapper Ellis Vyth

wetenschappelijk literatuuronderzoek + advies van experts + inzichten in de doelgroep = 14 veertien strategieën die kunnen verleiden tot gezondere keuzes

**DEZE VEERTIEN STRATEGIEËN ZIJN VERVOLGENS GETEST IN EEN ONDERZOEK**

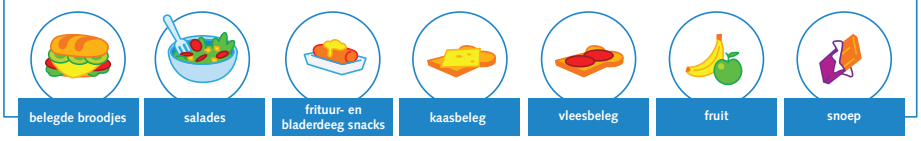
12 weken experiment

30 bedrijfs-restaurants

7 verschillende productgroepen

controlegroep vs interventiegroep

## De productgroepen




**VAN HET 'BETERE KEUZE' KAASBELEG, DE GEZONDERE BROODJES EN HET FRUIT WERD SIGNIFICANT MEER VERKOCHT.**
Dit verschil was constant gedurende de 12 weken.

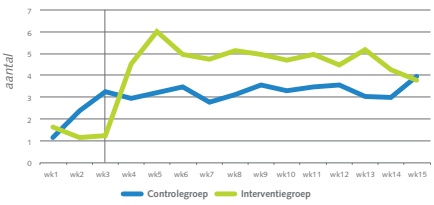
## 'Betere keuze' kaasbeleg

| AANPASSING | MARKETING MIX |
|---|---|
| Meer van uitgestald dan van de reguliere 48+ kaas. | Product |
| Prominent geplaatst. | Plaats |

60% 'BETERE KEUZE' 30+ KAAS

40% REGULIERE 48+ KAAS

**'BETERE KEUZE' KAASBELEG (VERPAKKINGEN) VERKOCHT PER 100 GASTEN**

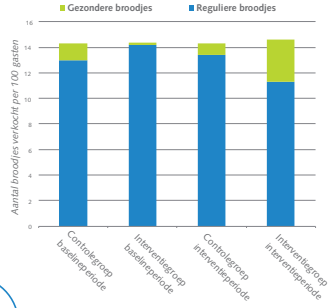



*Factsheet made for Veneca, February 2018. Design Ron Schuijt.*

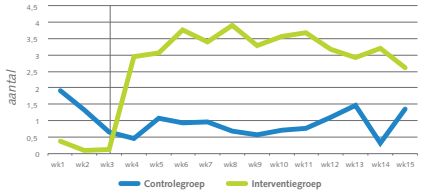
# Verleid worden om **gezonder** te lunchen op het werk

## Gezondere broodjes

| AANPASSING | MARKETING MIX |
|---|---|
| 25% goedkoper aangeboden. | Prijs |
| Meer van uitgestald dan van de reguliere broodjes. | Product |
| Prominent geplaatst. | Plaats |
| Promotie op menu's en in een voordelige combi-deal. | Promotie |




GEZONDERE BELEGDE BROODJES VERKOCHT PER 100 GASTEN




De verticale streep na de meting van week 3 geeft de start van het experiment weer. In de eerste drie weken deden we een zogenaamde baseline-meting. We hebben in die drie weken nog niets veranderd.

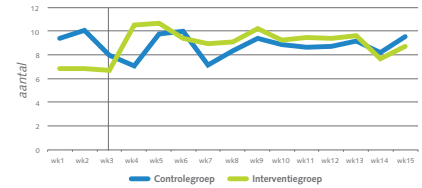
**TOTALE VERKOOP**

Zoals te zien aan de staafdiagrammen links, verandert de totale verkoop van belegde broodjes niet. Het lijkt erop dat in de interventierestaurants een verschuiving plaatsvindt van de reguliere naar de betere keuze.

## Fruit

| AANPASSING | MARKETING MIX |
|---|---|
| Op meerdere plekken aangeboden, waaronder bij de kassa. Bij de kassa lag niets anders dan fruit en snackgroenten. | Plaats |
| Fruit maakte deel uit van een combi-deal waardoor er een korting van 25% op werd gegeven. | Promotie |

FRUIT VERKOCHT PER 100 GASTEN




## Conclusies *Het gezonde bedrijfsrestaurant*

De manier waarop een bedrijfsrestaurant is ingericht heeft effect op wat mensen kopen. De strategieën van *Het gezonde bedrijfsrestaurant* zijn deels effectief om gasten te verleiden om een gezondere keuze te maken.

**PRIJS**
Het verlagen van prijzen van gezondere opties lijkt te werken.

**VERHOUDING AANBOD**
Mensen lijken eerder te kiezen voor een gezondere optie wanneer het aandeel gezondere opties groter is.

**COMBINEREN**
Het relatief eenvoudig combineren van de verschillende strategieën om een product aantrekkelijker te maken heeft waarschijnlijk effect.

GA NAAR **WWW.VENECA.NL**
VOOR HET ONDERZOEKSRAPPORT EN DE PRAKTISCHE HANDLEIDING

VENECA Vereniging Nederlandse Cateringorganisaties

7

# Summary

## General introduction

Improving dietary intake of Dutch adults is important in order to prevent overweight and related health risks. Food choices are made both consciously and less consciously. As a result, supporting healthy food choices can be done in various ways, including by making changes to the physical food environment. The worksite cafeteria is such a food environment. The aim of this thesis is to develop the intervention *The healthy worksite cafeteria* with nudging and social marketing strategies and to evaluate its effectiveness on objectively measured purchase behaviour of Dutch employees in the worksite cafeteria. This theses starts with a general introduction (**chapter 1**) in which I present the more extensive rationale for intervening this way in Dutch worksite cafeterias.

## Main findings

For the development of the intervention we conducted two qualitative studies exploring respectively drivers of the target group and the opinion of experts. (chapters 2 and 3).
**Chapter 2** describes seven focus groups among 45 Dutch employees. The analyses showed that respondents mentioned 'healthiness', 'price' and 'taste' as most important drivers for food selection. Healthiness played a less important role in visiting or making food choices in the worksite cafeteria.
**Chapter 3** describes the study conducted among 14 key stakeholders about the adoption and continued implementation of a healthy worksite cafeteria intervention with nudging strategies. The key stakeholders were caterers, nutritional experts and facility managers. From this study it appeared that important factors for adoption are guaranteeing freedom of choice and profitability, and ensuring the availability of attractive healthy options. For continued implementation proving effectiveness of the intervention is important. We describe the development of the intervention and the study design of the randomised controlled trial (RCT) in **chapter 4**. The development consisted of four phases: collecting strategies from literature followed by the in chapter 2 and 3 described qualitative face to face interviews with key stakeholders and qualitative focus group interviews with employees and lastly a feasibility pilot study. Subsequently, we show the main effects of *The healthy worksite cafeteria* intervention on food selection in **chapter 5,** by comparing sales data in an RCT with 30 worksite cafeterias**.** By simultaneously conducting 14 nudging and social marketing strategies for 12 weeks, we aimed at an increase of the share of healthier food products purchased. Strategies included a bigger share in healthier food products offered, price strategies and the prominent placing of healthier food products. We found significantly positive effects of the intervention on purchases for three of the seven studied product groups: healthier sandwiches, low fat cheese (to put on a sandwich) and fruit. We therefore concluded that the intervention was partly effective in nudging customers towards healthier choices. The final study we describe in **chapter 6** is about vitality of employees. As a result of an aging workforce, health and well-being of employees and its association with work

related outcomes have become more important. Our worksite cafeteria intervention emerged from the aim to develop an intervention (Workplace Health Promotion Program (WHPP)) that could possibly contribute to increasing 'sustainable employability'. Chapter 6 describes a cross-sectional study with Dutch employees (n=786) that was conducted using online questionnaires. Our study revealed that participating employees had a higher vitality compared to norm scores of the Dutch population. Furthermore, employees with a higher vitality bought more salad, had a higher self-reported work performance and had a lower BMI. The employees with lowest vitality scores ('very low' and 'low') had a higher BMI and lower self-reported work performance.

## General discussion

This thesis is completed with a general discussion in **chapter 7**, taking its findings in a broader perspective. Our study showed that a healthy worksite cafeteria with nudging and social marketing strategies is feasible in catering practice and partly effective in stimulating healthier food choices of Dutch customers. I emphasize that to possibly have more effect on food choices and subsequently on sustainable performance at work, some strategies should be intensified and additional efforts on specific target groups should be made. Besides using nudging that guides behaviour mostly automatically, behaviour change interventions could also try to raise people's competence to make their own more deliberate choices. These competence enhancing elements could – when added to nudging interventions – in some situations function as a catalyst and increase the effect on food choice. Furthermore, I discuss the ethics of nudging. Nudging can be seen as manipulation since it alters someone's behaviour, or as a violation of autonomy. Nudging towards a desired behaviour that is similar to the goals of the target group, for example offering more healthy options when the target group wants support to eat healthier, can however be seen as autonomy enhancing. Provided that the level of intrusiveness is taken into account, nudging can be seen as a fair and ethical tool to support people in making healthier choices. Similar to nudging, social marketing has the aim to change behaviour. Providing insight in goals and drivers of the target group supports the development of an effective intervention. Solely nudging and social marketing are however not the silver bullet to tackle obesity. It could however contribute to other approaches like reformulation, and governmental (fiscal) rules and regulations.

Based on the main findings we can formulate three recommendations for future nudging research: First, evaluating the long-term effect of nudging strategies is necessary. Second, more research is needed concerning the effect on food choice of the combination of changing the food environment, together with training personal knowledge and skills, like food literacy or implementation intentions (boosting). Third, more insight is needed in the effect of nudging specific target groups. Three recommenda-

tions for policy and practice derived from our intervention are at first sharpening the nudges. Second, the upscaling of this intervention to more worksite cafeterias and third, the development of implementation tools to support this upscaling.

### General conclusions

A healthy worksite cafeteria with nudging and social marketing strategies is feasible, and partly effective in stimulating healthier food choices of Dutch employees.
Besides intensifying some intervention strategies to possibly have more effect on food choices, future research should aim at the long-term effects, the possible combined effect of nudging and increasing the level of personal knowledge and skills, such as (elements of) food literacy and should focus on vulnerable groups, for example those with a lower socioeconomic status. The latter is important to prevent the socioeconomic inequalities in health from increasing further. *The healthy worksite cafeteria* intervention is a valuable contribution to an integrated approach alongside governmental interventions such as taxes and subsidies, with the aim to evoke sufficient changes in the average Dutch eating pattern.

# Samenvatting

## Algemene introductie

Het verbeteren van de voedingsinname van Nederlandse volwassenen is belangrijk ter preventie van overgewicht en bijkomende gezondheidsrisico's. Voedingskeuzes worden meer en minder bewust gemaakt. Als gevolg daarvan zijn er ook meerdere manieren waarop je gezondere voedingskeuzes kunt stimuleren, bijvoorbeeld door het aanpassen van de fysieke eetomgeving. Het bedrijfsrestaurant is zo'n eetomgeving. Het doel van dit proefschrift was het ontwikkelen van de interventie *het gezonde bedrijfsrestaurant* met nudging en sociale marketing strategieën en om de effectiviteit hiervan op het aankoopgedrag van Nederlandse werknemers objectief te meten. Dit proefschrift start met een algemene Introductie (**hoofdstuk 1**) waarin ik de achtergrond van deze wijze van interveniëren in Nederlandse bedrijfsrestaurants verder uitleg.

## Onderzoeksresultaten

Om de interventie te ontwikkelen zijn – naast het uitgaan van huidige kennis – twee kwalitatieve studies gedaan. In **hoofdstuk 2** wordt doormiddel van focusgroepinterviews inzicht verkregen in de doelgroep: Nederlandse werknemers. Uit kwalitatieve analyses kwamen *gezondheid*, *smaak* en *prijs* naar voren als meest belangrijke factoren bij het kopen van eten. Gezondheid speelde echter een minder belangrijke rol in de gang naar het bedrijfsrestaurant en bij de voedingskeuze die daar werd gemaakt. **Hoofdstuk 3** beschrijft vervolgens de studie waarbij 14 experts, zoals cateraars, voedingsdeskundigen en facilitair managers werden geïnterviewd over mogelijke faciliterende factoren en barrières bij de adoptie en de langdurige implementatie van een interventie in een bedrijfsrestaurant met nudging strategieën. Uit deze studie bleek dat het waarborgen van de keuzevrijheid van gasten en de winstgevendheid en het behouden van genoeg aantrekkelijke gezonde keuzes belangrijke factoren waren voor adoptie van de interventie. Voor langdurige uitvoer werd het bewezen effect genoemd als belangrijke factor. De ontwikkeling van de interventie en het studie protocol van de gerandomiseerde gecontroleerde trial (RCT) wordt beschreven in **hoofdstuk 4**. De ontwikkeling bestond uit vier fases: het verzamelen van strategieën beschreven in de literatuur, de in hoofdstuk 3 beschreven kwalitatieve interviews met experts en de in hoofdstuk 2 beschreven kwalitatieve focusgroepsinterviews en een uitvoerbaarheidspilot. In **hoofdstuk 5** laten we vervolgens de resultaten van de interventie *het gezonde bedrijfsrestaurant* zien door verkoopcijfers te vergelijken in een RCT met 30 bedrijfsrestaurants. Door het gelijktijdig uitvoeren van 14 nudging strategieën gedurende 12 weken probeerden we een toename te realiseren van het aandeel gezondere lunchproducten in alle verkochte producten. De strategieën waren onder andere het aanbieden van een groter aandeel aan gezondere opties, prijsstrategieën en het prominenter presenteren van gezondere producten. We vonden significante verschillen in de verkoop van 3 van 7 productgroepen: gezondere belegde broodjes, magere (30+) kaas en fruit. We concludeerden daarom dat de interventie *het gezonde bedrijfsrestaurant* deels effectief was in

het stimuleren van gezondere keuzes bij de gasten.
De afsluitende studie van dit proefschrift, **hoofdstuk 6**, gaat over de vitaliteit van werknemers. Als gevolg van het langer moeten doorwerken tot het pensioen is de gezondheid en het welzijn van werknemers en de effecten hiervan op de werkuitvoering steeds belangrijker. Onze bedrijfsrestaurant interventie ontstond vanuit het streven om een interventie te ontwikkelen die mogelijk kon bijdragen aan 'duurzame inzetbaarheid' van werknemers. In hoofdstuk 6 beschrijf ik een cross-sectionele studie met Nederlandse werknemers (n=786) die is uitgevoerd doormiddel van vragenlijsten. Onze studie liet zien dat de deelnemende werknemers een hogere vitaliteit hadden dan de normscores van de Nederlandse volwassen populatie. De resultaten lieten zien dat werknemers met een hogere vitaliteit meer salade kochten, een hogere zelfgerapporteerde werkprestatie hadden en een lagere BMI. De werknemers met de laagste scores op vitaliteit ('zeer laag' en 'laag') hadden een hogere BMI en lagere zelfgerapporteerde werkprestatie. Vervolgonderzoek zou zich moeten richten op specifieke subgroepen van werknemers, bijvoorbeeld door het ontwikkelen van maatwerk om de voedingskeuzes in het bedrijfsrestaurant gezonder te maken. Een combinatie van een omgevingsinterventie en persoonlijke strategieën zou mogelijk effectiever kunnen zijn dan alleen het aanpassen van het bedrijfsrestaurant.

## Algemene discussie

Dit proefschrift sluit af met een algemene discussie in **hoofdstuk 7** waarin alle bevindingen in een bredere context worden geplaatst. Onze studie liet zien dat een gezond bedrijfsrestaurant met nudging en sociale marketing strategieën uitvoerbaar is in de cateringpraktijk en deels effectief is in het stimuleren van een gezondere keuze van de gasten van het bedrijfsrestaurant. Ik benadruk dat om mogelijk meer effect te sorteren op voedselkeuzes en als gevolg daarvan op duurzame inzetbaarheid van personeel, sommige strategieën aangescherpt zouden moeten worden. Daarnaast zou er extra aandacht uit moeten gaan naar specifieke doelgroepen. Naast nudging dat het keuzegedrag vooral automatisch stuurt, kunnen interventies ook proberen om mensen te ondersteunen in de competentie om hun eigen, weloverwogen keuzes te maken. Deze vaardigheid verhogende elementen zouden – wanneer toegevoegd aan nudging interventies – in sommige situaties kunnen fungeren als een katalysator waarmee het effect op voedselkeuzegedrag groter wordt. Vervolgens bespreek ik de ethiek van nudging. Nudging kan worden gezien als manipulatie aangezien het iemands keuze beïnvloedt of omdat het ingrijpt op autonomie. 'Nudgen' richting een gewenst gedrag dat gelijk is aan de doelen van de doelgroep kan echter worden gezien als het bevorderen van autonomie. Bijvoorbeeld het aanbieden van meer gezonde opties kan worden gezien als bevorderen van autonomie, als de doelgroep graag ondersteuning wil bij het maken van gezondere keuzes. Onder voorwaarde dat de mate van opdringerigheid in de gaten wordt gehouden, kan nudging gezien worden als een eerlijk en ethisch middel om

mensen te stimuleren gezondere keuzes te maken. Net als nudging heeft sociale marketing het doel om gedrag te veranderen. Het verkrijgen van inzicht in de doelen en drijfveren van de doelgroep draagt bij aan het ontwikkelen van een effectieve interventie. Alleen nudging en sociale marketing zijn echter niet genoeg om het obesitasprobleem op te lossen. Het kan wel een zinvolle bijdrage vormen aan andere aanpakken zoals herformulering en (fiscale) wet- en regelgeving door de overheid.
Gebaseerd op de onderzoeksresultaten kunnen we drie aanbevelingen doen voor toekomstig onderzoek. Ten eerste: het evalueren van het lange termijn effect van nudgingstrategieën is nodig. Ten tweede: er is meer onderzoek nodig naar het effect op voedselkeuze, van de combinatie van het aanpassen van de eetomgeving en het verbeteren van individuele kennis en vaardigheden. Ten derde: er is meer inzicht nodig in het effect van nudging bij specifieke doelgroepen. Drie aanbevelingen voor beleid en de praktijk zijn ten eerste het aanscherpen van de nudges. De tweede aanbeveling is het opschalen van deze interventie naar een groter aantal bedrijfsrestaurants en ten derde is het belangrijk dat er implementatiemiddelen worden ontwikkeld.

**Algemene conclusies**

Een gezond bedrijfsrestaurant met nudging en sociale marketing strategieën is uitvoerbaar in de praktijk en is deels effectief in het stimuleren van gezondere voedselkeuzes van Nederlandse werknemers. Om meer effect te hebben op voedingskeuzes zou – naast het aanscherpen van een aantal interventiestrategieën – toekomstig onderzoek zich moeten richten op het mogelijke lange termijn effect van nudging. Ook het mogelijke effect van de combinatie van nudging met het vergroten van kennis en vaardigheden van het individu is interessant om te onderzoeken. Daarnaast zou onderzoek zich extra kunnen richten op kwetsbare groepen, zoals de groep met een lagere sociaaleconomische positie. Dat laatste is van belang om te voorkomen dat sociaaleconomische gezondheidsverschillen nog groter worden. Het gezonde bedrijfsrestaurant is een waardevolle toevoeging aan een integrale aanpak, naast overheidsmaatregelen zoals belastingen en subsidies met als doel het verbeteren van het voedingspatroon van Nederlanders.

# Dankwoord

## En dan... het dankwoord

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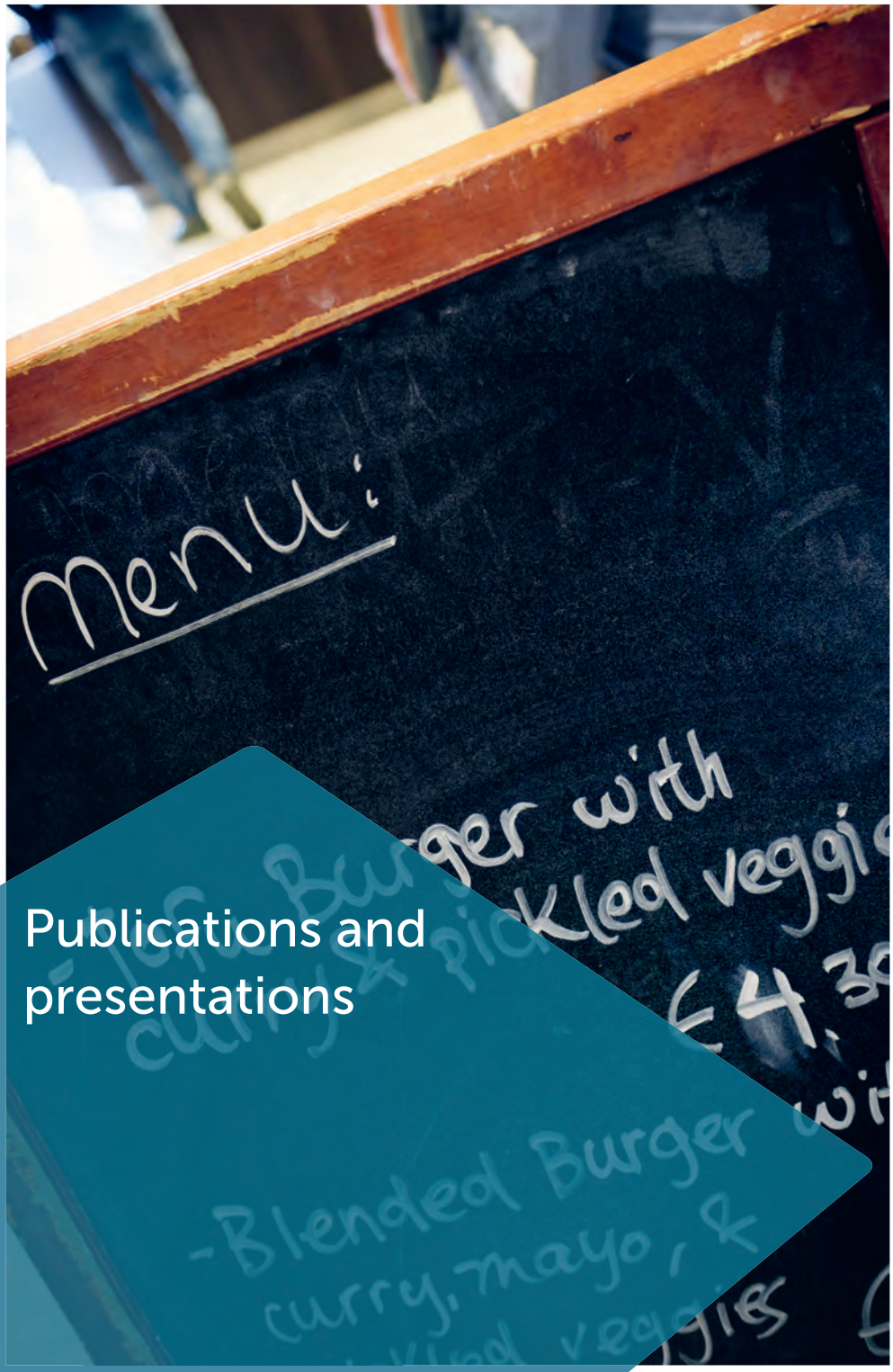
# About the author

## Elizabeth Velema

Elizabeth Velema was born in Wageningen, The Netherlands, on February 7th, 1984. After graduating secondary school, Atheneum, Pantarijn in Wageningen in 2002, she moved to Groningen where she started to study Human Movement Sciences at the University of Groningen. After finishing the two-year research master she moved to Amsterdam to expand her knowledge of a healthy lifestyle by conducting the master of Health Sciences at the Vrije Universiteit Amsterdam. Liesbeth combined two directions in the master; prevention and public health and nutrition and health. During this second master she completed an internship at the National Institute for Public Health and the Environment (RIVM) on the health effects of weight cycling, a study commissioned by the Ministry of Health. After this master Liesbeth worked shortly at BigMove, a healthy lifestyle program. She worked on completing the scientific support of this intervention.

In January 2011 she started at the Vrije Universiteit Amsterdam as an assistant in the PhD project of Maartje Poelman called 'Smart size@home', an RCT to evaluate an intervention aimed at portion size to prevent overweight. This two-year job was a very valuable work experience, since it gave insight into the work of a researcher. In 2013 she worked for one year at the community health service (GGD) in Arnhem as an epidemiologist. She conducted big data analysis for the Yought health care to gain insights in health status of children in preparation of the upcoming change in the health policy (in 2015 health provision got decentralised).

In 2014, Professor Ingrid Steenhuis selected her to lead the project on healthy eating in Dutch worksite cafeterias in collaboration with Dutch contract catering companies and Veneca, the trade organization for Dutch contract catering companies. After developing an intervention, Liesbeth conducted an RCT in 30 worksite cafeterias in 2016. The results of this work are presented in this thesis. In February 2018 the launch of the results got attention in Dutch national press. During the finishing of her PhD Liesbeth started working at the Netherlands Nutrition Centre as an expert on nutrition and behaviour. She was selected to participate in the European Nutrition Leadership Platform (ENLP) Essentials Programme in Luxembourg in March 2018. Since January 2019 she combines the function of nutrition and behaviour expert with being project leader of The Healthy Food Environment. That gives her the opportunity to continue the implementation of interventions to improve the food environment in multiple settings. In her future career, she would like to continue to fulfill an intermediate function between nutrition and health sciences and society by using scientific knowledge in health communication, interventions and policy.




# Publications and presentations

## Publications in this thesis

**Velema, E**., Vyth, E.L., Hoekstra, T., Steenhuis, I.H.M. *Stakeholders' view on implementing an intervention with nudging strategies to stimulate healthy choices in Dutch worksite cafeterias* (submitted for publication, 2019).

**Velema, E**., Vyth, E.L., Hoekstra, T., Steenhuis, I.H.M. *Vitality of Dutch employees: a cross-sectional study* (submitted for publication, 2019).

**Velema, E**., Vyth, E. L., & Steenhuis, I. H. (2019). *'I've worked so hard, I deserve a snack in the worksite cafeteria': A focus group study.* Appetite, 133, 297-304.

**Velema, E**., Vyth, E.L., Hoekstra, T., Steenhuis, I.H.M. (2018). *Nudging and social marketing techniques encourage employees to make healthier food choices: a randomized controlled trial in 30 worksite cafeterias in The Netherlands.* The American journal of clinical nutrition, 107(2), 236-246.

**Velema, E**., Vyth, E.L., Steenhuis, I.H.M. (2017). *Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands: intervention development and study design.* BMC Public Health, 17(1), 63.

## Other publications

Eykelenboom, M., **Velema, E**., Eberson, B. P., Scholten, G. C., Lushpa, V. K., & Steenhuis, I. H. (2018). *Results of a randomized controlled trial evaluating the effect of increasing package size on usage volume of peanut butter in older adults.* Appetite, 130, 184-189.

Lakerveld, J., Mackenbach, J. D., De Boer (...) **Velema, E**. (...) Beulens, J.W.J (2018) *et al., (2018). Improving cardiometabolic health through nudging dietary behaviours and physical activity in low SES adults: design of the Supreme Nudge project.* BMC Public Health, 18(1), 899.

Poelman, M. P., de Vet, E., **Velema, E**., de Boer, M. R., Seidell, J. C., & Steenhuis, I. H. M. (2015) *PortionControl@HOME: Results of a Randomized Controlled Trial Evaluating the Effect of a Multi-Component Portion Size Intervention on Portion Control Behaviour and Body Mass Index.* Annals of Behavioural Medicine, 49(1), 18-28.

Poelman, M. P., de Vet, E., **Velema, E**., Seidell, J. C., & Steenhuis, I. H. M. (2015). *The home food environment of overweight gatekeepers in the Netherlands.* Public Health Nutrition, 18(10), 1815-1823.

Sleddens E.F.C., Kroeze W., Kohl L.F.M., Bolten L.M., **Velema E**., Kaspers P., *et al. Correlates of dietary behaviour in adults: an umbrella review.* Nutrition reviews. 2015;73(8):477-99.

Sleddens, E. F. C., Kroeze, W., Kohl, L. F. M., Bolten, L. M., **Velema, E**., Kremers, S. P. J. (2015). *Determinants of dietary behaviour among youth: An umbrella review.* Int J Behav Nutr Phys Act, 12(7), 22.

Poelman, M. P., de Vet, E., **Velema, E**., Seidell, J. C., & Steenhuis, I. H. M. (2014). *Behavioural strategies to control the amount of food selected and consumed.* Appetite, 72, 156-165.

### Presentations

- **Velema, E**., Vyth E.L., Steenhuis, I.H.M. *Healthy eating at work: the effect of nudging in Dutch worksite cafeterias.* Invited speaker EFAD Conference, Berlin, Germany – November 2019.
- **Velema, E.**, Vyth E.L., Steenhuis, I.H.M. *Stakeholders' view on implementing an intervention with nudging strategies to stimulate healthy choices in Dutch worksite cafeterias.* Poster presentation ISBNPA Conference, Prague, Czech Republic – June 2019.
- **Velema, E**., Vyth, E.L., Hoekstra, T., Steenhuis, I.H.M. *Nudging and social marketing techniques encourage employees to make healthier food choices: an RCT in 30 worksite cafeterias in the Netherlands.* Oral presentation ISBNPA Conference Hong Kong, Hong Kong – June 2018.
- **Velema, E**., Vyth E.L., Steenhuis, I.H.M. *Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands.* Poster presentation ISBNPA Conference, Victoria, Canada – June 2017.
- **Velema, E.**, Vyth E.L., Steenhuis, I.H.M. *Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands.* Poster presentation Science Exchange day, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands – September 2017.
- **Velema, E.**, Vyth E.L., Steenhuis, I.H.M. *Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands.* Poster presentation WINK, the Nudge conference, Utrecht, the Netherlands – June 2017.
- **Velema, E**., Vyth E.L., Steenhuis, I.H.M. *Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands: intervention development and study design.* Oral presentation European Social Marketing Conference, Helsinki, Finland – September 2016.

## Elizabeth Velema

Elizabeth Velema (1984), born in Wageningen, The Netherlands, graduated secondary school, Atheneum Pantarijn in Wageningen in 2002. Velema studied Human Movement Sciences at the University of Groningen. After finishing the two-year research master she moved to Amsterdam to expand her knowledge of a healthy lifestyle by conducting the master of Health Sciences at the Vrije Universiteit Amsterdam. Velema combined two directions in the master: prevention and public health and nutrition and health. During this second master she completed an internship at the National Institute for Public Health and the Environment (RIVM) on the health effects of weight cycling, a study commissioned by the Ministry of Health.



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