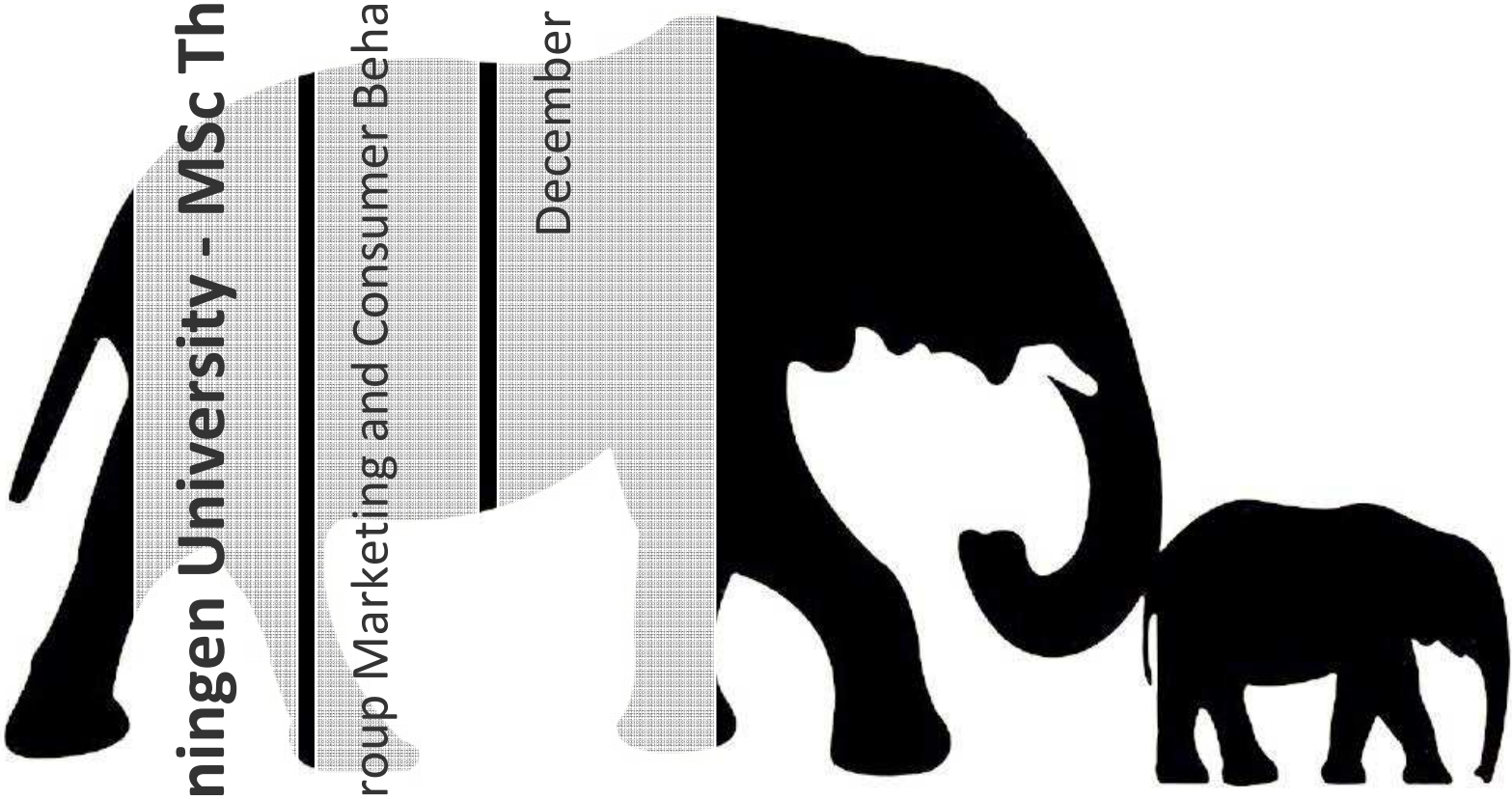
Wageningen University - MSc Thesis

Chair Group Marketing and Consumer Behaviour

December 2011



A smart nudge to encourage consumers' healthy food choices?

A lab and field study on the application of nudging on impulse shelves at canteens

MSc program: Management, Economics and Consumers studies (MME)

Department of Social Sciences
Specialisation B: Consumer studies
Thesis code: MCB-80433

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Date: December 2011

Summary

Nudging is becoming a more and more popular tool nowadays to counteract the food related health problems in America and Europe. There is an extensive number of different nudges, all of which can be applied to tackle different social problems and issues. One of these nudges is the so-called default nudge, a nudge that influences choice behaviour by changing the status quo option.

This study is conducted by a master student Marketing & Consumer behaviour at the Wageningen University in the Netherlands. The central focus of this study is to examine if, and to what extent, the factors proportion and location of healthy and unhealthy snack products have an effect on the choice behaviour of consumers. Another interest of this study is to find out if nudging works better for specific individuals. The research question is:

> Can the factors *shelf location* and *proportion* of healthy/unhealthy snack products be altered in the layout of an impulse shelf at the check-out counter, in order to increase the relative number of sold healthy snack products, without banning products, using a nudging concept?

The study exists of two separated experiments, a lab and a field study. In both studies the factors proportion (25% healthy snacks vs. 75% healthy snacks) and location (top shelves vs. bottom shelves) of healthy and unhealthy snack products are being manipulated.

The lab study is an online experimental study in which we investigate the effect of assortment structure on snack choices, product perceptions, implicit expectations and inferences. Dutch student participants chose a healthy or unhealthy product from a virtual shelf and are then being asked to fill in a questionnaire about their selves and their snack choice.

The field study is an experiment conducted at a Dutch hospitals' staff canteen in which we investigate the effect of assortment structure on snack choices. An impulse shelf has been placed in front of the checkout, filled with all kinds of healthy and unhealthy snack products.

This study shows that proportion of healthy/unhealthy snack products can be a good tool to use in order to increase the relative number of sold healthy snacks. Shelf location however, does not have any effect on the relative number of sold or chosen healthy snack products. Moreover, It seems that nudging does not work better for specific individuals. To conclude, this particular default nudge did not limit lab study respondents' feelings of autonomy, consumers felt free to choose their snack and did not felt helped or controlled whatsoever. Therefore, it seems that nudging them this way does not give feelings of patronization, a claim which is made often by critics of nudging.

Content

1. Introduction

The amount of food related health problems has increased tremendously the last decade [1]. Due to high calorie diets and a shortage of physical exercise, health problems like obesity are gaining ground rapidly. In 2008 50% of the Dutch population suffered from excessive weight. In that same year 10% of the Dutch population was classified as obese and this figure has been steadily increasing ever since. The same trend can be detected in countries adjacent to the Netherlands [2]. The World Health Organization even projects that by 2015, 2,3 billion people all over the world will be overweight and 700 million will be obese [3]. Due to these developments several organisations and governments devote their attention to promote a healthy lifestyle and a healthy diet.

Several approaches are used to encourage people to adopt a healthier diet [4]. Some examples of methods that are being used are financial rewards, education, on-pack information and pricing. Unfortunately, these methods do not always provide the desirable effect. Simple financial incentives (e.g., participants obtained $67 for achieving a healthy target weight; $268 and $670 if target weight was maintained for 5 and 12 months, respectively) turn out to be only effective on the short term but don't guarantee a sustained change when it comes to overweight [4, 5]. Public-health campaigners educate the public by urging them to eat right and exercise more, but their attempts fail time and time again [6]. On-pack information about the healthiness of products is only attended to by a small part of the consumers [7, 8]. And finally, several studies show that the impact of pricing is also mixed, raising prices of high-sugar soda has a fair effect on its consumption, but raising the prices of snacks (respectively chocolate bars and potato chips) has only had small effects on its consumption [9, 10, 11]. The fact that these methods mainly rely on the rational thoughts of consumers inspired researchers to focus more on consumers' intuition to encourage them to eat more healthy. Intuition belongs to the heuristic-based decision making theory which states that people make decisions on the basis of rules of thumb (i.e., status quo and habits). For instance, consumers could use the colour brown to indicate if a bread is healthy or not. Due to the overwhelming environmental influences we face every day (e.g., pricing, packaging and promotions) we tend to rely on rules of thumb and status quo to make decisions because assessing everything with rational thoughts would cost too much time and effort [12]. David *et al*., argue that the more consumers are distracted, the more they will rely on cues in the environment to steer their decision making [12].

One of the concepts that are developed from this philosophy is nudging. Nudging appeared first in an article in 2003 written by Sunstein and Thaler [13]. The concept is basically a tool that offers guidance, without enforcement, on the behaviour change of consumers that is good for and, preferred by, consumers themselves [14]. Nudging provides a simple and low-cost solution that can help consumers make healthier choices, without banning certain products [13]. In subsequence of their article, Sunstein and Thaler presented their book 'Nudge: Improving decisions about health, wealth and happiness' in 2008, which turned out to be a massive success and an influential factor in American policy making [15]. According to Thaler and Sunstein, the assumption that people always make choices that are in their best interest is false. In many cases organizations or agents make choices that will affect the choice of the consumer [15]. One of the choices that can affect consumers' choice is the

default option (i.e., status quo). This is an option that must be pre determined by so called choice architectures (e.g., organizations and agents) and is often chosen by consumers whether or not it is in their best interest [13]. With nudging, choice architecture is used to nudge people towards a better choice without banning certain options or forcing certain outcomes upon people. There are an extensive number of tools that can be used to nudge people, like, defaults, giving feedback and structuring complex choices [15]. Examples of already conducted nudges are for instance, placing salads before the desserts in a cafeteria or placing fruits on eyelevel at the check-out counter of a shop. By doing this, consumers can be seduced to choose the healthier option. No coercion is involved and all products, whether they are healthy or unhealthy, are available. Such actions are called libertarian paternalism by Thaler and Sunstein [13].

This study will focus on impulse snack products at the check-out counter. Impulse buying can be described as making sudden and unplanned, not regulated purchases, that are decided upon on the spot, and that give the consumer a powerful urge and feeling of pleasure or excitement [16]. This type of buying behaviour is primarily stimulus driven instead of goal driven and is therefore very suitable for the nudging concept, because these purchases are often not made with rational thoughts. The impulse products displayed on the shelves near the check-out counter are most of the time unhealthy (e.g., candy, chocolate bars, crisps and cookies). Shops display these kind of snacks in prime sites in a way to trigger quick and unintended purchase [17, 18]. While waiting to check-out it is more likely for consumers to be persuaded to pick a snack from the shelf because self-control decreases while seeing so many appealing products [19]. Self-control decreases because the consumer is being distracted from its health goals (e.g., losing weight) and instead relies on the environment to steer its decision making [12]. This is in line with the present bias theory, which states that consumers pursue immediate gratification (e.g., purchasing unhealthy snacks) rather than sticking to long-run well being goals like obtaining a healthy weight [20]. In this study we will conduct a lab study and a field study in order to see if it is possible to nudge consumers to pick a healthy impulse snack. The field study will be conducted at a hospitals' canteen in the Netherlands.

1.1 Problem statement

An increasing number of people worldwide struggle with health problems due to an unhealthy diet. Educational efforts to encourage consumers to eat more responsible have only had limited success. These encouragements are mainly directed to rational thoughts, although these days consumers make their decisions more and more on heuristic-based logics like rules of thumb and status quo. This has great implications on purchase behaviour; as consumers pass the impulse snack shelves they are being tempted and tested every single time. Almost every self-service restaurant and canteen in the Netherlands offers unhealthy impulse snack products at the counter. This study examines how assortment structure influences the choice between vice and virtue foods at the checkout counter.

The main question of this study will be:

> Can the factors *shelf location* and *proportion* of healthy/unhealthy snack products be altered in the layout of an impulse shelf at the check-out counter, in order to increase the relative number of sold healthy snack products, without banning products, using a nudging concept?

1.2 Objective

The objective of this study is to find out what the purchase effects are when healthier snacks become the implicit default, by making them more prominent and reachable at the impulse shelf, without changing the availability of unhealthy snacks. Furthermore, it would be relevant to know what consumers think about being 'nudged' into a more healthful direction.

Health problems caused by an unhealthy diet have great implications for the worlds population. This study will provide insights in how to use the concept of nudging on impulse snacks in order to increase the amount of sold healthy products at check-out counters. A great practical advantage of nudging is that these solutions are low-cost and easy to employ. But, up to now the concept of nudging is new and in the developing stage, and therefore not often empirically proven [14].

1.3 Research questions

The sub questions that will be answered in this report are:

- To what extent could this particular nudge influence consumers to buy healthier snacks at impulse shelves?
- Does nudging work better for specific individuals?

1.4 Structure of report

This report consists of two parts, a conceptual chapter in which hypotheses are put forward based on existing literature and an empirical chapter which reports on the conducted lab and field study.

Conceptual chapter (chapter 2)

The conceptual background will deal with previous research regarding the subjects of shelf management, nudging and consumer decision making processes regarding impulse snacks. These studies will be used to obtain a prediction pattern and to formulate hypothesises.

Empirical chapter

The first reported experiment is a lab study which is done in order to get a grasp of the underlying psychological mechanisms of choice behaviour and to test the conditions. The lab study was carried out online with a questionnaire meant for Dutch student participants from the Wageningen University. Four conditions of assortment layouts were tested in which we manipulated shelf location and proportion of healthy and unhealthy snack products available. Each participant was randomly assigned to one of the conditions in which he or she had to pick one snack product from a virtual shelf. After making their choice, participants responded to various questions about choice satisfaction, shelf perception and personality characteristics. In both studies, healthy snack products consisted of one portion, pre-packaged, minimally processed fruit or vegetables and unhealthy snack products consisted of one portion candy bars, gingerbread, cereal bars and crisps.

Although the lab study gave us a high degree of control, it has some disadvantages such as a less realistic choice environment (not many students choose their snacks online) with students as participants. Therefore, to gain insight outside a laboratory context, we repeated

the experiment in a more realistic choice environment. This field study provided a more true-to-nature outcome and can therefore increase scientific knowledge on this subject. The field study was conducted at the staff canteen of 'De Gelderse Vallei' hospital in Ede. Four conditions were tested, each for one week, in which we again manipulated shelf location and proportion of healthy and unhealthy snack products available. The canteen has a daily visit of approximately 500 staff members. In front of the check out counter a shelf was placed with multiple rows on which the snacks products were displayed.

To conclude, chapter 5 discusses the findings of both studies and their theoretical and practical implications. In addition, directions for future research will be brought up.

2. Conceptual background

This section integrates relevant literature on consumers' choice behaviour, providing a conceptual framework and a set of field testable hypotheses. It is in this study's interest to consult previous research to find out what can influence consumers' impulse purchase choice regarding snack products. The main question will be; What determines the healthiness of the snack chosen at the check-out counter of stores? After the concept of nudging is explored in more detail, the possible influences of impulse buying are being discussed.

2.1 Nudging

Consumers make their purchase decisions in an environment in which many signals and cues can influence their decision. They are often not aware of the strong influence of the environment on their decision. The goal of nudging is to help consumers make better choices (as judged by themselves) without banning certain products or telling them how to live. This philosophy is also called libertarian paternalism [21]. In other words, nudging is the concept of moving consumers towards a healthier choice, by giving them a gentle push in the right direction.

Boyd and Bahn (2009) argue that early research in examining consumer decision making behaviour assumed that consumers use a systematic processing strategy when selecting a product. This means that every item in a product assortment is systematically assessed by a consumer to determine its utility in order to evaluate the offer. However, in reality consumers are often under time pressure and make quick decisions. In many cases, a heuristic-based approach is followed in order to select a preferred product. One of the features of this heuristic-based approach is minimized processing effort [22]. John, Smith and Stoker (2009) state that when consumers of today are faced with decisions, they can not think of every single available option and consequently not always make the optimal choice because of cognitive limitations. A consumers' cognition helps them to focus on things and ignore others and is driven by heuristics, emotions, habits, defaults and norms [23]. Nowadays consumers use heuristics such as availability of the most preferred option, presentation within an assortment or the amount of shelf space devoted to an assortment to select a product [22]. This stimulus driven decision making system enables nudging to work.

According to Thaler, Sunstein and Balz (2010), the person who creates the environment in which consumers make decisions is a choice architect [21]. Choice architectures have a variety of tools at their disposal to initiate a nudge. For instance, defaults, feed-back options and structuring complex choices. This study will focus on the default nudge, and therefore only discuss this particular nudge. The default nudge is first implemented in an organ donor study which is conducted by Johnson and Goldstein (2003) in eleven different countries. They showed that when the default option for organ donation was turned around in seven of those eleven countries, from non donor (and the option to become a donor) to donor (and the option to become non donor), far more people agreed to be a organ donor compared with the four countries that still maintained the initial default: non donor [24].

When it comes to food, most of the time the default choice that is being offered to consumers is the unhealthy and less preferred choice. When you order crisps or sodas you will probably get the regular version instead of the light one. The same applies for canteens and self-service restaurants where most of the default snack offer, displayed at the check out counter, is unhealthy. As discussed in the introduction, while customers wait in line to pay, it is more likely that they get tempted to purchase one of these impulse snacks because self-control drops. In this study we try to nudge participants by changing the default option from unhealthy to healthy snacks. We will use two different tools in order to turn around the default, which are shelf location and proportion of unhealthy and healthy snacks.

2.2 Conceptual framework

Consumers make impulse choices every day. A substantial part of these choices involve self-control issues that cause consumers to choose between alternatives that are rewarding in the long run but unappealing in the present, and alternatives that provide immediate gratification with delayed cost. The first ones are typically called virtues (i.e., healthy snacks) and the latter ones vices (i.e., unhealthy snacks) [25]. Choosing virtue over vice requires self-control, because vices can be very tempting [26]. As discussed earlier, this issue of self-control certainly holds for passing the impulse shelves at the check-out counter. Consumers may be distracted, do not use rational thoughts and let the environment steer their purchase behaviour [12, 19]. People often find themselves selecting an indulgent option that is contrary to what they actually had intended or what is in their best interest. Healthier options (i.e., virtues) tend to be easier to justify in general but situational factors can provide reason to choose the unhealthy option (i.e., vices) [27]. But which factors influence these vice versus virtues choices? The conceptual framework below is used to give structure to the concepts that influence these type of impulse choices. The framework is based on the classic steps in consumer decision making models, and concepts from the literature of self-regulation [28, 29, 30].

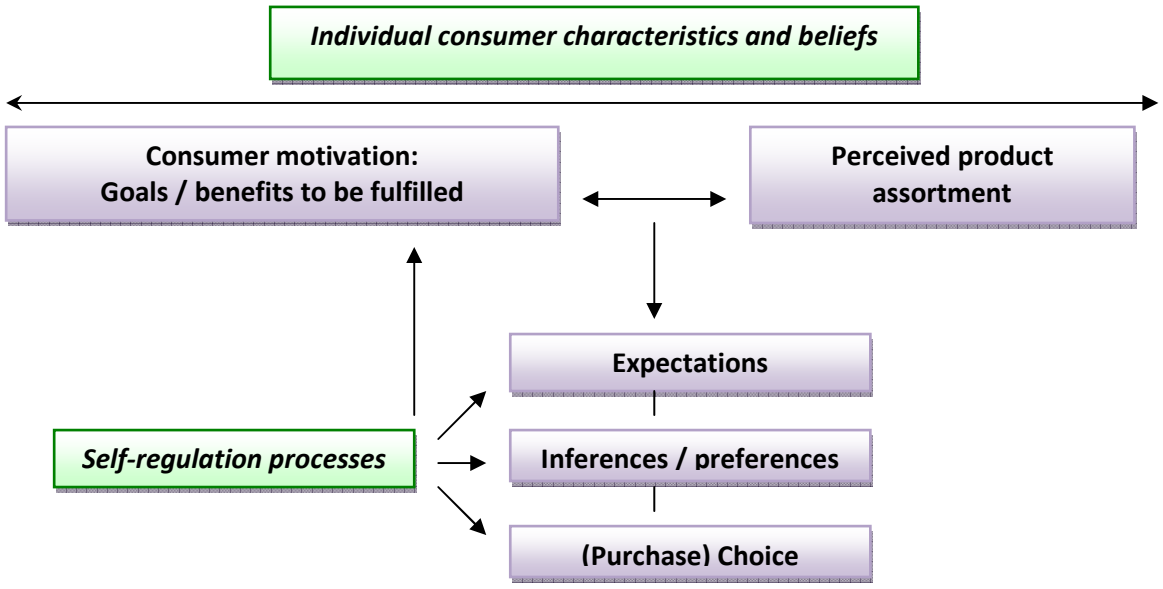

Figure 1. Conceptual framework

Consumer motivation: goals / benefits to be fulfilled

Underlying needs motivate consumer purchase behaviour. Consumer needs can originate from either an internal or external source. An internal source causes consumers to feel a state of discomfort, for example feelings of hunger or boredom, which may arouse needs [31]. So, consumers can actually seek for a product that fulfils their need when they enter a supermarket, a restaurant or a gas station shop [32]. However, this is not the case with impulse buying behaviour. Like mentioned before this type of purchase behaviour is stimulus driven, meaning that the consumer does not have a pre existed idea about what he or she is going to buy . Impulse buying originates from an external source which may lead consumers to realise that they have a need. For example, an in-store advertisement or the sight of a shelf with chocolate bars can serve as external stimuli that arouses the recognition of a need [31, 32]. In the case of the chocolate bar example, the exposure to the sight of these palatable snack products can for instance induce a response of appetite to consumers [33].

Particular goals and benefits that have to be fulfilled will influence choice behaviour. Examples of such desires-for benefits might include convenience, time saving, health and comfort. A lot of these desires have changed over the years, causing consumers to change their snack behaviour. Duffey and Popkin (2010) show that peoples' snacking episodes and amount of snacks per episode have increased, compared to 30 years ago. Moreover, the types of snacks have also changed since then, causing children and adults to increase their snack intake by approximately 180 kcal per snacking occasion [34]. But, what do consumers exactly look for in a snack nowadays? In a food choice questionnaire conducted by Carrillo *et al*., (2010) different motivations were measured on importance. They found that consumers generally find the motivation of ''sensory appeal'' the most important to buy a food product, followed, in order of importance, by price, convenience, natural content, ethical concern, health, weight control, mood and familiarity [35]. The motivations were measured on a number of different items or reasons to choose a food product. The most important reason within the sensory appeal motivation is 'the product has to look nice'. When it comes to the price motivation it may not be too expensive. This is in line with a study conducted by French *et al*., (2010) which showed that snack purchasers at vending machines were very price responsive when making choices. When prices dropped 10%, sales increased significantly [36].

When it comes to the category of convenience the most important reason is that the food has to be easy to prepare for consumption. Concerning natural content the most important is that the product must not contain any artificial ingredients. Within the motivation of ethical concerns the most important reason is that the product' origin is clearly marked on the product. The most important reason concerning health motivations is that the product contains a lot of vitamins and minerals. When we turn to weight control the product has to be low in calories. When it comes to mood the most important is that the food product helps the consumer to relax. And finally, within the category of familiarity the most important reason to choose a food product is that the product is the one that is usually being eaten [35].

Types of snack products that were not around 30 years ago, but can be an alternative for unhealthy types of snacks, are the minimally processed pre-packaged fruits and vegetables, like Beatz and snack tomatoes. These types of snacks are becoming more and more popular

[37]. Ragaert *et al*., (2003) show that in the case of minimally processed vegetables, 'convenience' and 'speed' were rated the most important motivations to buy these products. For minimally processed fruits, 'delicious' was rated as number one motivation to purchase these products. The researchers also found that importance of health as motivation to buy minimally processed fruits and vegetables scored relatively low [37].

Perceived product assortment

This is one of the more obvious levels of the framework that can influence consumer choice behaviour. But, it is not only assortment and assortment size that influences choice, also factors like shelf position and relative proportion vice/virtue and extrinsic cues in the environment can have an impact.

In shopping environments, the sensory receptors of consumers can be triggered by smells, sounds, tastes, textures and sights [38]. All these sensory stimuli can be defined as environmental stimuli. Processing all sensory stimuli at the same time is impossible; therefore consumers always keep focus on a few stimuli in the environment. They filter the incoming information on the bases of relevancy and preferences. When a property of a product draws the attention of the consumer, it is being perceived and therefore belonging to the attended stimuli. Neisser (1967) called this phase reduction; ''the process where the brain reduces the amount of stimuli because of efficiency gains'' [39]. According to Brinck (2003) attention is the phase where consumers have an increased awareness of something either external or internal to the subject [40]. But, what determines whether a product enters the first screening? According to Wansink *et al*., (2002) visibility and convenience are important factors in this process. The researchers showed that a hedonic product like chocolate is consumed more often when it is visible and easy to get to [41]. These findings were confirmed by Wansink, Painter and Lee in 2006, when they underscored that proximity and visibility of food can consistently increase an adult's consumption of it [42]. Increased effort (i.e., ease, access and convenience) to obtain a food item decreases it consumption. The effort it takes to get to a food often explains which foods people prefer [43]. This may also explain why products within reach are chosen more often than the products that are positioned on the bottom shelf.

Consumers often draw conclusions on a product depending its position on the shelf. For example, products on the end-of-aisle display are expected to be on discount. However, prior research in this field has found inconsistent results and product specific effects for space allocation [44]. It is in the interest of this study to find out which position and space allocation on the shelf has an advantage (i.e., a more favourable evaluation, higher sales and/or a higher choice likelihood).

When we turn to the number of facings a product gets we find contradictory results. On the one hand, Drèze, Hoch and Purk (1994) claim that the number of facings only seem to have limited effects on sales and choice likelihood, far more important is the location on the shelf. The authors found that a facing on eye level height has more effect than five facings on the bottom shelf and therefore, most brands would not benefit from multiple facings [45]. However, Chandon *et al*., (2009) found that the number of facings strongly influences attention and evaluation of a product and consequently improve the chances of buying. When a product gets double the amount of facings, likelihood of buying increases, this can

vary from 10% (i.e., for the average brand and consumer) to even 67% (i.e., for occasional users of a low-market-share brand) [46].

The results for shelf position are less contradictory. Drèze, Hoch and Purk (1994) claim that the best shelf position is (slightly below) eye level [45]. This is confirmed by Nierop, Fok and Franses (2006) [72]. Chandon *et al*., (2009) state that positioning products on the top shelves improves their attention and evaluation [46]. Another position concern is the centre-stage effect. This theory states that consumers infer that the products that are positioned on the middle of an array are chosen most often by other consumers and are therefore preferred. This effect is confirmed in a study conducted by Valenzuela and Raghubir (2009) [44].

Although we found inconsistency in the results concerning the number of facings, we presume on the bases of results from Valenzuela and Raghubir (2009) that also the number of facings a product has can infer its popularity and also the norm [44]. Therefore, it is likely that when shelf proportion is in favour of virtue snacks it indicates healthy snacks are the norm and subsequently can positively influence the buying likelihood of those snack products.

Besides the salience of a product it is also important whether a particular product assortment is appreciated by consumers in terms of their implicit expectations and perceptions. A factor belonging to this fase is assortment size, that is the number of available options. Previous research has shown that having more choice options increases satisfaction, as consumers have a higher likelihood that they find a preferred product [47]. On the other hand, large assortment sizes may lead consumers to be less happy with the choices they made due to feelings of regret [27]. Too much choice can be overwhelming. A study conducted in 2008 argued that when consumers get confronted with larger assortment sizes, choices can either shift to the healthy or to the unhealthy options [27]. Choosing from larger assortments logically increases the choice difficulty, and consequently, can cause consumers to choose whatever option that is the easiest to justify. As stated before virtues are generally easier to justify than indulgences causing consumers to pick a virtue when confronted with large assortment sizes. However, the study also showed in two different experiments that when consumers had accessible justifications of indulgence, they tended to choose the hedonic options instead of the utilitarian when assortment sizes where large [27].

Assortment size and variety are also closely linked. It turns out that greater numbers of categories increase perceptions of variety. Subsequently, greater perceptions of variety cause an increase of self-determination, or in other words, a feeling of free choice of one's own actions. Greater self-determination increases consumers' satisfaction [47]. When perceived variety increases it makes consumers believe they will enjoy the assortment more and therefore increases consumption [48].

Inferences / preferences

Consumers relate perceived product information to their pre-existing information to infer meaning about a product [28]. This is also the moment where product preferences can be made. This stage of the conceptual framework deals with these two subjects.

Consumers often draw inferences about a product from brand positioning, from comparable products or from packages [48]. When the 'image' of a product is considered good, the product will probably be preferred. But, inferences are not always based on proper product information. Health halos for instance, cause consumers to underestimate the caloric content of food products such as snacks, because they make consumers think and presume that a particular food item is healthy [48]. 'Naturalness' and 'organic content' are for example claims that are often being used on packages and are closely linked with 'healthiness' by consumers. A study by Schuldt and Schwarz (2010) shows that when a food is described as organic, consumers infer that the food is lower in calories and can be eaten more frequently [49]. However, organic and naturalness do not necessarily mean that a product is healthy. Health claims only promise health-related benefits and therefore should only have an impact on the perception of health-related attributes of a product [50].

Product value is not only determined by the utility that consumers derive from it, there is also a social component involved. For example scarce products tend to be seen as valuable no matter the utility derived from it. According to van Herpen, Pieters and Zeelenberg (2005) there are two routes through which scarcity enhances product choice. The first route, which is related to the bandwagon effect, deals with excess demand. When consumers see that others purchase specific products it can induce them to copy that behaviour, because of conformity or because it helps them to refine their own evaluations [51]. So, excess demands increases inferences about product quality and popularity. The other route deals with the notion of insufficient supply. When specific items are perceived as exclusive it infers quality. This is called the snob-effect [51]. When there is a lack of a specific product this product is seen as scarce. When that product is almost out of stock it can act as a cue of scarcity and therefore enhances its popularity, preference and choice [51].

Wilcox *et al*., (2009) show that also choice sets can have an impact on preference and choice behaviour. They argue that when a healthy choice option is added to a choice set, it vicariously fulfils a consumers' health-related eating goal, causing consumers to focus on the unhealthy choice options and giving them a licence to indulge and therefore choose a unhealthy food item [52].

Another interest of this study is the inference and preference of impulse snack purchasers regarding the offer of snacks at the check-out counter after and before it is being 'nudged'. Do participants notice, and if they do, do they mind the nudge? As far as we know there has not been done any research on this subject. But, critics of nudging stress that the concept is at the expense of consumers' autonomy. There are various authors that claim that people loose their freedom of choice the moment they are being nudged [53, 54]. According to Philip Booth (2011) it undermines freely chosen paternalistic mechanisms. He claims that 'The best form of paternalism is that which evolves naturally in society without the interference of government [53].

Purchase / Choice

This stage of the conceptual framework covers factors within the purchase and choice level. How do consumers experience their snack choice process? As described before, impulse buying can cause internal conflict due to the fact that consumers often do not stick to their long-term health goals but instead find themselves indulging on unhealthy snack products.

When they make a choice that is not in line with their goals and benefits all kinds of negative emotions can arise. In this section satisfaction, regret and guilt will be discussed.

Satisfaction
Feelings of satisfaction are created when consumers compare their expectations and desires with their perceptions of a product's performance. When the perceived performance exceeds the expectations the consumer is satisfied. When the perceived performance falls short on the consumers' expectation the consumer is dissatisfied [55]. It all depends on what the consumer expects from a product. As stated before, one of the things that can cause wrong expectations are health halos.

Regret
Often when a product does not meet a consumers' expectations regret arises. Landman (1993) has defined regret as "a more or less painful judgment and state of feeling sorry for misfortunes, limitations, losses, shortcomings, transgressions, or mistakes" [56]. After the initial feelings of regret, consumers will try to enhance the situation by trying to employ coping strategies, such as brand switching behaviour. In the reflection and evaluation fase that follows after the purchase, consumers compare experienced outcomes and the outcomes that would have occurred under a different choice [57]. Questions like: ''Should I have purchased that unhealthy Mars rather than that healthy cereal bar''? can pop up. According to Bui, Kirshen and Bates (2009) regret can even occur when consumers are satisfied with their present choice. When comparing to alternatives it is not necessarily important how satisfied people are with their current selection but whether the alterative could lead to a more preferred outcome [57].

Guilt
As mentioned before virtues are easier to justify than vices. As a consequence vices induce greater guilt [58]. According to Baumeister *et al*., (1994) guilt refers to the "unpleasant emotional state associated with possible objections to his or her actions, inactions, circumstances, or intentions" [59]. But when consumers select a vice, like an unhealthy snack product, and start to feel guilty about that choice because it is the opposite of what they should have selected (according to their long-term health goals), how do they react? Yi and Baumgartner (2011) state that several strategies exist to cope with feelings of guilt after purchasing impulse products. Mental undoing (i.e., simulating how to have avoid a situation), planning to reduce impulse buying and planning to make up for the monetary loss are three coping strategies that are used in impulse buying [60].

Individual consumer characteristics and beliefs
This part of the model reflects relevant bases on which individuals differ in their decision and choice behaviour. The following defining characteristics of consumers are expected to be relevant in relation to choices made from an impulse assortment of snack foods.

Restrained eating style
Dieting and restrained eating styles are characteristics that have an influence on food choice behaviour. According to Teomans and Coughlan (2008) dietary restraint can be defined as 'the cognitively mediated effort to combat urges to eat' [61]. Consumers with restrained eating styles have set their minds on a particular goal, like preserving a healthy weight,

eating less fatty foods or reducing snacking behaviour. The theory of restrained eating states that restrained eaters' self control is easily broken. After certain disinhibitors, such as commercials or strong emotional states, they tend to eat more, specifically sweet and fatty foods [62]. In particular, a phenomenon called 'what the hell effect' suggests that when consumers neglect their goal-directed behaviour (e.g., eating healthy snacks), they are less likely to take the middle ground (e.g., a compromise snack option) and are more likely to choose an indulgent option (e.g., really unhealthy snack) [52]. Therefore, we predict that, consistent with dietary restrained theory, when particular restrained eaters are reminded of their healthy eating goals at the check-out counter chances are that they will not neglect them and choose the healthy snack option or the compromised option instead.

Attitude and habits

Food choice motives determine the attitudes consumers have towards healthy eating behaviour [63]. Weijzen, de Graaf and Dijksterhuis (2007) state that attitudes play a role when making food choices [64]. Consumers that have greater health concerns have different food choice motives and better subsequent attitudes towards healthy food [63]. For example, a positive health attitude increases intention to choose an apple over a chocolate bar. However, a strong taste attitude increases the intention to choose a chocolate bar over an apple [64]. Weijzen, de Graaf and Dijksterhuis (2007) argue that habitual and past behaviour also influence choice making in the domain of foods. If the intention is congruent with previous behaviour or habits, intention-behaviour consistency is likely. One of the characteristics of habits is automaticity, implying that little effort is needed [64].

Feelings of hunger

According to Weijzen, de Graaf and Dijksterhuis (2007) levels of self-control and the strength of positive attitude towards healthy eating can diminish when consumers get hungry. Consumers with feelings of hunger are more inclined to gave in to impulse buying which often opposes long-term health goals [64]. On the other hand Shimizu, Payne and Wansink (2010) show that people who are not hungry consume the same amount of snacks as consumers who are hungry [65]. Although feelings of hunger do not seem to have effects on the amount of snacks eaten by consumers, we predict that feelings of hunger do have effects on the type of snacks chosen (i.e., an unhealthy choice when hungry).

Emotional triggers

Loxton, Dawe and cahill (2011) argue that emotional states influence eating patterns [33]. The authors state that people in a negative mood often eat to improve their mood. People want to feel good, and when people are upset, the goal of feeling better becomes increasingly central to their actions [19]. Feelings of boredom, depression, anxiety, sadness and tension all have been reported to trigger binge-eating [61]. Emotional distress often contributes to the breakdowns of self-control, as we will see in the next stage. As stated before, levels of high stress periods can cause consumers, especially women, to eat more fatty foods, less fruits and vegetables and more snacks [66, 67, 68]. These foods are often being selected in high stress situations to comfort the consumer or simply because they taste good [19, 35, 61, 67]. Unusan argues that stress resistance can be enhanced by opting a diet that contains large amounts of fruits and vegetables [66].

Because the field study will take place in the staff canteen of a hospital it is possible that stress levels could be a influential factor in this study.

Self-control as a trait

According to Baumeister (2002) there are individual differences when it comes to self-control [19]. One person could be better in controlling impulses, maintaining self-discipline, and regulate emotions than another person. Baumeister (2002) states that people with high levels of self-control probably have to be approached different than people with low levels of self-control, from a marketing perspective. People with high levels of self-control are more vulnerable for purchases that are based on long-term value and benefits. People with low self-control will probably be more attracted to being seduced by the moment, emphasizing on immediate gratification [19].

When this trait of self-control is applied to snacks, and especially to impulse snack behaviour, where virtues are in conflict with vices due to long-term health goals and immediate gratification, it is probably easy to predict what type of snack someone with a high level of self-control will choose from this point of view. Weijzen, de Graaf and Dijksterhuis (2007) confirm this by stating that high levels of self-control enhances sticking to choices with long-term desirable characteristics that correspond with health goals [64].

Self-regulation processes

Consumer choices for snacks at a checkout counter are generally driven by both utilitarian and hedonic considerations. Consumers choosing a snack may care about utilitarian attributes (e.g. price, healthiness) as well as hedonic attributes (e.g. creamy taste). In this part the regulation processes will be defined, which are being created by these multiple considerations.

Goal conflict

Trade-offs between these two dimensions (i.e., utility and hedonism) often involve self-control. According to Baumeister (2002) self-control is the capacity to alter its own states and responses. This means that self-control is the process where a pattern of responses is being override and replaced by other responses. Responses can include thoughts (e.g., suppressing certain thoughts), regulating impulses (e.g., resisting temptations) and changing emotions (e.g., getting into or out a specific state or mood). Goal-conflict happens often in the case of impulse behaviour, where the impulse contradicts some long term goal [19].

But why does self-control fails from time to time when it comes to impulse buying? Self-control can be undermined when standards, a monitoring process or the operational capacity to alter one's behaviour fails. Standards refer to guidelines like norms, goals and ideals that help us how to behave, like a norm that indicates a healthy weight. Consumers that have straightened these standards out and thus know what they want, are less likely to give in to impulse buying. However, emotional distress can contribute to the breakdown in self-control and cause consumers to indulge to vices in order to feel better [19].

The next important factor which can cause self-control to fail is monitoring. Monitoring can be described as keeping track on relevant behaviour. When consumers fail to keep track of, for example, their snack intake, self-control breaks down and they will eat more snacks than when they would have monitored how much they had eaten [19]. The third and last factor of self-control fail is the capacity to alter the self. Is the consumer able to resist the temptation to buy unhealthy snacks? Baumeister (2002) states that the most likely theory explaining why some people can resist certain temptations and others can not is that of willpower and

strength. He argues that there is some energy resource or strength that matches or beats the power of the impulse [19].

When people have conflicting goals which they pursuit, the immediacy effect can occur. This effect is in line with the earlier described present bias theory, which states that consumers pursue immediate gratification rather than sticking to long-run well being goals like obtaining a healthy weight [20]. According to Read, Loewenstein and Kalyanaraman (1999) people are dynamically inconsistent, and have the tendency to change their mind from virtues to vices when the moment of consumption is coming. They demonstrated this immediacy effect by letting participant choose a series of three movies which they had to watch on three different days. Subjects chose the movies from a list that contained both highbrow movies (i.e., virtues) and lowbrow movies (i.e., vices). Half of the subjects chose each movie on the day they would watch it and the other half picked the three movies on the day they started the experiment. The experiment showed that subjects who chose a movie per day had a pattern that was commonly vice-vice-vice as the subjects who made their series of choices at the same time had a preference for the pattern vice-virtue-virtue [25].

Fischach and Zhang (2008) state that people have multiple goals at a time which pose a self-control dilemma when dealing with vices and virtues. They argue that low order goals, which offer immediate but small benefits (i.e., vices), in the self-control dilemma can be labelled temptations [69]. Temptations often compete with long-term goals which provide conflict.

Consumers' goals and environmental cues often remind people of their self-control problems and help them to not give in to desires [69]. Stimuli in the shopping environment can cue the pursuit of goals and temptations. Moreover, they can also activate self-control dilemmas [69]. For example, when consumers walk by an aisle that displays fresh fruits it can remind them of their weight and health goals, when passing by the impulse snacks it can evoke feelings of indulgence. Fishbach and Zhang (2008) argue that when a single goal is activated by a choice set, a person is more likely to adhere and stick with that goal [69]. The authors found, that when healthy and unhealthy foods are being presented together in one choice set and appear to complement each other, consumers will have the preference for the more tempting option (i.e., the vice, the unhealthy food). However, when the two items are being presented in two choice sets and seem to compete each other, consumers prefer to choose for items that are in line with their goals [69]. So, in order to increase the probability that consumers stick to their goals (i.e., eating healthy) shops should create an impulse shelf that makes a distinction between 2 choice sets, a healthy and an unhealthy. Moreover, these choice sets have to evoke a clear notion of competition between each other.

Consumption norms

Determining how much to eat or drink is for many consumers an issue of low-involvement behaviour. Consumption norms are helpful and convenient estimators to determine how much to consume [48]. As stated before the size of snacks have been changed over the previous 30 years [34]. The same goes for the portion sizes; they have been steadily increased since then. The size of packages can increase consumption because it suggest

larger consumption norms [43, 48]. This means the package is perceived as a normal and appropriate amount to eat in one sitting.
According to Wansink (2004) consumption norms can influence consumption behaviour. Norms have an impact on what product is selected and the quantity being eaten [43].
Kahn and Wansink (2004) demonstrated this change of behaviour with the help of the assortment. When they enlarged the assortment structure, either by size or number of available options, participants used consumption norms to steer their behaviour [71].

Accessibility of justification
When consumers are confronted with choice situations that are difficult, they often look for reasons to justify their choices [27]. When it comes to snacking for example, most consumers know that chocolate candy bars are bad for their health, on the other hand they can provide immediate pleasure. In such conflicting situations people typically look for reasons that give them permission to indulge. Options that give consumers convincing and readily justifiable arguments are more likely to be chosen. That means that in most cases it is easier to choose for an utility or virtue product than for a hedonic or vice one. Vices are often not so easy to justify due to feelings of guilt [27]. However, it all depends on which justifications are accessible at the time of making a decision. In the example above it is well possible that consumers who just finished a work out indulge on a vice because they think they 'earned' it. Kivitz and Zheng (2006) call this type of justification 'the cue of entitlement' [70]. Sela, Berger and Liu (2009) argue that also assortment size can influence consumers' access to justifications. According to their study larger assortment sizes lead consumers to resort to accessible justifications, because the decision becomes more difficult [27].

2.3 Hypothesis
This part of the report will discuss the various hypotheses that will be tested during the lab and field study. A distinction has been made between hypothesises which deal with shelf differences and individual differences. Hypotheses H1 till H3 will be tested in both the lab study and field study. H4 till H6 will be tested only in the lab study.

Shelf differences

H1: Consumers are more likely to choose a healthy product when the majority (75%) of the shelf consists of healthy snack products compared with the situation where the majority (75%) consists of unhealthy snacks, irrespective of shelf location.

H2: Consumers are more likely to choose a healthy product when those are positioned on the top shelves compared with the situation when they are on the bottom shelves, irrespective of proportion.

H3: Consumers are more likely to choose a healthy product when 75% of the total shelf consists of healthy snacks which are on the top shelves compared to the situation where they are on the bottom shelves.

Individual differences

H4: Consumers with dietary restraints and eating styles will choose a healthy product over an unhealthy product irrespective of the proportion healthy/unhealthy or shelf location.

H5: Hungry consumers will pick unhealthy snack products more often than consumers who are not hungry, irrespective of the proportion healthy/unhealthy or shelf location.

H6: Consumers with high levels of self control will stick more to their long-term health goals than consumers with low self control and will therefore pick the unhealthy snacks less.

3. Method

3.1 Lab study

The first study is an online experimental study in which we investigate the effect of assortment structure on snack choices, product perceptions, implicit expectations and inferences.

3.1.1 Participants

Dutch students from the Wageningen University were sampled by email and by personal recruitment at the main building of the university. Potential participants were approached and asked whether they were willing to participate in an online study. When they agreed, the URL to the questionnaire was sent to them by e-mail.

3.1.2 Research design

A virtual shelf with four rows of snack products was developed, on which sixteen snack products were displayed, both healthy and unhealthy ones. This study has a between subjects design with two factors, of which one is location - with two levels, which are top rows and bottom rows. The other factor is proportion of healthy / unhealthy snack products – with two levels, which are 25% and 75%. There are four conditions, in which we have manipulated the proportion and the location of the products on the shelf.

In the first condition the top rows are being used to display the healthy snacks (75% of total shelf space), the bottom row is used for unhealthy snacks (25% of total shelf space). In the next condition we turn the location and proportion around – the healthy snacks (25% of the total shelf space) are now positioned on the bottom row and the unhealthy snacks (75% of the total shelf space) are positioned on the top rows.
The figure below shows these two conditions.

+	+	+	+
+	+	+	+
+	+	+	+
-	-	-	-
+= virtue -=vice			

-	-	-	-
-	-	-	-
-	-	-	-
+	+	+	+
+= virtue -=vice			

Figure 2. 75% healthy top condition (left) and 25% healthy bottom condition (right)

In the third condition we place the healthy snacks (75% of total shelf space) on the bottom rows and the unhealthy snacks (25% of total shelf space) on the top row. In the fourth, and last, condition we turn the location and proportion around – the healthy snacks (25% of total shelf space) are now being placed on the top row and the unhealthy snacks (75% of total shelf space) are being put on the bottom rows.
The figure below shows these two conditions.

-	-	-	-
+	+	+	+
+	+	+	+
+	+	+	+
+= virtue -=vice			

+	+	+	+
-	-	-	-
-	-	-	-
-	-	-	-
+= virtue -=vice			

Figure 3. 75% healthy bottom condition (left) and 25% healthy top condition (right)

Students were randomly assigned to one of these conditions. Afterwards, they got some communal questions. The research design is graphically displayed in Figure 4. Figure 5 shows one of the four virtual shelves that participants had to select one snack from.

Condition 1	Condition 2	Condition 3	Condition 4
Snack proportion: 75% healthy 25% unhealthy **Snack location:** Top healthy Bottom unhealthy	**Snack proportion:** 25% healthy 75% unhealthy **Snack location:** Top unhealthy Bottom healthy	**Snack proportion:** 75% healthy 25% unhealthy **Snack location:** Top unhealthy Bottom healthy	**Snack proportion:** 25% healthy 75% unhealthy **Snack location:** Top healthy Bottom unhealthy
Communal 7-point scale questions about choice satisfaction and shelve perception			
Communal background questions			

Figure 4. Research design

Figure 5. Screenshot of one of the virtual shelves (75% healthy, on bottom shelves)

3.1.3 Procedure

This part describes the procedure of the lab study.

Recruitment of participants

The majority of the students was sampled by e-mail. Students of the Wageningen university have the opportunity to subscribe to a newsletter in which studies are announced that seek for participants. This database currently holds approximately 1200 students from the Wageningen University. These students received an e-mail with an invite to participate in this study and the web link. A smaller amount of students was recruited personally by walking through the Forum building asking whether they wanted to participate.

Questionnaire design

When the participants open the link to the survey they first got an informed consent. When the participant decided to take part in the study the proceed button was clicked. The next page gave a situation description, saying that the participant has to imagine that he or she is passing the university canteen around four o'clock in the afternoon and that he or she notices all kinds of different snack products that are displayed at the checkout counter. Next, the participant had to pick a snack from the shelf from which he or she was randomly assigned to. After the choice, communal questions about the condition were displayed on the next page. Participants could now click on their desired answers and submit them. Finally, the background questions were displayed and could also be filled in and submitted. At the bottom of the last page the participant was asked if he or she wanted to submit an e-mail address in order to possibly win a voucher of €25,-, which was raffled when the lab study had ended. Filling in the questionnaire took approximately 10 minutes per participant.

3.1.4 Products and health classification

During this study 24 one portion snack products were used, from which twelve healthy and twelve unhealthy. The snacks are defined and grouped on their healthiness according to the Voedingscentrum snack-group system (appendix A). Three categories are used to group the snack products, there is the (A) 'preferred' category, the (B) 'middle course' category and (C) 'very rarely' category. Within this study we considered healthy snack products, items that can be classified in groups A ('preferred' category) and B ('middle course' category) healthy, and items that can be classified in group C ('very rarely' category) unhealthy. A scheme of these products is presented in table 1.

Table 1. Product and health classification scheme

Product category	Brand	Product name	Health classification
Vegetables and fruit snacks	Walking fruit	Apple parts	(A) Preferred
Vegetables and fruit snacks	Walking fruit	Carrot parts	(A) Preferred
Vegetables and fruit snacks	Walking fruit	Little tomatoes	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Strawberry	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Pineapple	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Apple	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Banana	(A) Preferred
Vegetables and fruit snacks	Orange	Orange	(A) Preferred
Vegetables and fruit snacks	Balisto	Green: muesli-mix	(B) Middle course
Vegetables and fruit snacks	Balisto	Yellow: honey-almond mix	(B) Middle course
Vegetables and fruit snacks	Nestle	Fitness Choco muesli	(B) Middle course
Vegetables and fruit snacks	Nestle	Fitness White Choco museli	(B) Middle course
Snacks	Mars	Mars normal size	(C) Very rarely
Snacks	Snickers	Snickers normal size	(C) Very rarely
Snacks	Twix	Twic normal size	(C) Very rarely
Snacks	KitKat	KitKat Chunky normal size	(C) Very rarely
Snacks	Rolo	Rolo normal size	(C) Very rarely
Snacks	M&M	M&M Peanut normal size	(C) Very rarely
Snacks	Skittles	Skittles Fruit normal size	(C) Very rarely
Snacks	Maltesers	Maltesers normal size	(C) Very rarely
Snacks	LU	Chocoprince vanilla normal size	(C) Very rarely
Snacks	Wieger Ketellapper	Snelle Jelle Kruidenkoek	(C) Very rarely
Snacks	Peijnenburg	Complete start Vezels	(C) Very rarely
Snacks	Eat natural	Muesli bar almonds and hazelnut	(C) Very rarely

3.1.5 Measures

Snack choice is the dependent variable in this study. Differences between the conditions can give proof that a particular nudge works the way it is intended. The term snacking is defined in this online survey as: 'the food that is consumed within a timeframe of fifteen minutes, besides breakfast, lunch and dinner'. This definition is used by Popkin and duffy (2010) [34].

The statements from this lab study refer specifically to the snack choices that have been made by the participants. Like mentioned before, these questions are measured on 7-point Likert scales and on 5-point Likert scales. The participant can click the following seven answers when answering 7-point scales questions, I: totally disagree, disagree, slightly disagree, do not disagree / do not agree, slightly agree, agree, totally agree. And the following five answers when answering 5-point scales questions: never, rarely, sometimes, often, very often. Four pre-existing scales are used during this study. Which are a mood scale, a restrained scale, a self-control scale and a taste scale.

Mood scale

We measured how participants felt on a 3-item, 7-point mood scale [73], anchored by 'happy/sad', 'relaxed/stressed' and 'cheerful/depressed'.

Restrained scale

We measured if participants were restrained eaters on a ten-item, 5-point scale [74]. The possible answers are: never, rarely, sometimes, often, very often. The items are displayed in appendix B.

Self-control scale

We measured participants' self-control on a 13-item, 7-point scale [75]. The items are displayed in appendix C.

Taste scale

The taste scale is partly incorporated from previous lab study surveys of the Wageningen University. A six-item, seven-point taste scale was being used, anchored by 'tasty/not tasty', 'healthy/unhealthy', 'good choice/bad choice', 'popular/unpopular', 'familiar choice/unfamiliar choice', 'appealing/unappealing'.

3.1.6 Data analysis

All analyses were conducted with PASW Statistics 18. Tests of the hypotheses were performed using binary logistic regression (with $p \leq 0.05$ set for statistical significance), because we were trying to predict the membership of two categorical outcomes (i.e., healthy and unhealthy choice). The internal reliability for the restrained and self-control scale was analyzed according to Cronbach's alpha coefficient. The restrained eating style scale in this study had Cronbach $\alpha=.91$ according to a reliability analysis, which means that the construct is reliable. We obtained a Cronbach $\alpha=.66$ for the self-control scale, according to a reliability analysis, after reversing items 1(I'm good at resisting temptation,), 6(I refuse things that are bad for me), 8(They say I have an iron self-discipline,) and 11(I can effectively work towards long term goals). When we deleted those four items, the reliability of the scale became Cronbach $\alpha=.78$, which means that the construct is reliable.

3.2 Field study at hospital 'De Gelderse Vallei'

The second study is a field experiment in which we investigate the effect of assortment structure on snack choices.

3.2.1 Participants

Employees of 'De Gelderse Vallei' hospital who visit the main staff canteen.

3.2.2 Research design

As in the lab study, two types of snack products will be offered at an impulse shelf during this study. The shelf was placed in front of the self-checkouts counter in the canteen (figure 6).

Figure 6. Shelf with snacks located near self-service checkout counter

The shelves were filled with vice snack products and virtue snack products. Each row contained several healthy or unhealthy products, depending on the condition. Each condition was on display for one week. Before the data gathering started we gave employees one week the opportunity to get used to our impulse shelf. In this week the shelf was filled with products that would actually be used during the experiment.
The following four conditions were used during this experiment.

In the first condition the top row is used to display healthy snacks (25% of total shelf space) and the unhealthy snacks (75% of total shelf space) are being put on the bottom rows, see appendix D. The condition was displayed from 31 October till 6 November. In the second condition the top rows are being used to display the healthy snacks (75% of total shelf

space), the bottom row is used for unhealthy snacks (25% of total shelf space), see appendix E. The condition was displayed from 7 November till 13 November.
The figure below shows these two conditions.

+	+	+	+
-	-	-	-
-	-	-	-
-	-	-	-
+= virtue -=vice			

+	+	+	+
+	+	+	+
+	+	+	+
-	-	-	-
+= virtue -=vice			

Figure 7. 25% healthy top condition (left) and 75% healthy top condition (right)

In the third condition we placed the healthy snacks (75% of total shelf space) on the bottom rows and the unhealthy snacks (25% of total shelf space) on the top row, see appendix F. The condition was displayed from 14 November till 20 November. In the fourth, and last, condition, we turned the location and proportion around – the healthy snacks (25% of the total shelf space) are now positioned on the bottom row and the unhealthy snacks (75% of the total shelf space) are positioned on the top rows, see appendix G. The condition was displayed from 21 November till 27 November.
The figure below shows these two conditions.

-	-	-	-
+	+	+	+
+	+	+	+
+	+	+	+
+= virtue -=vice			

-	-	-	-
-	-	-	-
-	-	-	-
+	+	+	+
+= virtue -=vice			

Figure 8. 75% healthy bottom condition (left) and 25% healthy bottom condition (right)

A picture overview taken at the staff canteen of all four conditions can be seen in figure 9.

Figure 9. The four different conditions in practice

All products were sold for €0,85 except for fresh fruits (i.e., apples, oranges and bananas) which are sold for €0,50.

3.2.3 Procedure

Hospital staff has the opportunity to purchase foods and beverages throughout the day at the staff canteen of the hospital. There are two different check out counters, one with cashier and one without (i.e. self service check out). In front of the self service check out the

shelf, containing various healthy and unhealthy products, was placed. In four different conditions, which were displayed for one week each, shelf location and proportion healthy/unhealthy snacks were manipulated. The employees of the canteen have registered the number of sold snacks daily. Care was taken that all snacks were sufficiently available throughout the day by refilling products daily. After the data gathering had ended a link with a survey has been put on the intranet of the Gelderse Vallei. Employees could fill in the survey which contained questions about product perceptions, expectations and inferences. Parts of these data will be used in this report.

3.2.4 Products and health classification

We tried to use the same products as in the lab study as much as possible. However due to the suppliers´ assortment we were bound to a limited set of snack products.
During this study 24 one portion snack products are used, from which twelve healthy and twelve unhealthy. The snacks are again defined and grouped on their healthiness according to the Voedingscentrum snack-group system (appendix A). Also in this study we will consider healthy snack products, items that can be classified in groups A ('preferred' category) and B ('middle course' category) healthy, and items that can be classified in group C ('very rarely' category) unhealthy. A scheme of these products is presented in table 2.

Table 2. Product and health classification scheme

Product category	Brand	Product name	Health classification
Vegetables and fruit snacks	Tommies	Little cucumbers	(A) Preferred
Vegetables and fruit snacks	Vitapep	Little paprika's	(A) Preferred
Vegetables and fruit snacks	Tommies	Little tomatoes	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Strawberry	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Pineapple	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Apple	(A) Preferred
Vegetables and fruit snacks	Beatz	Ice dried Banana	(A) Preferred
Vegetables and fruit snacks	Orange	Orange	(A) Preferred
Vegetables and fruit snacks	Banana	Banana	(A) Preferred
Vegetables and fruit snacks	Apple	Apple	(A) Preferred
Vegetables and fruit snacks	Balisto	Green: muesli-mix	(B) Middle course
Vegetables and fruit snacks	Peijenburg	Happers	(B) Middle course
Snacks	Mars	Mars normal size	(C) Very rarely
Snacks	Snickers	Snickers normal size	(C) Very rarely
Snacks	Twix	Twix normal size	(C) Very rarely
Snacks	Rolo	Rolo normal size	(C) Very rarely
Snacks	Skittles	Skittles Fruit normal size	(C) Very rarely
Snacks	Lays	Chips paprika	(C) Very rarely
Snacks	BiFi	Sausage original	(C) Very rarely
Snacks	Wieger Ketellapper	Snelle Jelle Kruidenkoek	(C) Very rarely
Snacks	Peijnenburg	Complete start Vezels	(C) Very rarely
Snacks	Hero	B'tween hazelnut/almond	(C) Very rarely
Snacks	Snack-A-jack	Mini cheese	(C) Very rarely
Snacks	LU	Chocoprince vanilla normal size	(C) Very rarely

3.2.5 Measures

Snack purchase was the dependent variable in this study.
The employees working at the staff canteen collected the numbers of the sold products daily. These results were communicated to the researchers at the end of each week

(condition). The number of visitors was estimated daily on the basis of the checkout registration. We do not have insight in the unique visitors, only in the total amount of purchases per day.

3.2.6 Data analysis

All analyses were conducted with PASW Statistics 18. Tests of the hypotheses were performed using analysis of variance (with $p \leq 0.05$ set for statistical significance), because we would like to know if the means of the different conditions are equal.

4. Results

4.1 Lab study

In this part of the report the results of the lab study will be presented. First of all there will be a discussion on the demographical data of the respondents that took part in this study. Afterwards, the results of a manipulation check will be discussed in order to determine the differences between respondents across the conditions. At the end, the hypotheses will be tested.

4.1.1 Participants.

In total there were 158 people, mainly Wageningen University students, that took part in this study. From those 158 respondents 55 were men and 103 were women. The mean age of the respondents is 22 years, ranging from the youngest participant, who is 17 years, to the oldest participant, who is 67 years.

4.1.2 Manipulation check

The respondents were fairly distributed among the conditions, the condition with the least participants contained 39 people and the condition with the most participants contained 40 people. The women were distributed quite evenly between the conditions, ranging from 21 to 28 women. The men were a little poorer distributed, ranging from 12 to 18 men. No significant difference has been found between the proportions, the shelf locations or the interaction between the both as far as sex is concerned, respectively, $\chi^2(1, N = 158)= .70$, $p=.40$, $\chi^2(1, N = 158)= 1.37$, $p=.24$ and $F(1, 158)= .90$, $p=.34$. No significant differences have been found between the proportions, the shelf locations or the interaction between the both as far as age is concerned, respectively, $F(1, 158)= .50$, $p=.48$, $F(1, 158)= .97$, $p=.33$ and $F(1, 158)= 3.71$, $p=.06$.

Besides the number, sex and age distribution of respondents across the conditions, another concern that could influence the result of this study is their body mass index (BMI). Self-reported height and weight of most respondents was obtained during the survey (this question was not mandatory). The BMI for the study turned out to be 21,7 with a range of 15,7 to 33,4. According to the World Health Organization a normal body mass is considered to be between 18.50 - 24.99. According to the body mass guidelines of this organization 7,7% of the respondents participating in this study have underweight, 11,6% have overweight and 0,6% suffer from Obesity [76]. These numbers are far less compared to current figures of the Dutch society [52]. With an ANOVA we assessed whether respondents were equally distributed among the conditions as far as their BMI is concerned. We found no significant body mass difference between proportions and locations and their interaction, respectively, $F(1, 156)= .13$, $p=.71$, $F(1, 156)= .27$, $p=.60$ and $F(1, 156)= 3.07$, $p=.08$.

Another factor that needs attention is eating type. In the survey four questions have been asked concerning this factor. First of all there is a statement saying; 'I concern myself a healthy eater'. Which is answered with an average score of 4,85, although no significant difference was found across proportions, locations and the interaction of the both, respectively, $F(1, 158)= 1.02$, $p=.32$, $F(1, 158)= 1.30$, $p=.26$ and $F(1, 158)= .03$, $p=.89$.

Second, there is a statement saying; 'Are you slimming at the moment?'. Which was answered with an average score of 1,89, although no significant difference was found across proportions, locations and the interaction of the both, respectively, F(1, 158)= .93, *p*=.34, F(1, 158)= .40, *p*=.53 and F(1, 158)= .03, *p*=.86. The third question concerning the factor eating type is; 'How many snack moments do you have a day?'. This open-ended question is answered with an average score of 2,5 snacks a day. Again, according to an ANOVA, no significant difference has been found across proportions, locations and the interaction of the both concerning the daily amount of snacks eaten by the respondents, respectively, F(1, 115)= .39, *p*=.54, F(1, 115)= .03, *p*=.86 and F(1, 115)= 2.30, *p*=.09.

The last question determining the eating type of respondents is; 'Are there certain foods that you do not eat because of your health (e.g. allergies) or other considerations?'. 42 respondents had some type of diet, but only 15 of them had adopted a diet that could influence the results of this study (e.g. no chocolate, no nuts, no apples etcetera.). No significant differences have been found between proportions, locations and between the interaction of the both as far as diet is concerned, respectively, $\chi^2(1, N = 158)= ,07$, *p*=.79, $\chi^2(1, N = 158)= ,07$, *p*=.79 and F(1, 158)= 1.96, *p*=.16.

Next, we turn to another factor which could manipulate results, feelings of hunger. The question; 'How hungry are you at this moment?' is answered with an average score of 2,87, although no significant difference was found between proportions, shelf locations or the interaction of the both, respectively, F(1, 158)= .01, *p*=.94, F(1, 158)= 1.06, *p*=.31 and F(1, 158)= 1.69, *p*=.20.

Finally, we have also included two scales, restrained eating style (appendix B) and self-control (appendix C), which could influence results. The restrained eating style construct has an average score of 2,20. No significant difference has been found between proportions, locations and their interaction as far as restrained eating style is concerned, respectively, F(1, 158)= .07, *p*=.79, F(1, 158)= 3,56, *p*=.06 and F(1, 158)= .39, *p*=.53.

The self-control construct has an average score of 3,85. A significant difference has been found for proportion concerning the self-control of participants in this study, F(1, 158)= 8,95, *p*=.00. A post hoc LSD test showed that the self-control of participants who were assigned to the 25% healthy proportion (*M*=3.62) shelves significantly differed from the 75% proportion shelf (*M*=4.08) (*p*=.00). No significant differences have been found for location and for the interaction between proportion and location, respectively, F(1, 158)= .98, *p*=.33 and F(1, 158)= .49, *p*=.49.

The discussed factors are presented below in table 3.

Table 3. Check whether randomization of participants was successful (SD)

location	**Top**		**Bottom**		***P*-value**		
Proportion healthy snacks	**75%** (n= 39)	**25%** (n= 40)	**75%** (n= 40)	**25%** (n= 39)	**Proportion**	**Location**	**Interaction**
Men	18 resp.	13 resp.	12 resp.	12 resp.	.40	.24	.34
Women	21 resp.	27 resp.	28 resp.	27 resp.	.40	.24	.34
Age	22 (6.86)	21 (2.82)	21 (3.20)	24 (10.72)	.48	.33	.06
BMI	21.88 (3.00)	21.30 (2.07)	21.37 (2.52)	22.25 (2.74)	.71	.60	.08
I concern myself a healthy eater*	5.08 (1.20)	4.85 (1.17)	4.82 (1.24)	4.67 (1.12)	.32	.26	.86
Are you slimming at the moment?**	1.90 (0.85)	1.78 (0.95)	2.03 (1.14)	1.85 (0.96)	.34	.53	.86
How many snack moments do you have a day?	2.63 (1.08)	2.43 (0.99)	2.34 (0.87)	2.78 (1.01)	.54	.86	.09
Are there certain foods that you do not eat because of your health (e.g. allergies) or other considerations?	5 resp.	2 resp.	3 resp.	5 resp.	.79	.79	.16
Feelings of hunger***	3.18 (1.89)	2.85 (1.78)	2.55 (1.45)	2.92 (1.66)	.94	.31	.20
restrained eating ****	2.11 (0.74)	2.06 (0.69)	2.26 (0.86)	2.36 (0.69)	.79	.06	.53
Self-control*****	3.95 (0.99)	3.60 (0.96)	4.20 (0.99)	3.64 (0.84)	.00	.33	.49

*Answers from 1(not at all) to 7(very much)
**Answers from 1(not at all) to 5(very much)
*** Answers from 1(not hungry at all) to 7(very hungry)
**** Answers from 1(indicating no restrained eating style) to 5(indicating restrained eating style)
***** Answers from 1(indicating high self-control) to 5(indicating low self-control)

All the factors that could possibly influence the results are distributed equally among the conditions except for the factor self-control (significant main effect for proportion). In the next part of this chapter the hypotheses will be tested.

4.1.3 Hypotheses testing

We will now turn to the snack choices respondents made. In total, 46 respondents chose for a healthy snack product and 112 chose for an unhealthy snack product. A total overview of the chosen snacks per condition can be seen in table 4. In the following parts we will take a closer look at the shelf differences of the conditions and how this influences snack choice. Afterwards, we will discuss whether, and if yes, how much, individual differences influence snack choice.

Table 4. Overall picture of chosen snacks

Proportion	**Position**	**Total snacks chosen**	**Healthy**	**Unhealthy**
25% healthy	Top	40	7	33
75% healthy	Top	39	17	22
75% healthy	Bottom	40	18	22
25% healthy	Bottom	39	4	35
TOTAL		**158**	**46**	**112**

Shelf differences

Hypothesis 1 states that 'Consumers are more likely to choose a healthy product when the majority (75%) of the shelf consists of healthy snack products compared to the situation where the majority (75%) consists of unhealthy snacks, irrespective of shelf location'. 35 respondents chose a healthy snack in the 75% healthy conditions and 11 respondents chose a healthy snack product in the 25% healthy snack conditions. As can be seen in the table 5 below, the addition of proportion(*p*=.01) to the model is statistically significant. In other words this variable does explain variations in turnout. Consumers that are exposed to a shelf with 75% of the assortment consisting of healthy snacks are 3.64 times more likely to choose a healthy snack than consumers who are exposed to a shelf with 25% of the assortment consisting of healthy snack products.
This means that H1 is supported.

Hypothesis 2 states that 'Consumers are more likely to choose a healthy product when those are positioned on the top shelves compared with the situation when they are on the bottom shelves, irrespective of proportion'. 24 respondents chose a healthy snack when the top shelves were filled with healthy snacks. 22 respondents chose a healthy snack product when the bottom shelves were filled with healthy snacks. As can be seen in table 5, the addition of the factor shelf location(*p*=.90) to the model is not statistically significant. Consumers are not more likely to choose a healthy product when those are positioned on the top shelves compared with the situation when they are placed on the bottom shelves. This means that H2 is not supported.

Hypothesis 3 states that 'Consumers are more likely to choose a healthy product when 75% of the total shelf consists of healthy snacks which are on the top shelves compared to the situation where they are on the bottom shelves'.
In the condition where 75% of the total shelf consisted of healthy snacks which where placed on the top shelves, 17 participants choose a healthy snack. In the condition where 75% of the total shelf consisted of healthy snacks which where placed on the bottom shelves, 18 participants choose a healthy snack. As can be seen in table 5, the addition of the interaction proportion*shelf location (*p*=.41) to the model is not statistically significant. Consumers are not more likely to choose a healthy product when 75% of the total assortment is healthy and positioned on the top shelves, compared with the situation when 75% of the total assortment is healthy and placed on the bottom shelves. This means that H3 is not supported.

Table 5. Proportion and location differences on choice behaviour

		95% CI for Odds Ratio			*P*-value
	B (SE)	**Lower**	**Odds Ratio**	**Upper**	
Included					
Constant	.26 (.32)	-	1.29	-	.43
Proportion 25% in relation to 75% healthy	1.29 (.53)	1.30	3.64	10.23	.01
Shelf location bottom in relation to top healthy	-.06 (.45)	.39	.94	2.30	.90
*Proportion*Shelf location*	.68 (.81)	.40	1.97	9.62	.41
R^2= .11 (Hosmer & Lemeshow), .12 (Cox & Snell), .16 (Nagelkerke).					

Individual differences

Hypothesis 4 states that 'Consumers with dietary restraints and eating styles will choose a healthy product over an unhealthy product irrespective of the proportion healthy/unhealthy or shelf location'. As can be seen in the table below, restrained eating style (*p*=.01) has got a significant main effect on the type of chosen snack (i.e., healthy or unhealthy). Consumers scoring high on the restrained eating scale (indicating a restrained eating style) are 1.05 times more likely to choose a healthy snack. However, the main effect of snack diet and the interaction effects snack diet*proportion and restrained eating style*proportion do not have a significant effect on the type of chosen snack (i.e., healthy or unhealthy). H4 is partly supported. Consumers with restrained eating styles will choose a healthy product over an unhealthy product irrespective of the proportion healthy/unhealthy or shelf location consumers with a snack diet will not.

Table 6. Restrained eating style and diet differences on choice behaviour

		95% CI for Odds Ratio			*P*-value
	B (SE)	**Lower**	**Odds Ratio**	**Upper**	
Included					
Constant	1.47 (.98)	-	4.33	-	.13
Proportion 25% in relation to 75% healthy	.65 (2.10)	.03	1.92	18.56	.76
Shelf location bottom in relation to top healthy	.60 (.70)	.46	1.82	7.16	.39
*Proportion*Shelf location*	.02 (.86)	.19	1.02	5.53	.99
Restrained eating style	.05 (.60)	.33	1.05	3.37	.01
*Proportion*Restrained eating style*	.59 (.58)	.58	1.80	5.60	.31
Diet	.35 (.78)	.31	1.42	6.57	.66
*Proportion*Diet*	-5.72 (.36)	.88	1.77	3.55	.11
R^2= .16 (Hosmer & Lemeshow), .16 (Cox & Snell), .23 (Nagelkerke).					

Hypothesis 5 states that 'Hungry consumers will pick unhealthy snack products more often than consumers who are not hungry, irrespective of the proportion healthy/unhealthy or shelf location'. In table 7 can be seen that hunger (*p*=.50) does not have a significant main effect on the type of snack (i.e., healthy or unhealthy) consumers pick. Also the interaction effect hungry*proportion (*p*=.29) is not significant. Therefore, H6 is not supported. Hungry consumers will not pick unhealthy snack products more often than consumers who are not hungry, irrespective of the proportion healthy/unhealthy or shelf location.

Table 7. Hunger differences on choice behaviour

		95% CI for Odds Ratio			*P*-value
	B (SE)	**Lower**	**Odds Ratio**	**Upper**	
Included					
Constant	-.04 (.54)	-	.97	-	.95
Proportion 25% in relation to 75% healthy	2.04 (.90)	1.33	7.71	44.73	.02
Shelf location bottom in relation to top healthy	.00 (.46)	.40	1.00	2.47	1.00
*Proportion*Shelf location*	.63 (.82)	.38	1.88	9.34	.44
Hunger	.09 (.14)	.84	1.10	1.44	.50
*Proportion*Hunger*	-.25 (.23)	.50	.78	1.23	.29
R^2= .12 (Hosmer & Lemeshow), .12 (Cox & Snell), .17 (Nagelkerke).					

The final hypothesis, H6, states that 'Consumers with high levels of self-control will stick more to their long-term health goals than consumers with low self control and will therefore pick the unhealthy snacks less'. Table 8 shows that self-control (*p*=.20) does not have a

significant main effect on the type of snack (i.e., healthy or unhealthy) consumers pick, nor does the interaction self-control*proportion (*p*=.54). Therefore, H7 is not supported.

Table 8. Self-control differences on choice behaviour

		95% CI for Odds Ratio			*P*-value
	B (SE)	**Lower**	**Odds Ratio**	**Upper**	
Included					
Constant	-.93 (.98)	-	.40	-	.34
Proportion 25% in relation to 75% healthy	.50 (1.63)	.07	1.65	40.38	.76
Shelf location bottom in relation to top healthy	-.14 (.46)	.35	.87	2.16	.77
*Proportion*Shelf location*	.72 (.83)	.41	2.06	10.38	.38
Self-control	.30 (.24)	.85	1.35	2.15	.20
*Proportion*Self-control*	.27 (.44)	.55	1.31	3.13	.54
R^2= .14 (Hosmer & Lemeshow), .14 (Cox & Snell), .20 (Nagelkerke).					

To conclude, we turn to some statements answered by respondents about the assortment in order to determine if answers differed across the factors. Table 9 shows that non of the statements turn out to be significant on the factors except for the statements: 'The products in the assortment are attractive' and 'The products in the assortment are surprising'.
The factor proportion has a significant effect on the statement: 'The products in the assortment are attractive', F(1, 158)= 5.92, *p*=.02. Participants who were confronted with the conditions consisting mainly of unhealthy snacks (i.e., 25% healthy) think that the products on that shelf are more attractive than participants who were confronted with the conditions consisting mainly of healthy snacks (i.e., 75% healthy). Proportion has a significant effect on the statement: 'The products in the assortment are surprising', F(1, 158)= 5.50, *p*=.02. Participants who were confronted with the conditions consisting for 75% of healthy snacks think that the products on that shelf are more surprising than participants who were confronted with the conditions consisting mainly of unhealthy snacks.

Table 9. mean figures per condition (SD)

location	**Top**		**Bottom**		***P*-value**		
Proportion healthy snacks	**75%** (n= 39)	**25%** (n= 40)	**75%** (n= 40)	**25%** (n= 39)	**Proportion**	**Location**	**Interaction**
My choice is popular*	4.64 (1.33)	4.38 (1.41)	4.73 (1.15)	4.21 (1.28)	.06	.84	.54
I picked a trusted choice*	5.23 (1.51)	5.18 (1.47)	5.10 (1.63)	5.46 (1.39)	.52	.75	.38
The products are attractive*	4.69 (1.17)	5.03 (1.46)	4.63 (1.43)	5.31 (1.15)	.02	.61	.40
The products are diverse*	4.82 (1.57)	4.10 (1.81)	4.85 (1.72)	4.64 (1.58)	..08	.29	.34
The products are surprising*	4.69 (1.73)	4.12 (1.80)	4.85 (1.55)	4.18 (1.54)	.02	.69	.85
I felt free in making a choice*	5.59 (1.37)	5.55 (1.71)	5.20 (1.95)	5.79 (1.34)	.28	.78	.22
I felt I was helped in making a choice*	3.05 (1.47)	2.62 (1.46)	2.90 (1.80)	2.82 (1.52)	.31	.93	.49
I felt influenced by the situation**	4.56 (1.89)	4.95 (1.75)	4.95 (1.84)	4.87 (1.82)	.60	.60	.43
I felt controlled in making a choice**	5.44 (1.41)	5.78 (1.19)	5.50 (1.66)	5.41 (1.60)	.60	.52	.36

*Answers from 1(not at all) to 7(very much) **Answers from 1(very much) to 7(not at all)

So, although the products in the 75% healthy conditions look less attractive and are more surprising than in the 25% healthy conditions, participants do choose more healthy snacks in the 75% healthy conditions than in the 25% healthy conditions.

Other interesting notions are that consumers overall seem to feel free (*M*= 5,53), they do not feel that they are being helped (*M*= 2.85), they do not feel influenced (*M*= 4.83) and do not feel controlled (*M*= 5.53) when making their choice. This can give proof that this particular default nudge does not limit respondents' feelings of autonomy and therefore the nudge does not feel like patronizing in any way.

4.2 Field study

In this part of the report the results of the field study will be presented. First of all there will be some information about the respondents that took part in this study. Afterwards, the results will be discussed in order to determine the differences between purchases across the conditions.

4.2.1 Participants.

In total 291 snack products have been sold to hospital staff in the four weeks the conditions were up. We do not know exactly how many unique customers have bought snacks, and how many snacks each customer has purchased. We do know that in the time span of these four weeks 10.248 customers moved through the checkout counter. We will also use this number as the estimation of total visitors, because it gives the best prediction. The number of visitor varies between approximately 2489 and 2698 a week.

4.2.2 Hypothesis testing

We will now turn to the snack purchases subjects made. In total, 200 healthy snack products and 91 unhealthy snack products have been sold. An overview of the total amount of sold snacks and a estimation of the total amount of visitors per week is presented below in table 10. A graphical display of the relative number of weekly sold snacks is presented in figure 10.

Table 10. Overall picture of sold snacks

Week	Proportion	Position	Total snacks sold	Healthy	Unhealthy	Visitors
Week 1	25% healthy	Top	56	33	23	2489
Week 2	75% healthy	Top	108	91	17	2698
Week 3	75% healthy	Bottom	75	65	10	2489
Week 4	25% healthy	Bottom	52	11	41	2608
TOTAL			**291**	**200**	**91**	**10248**

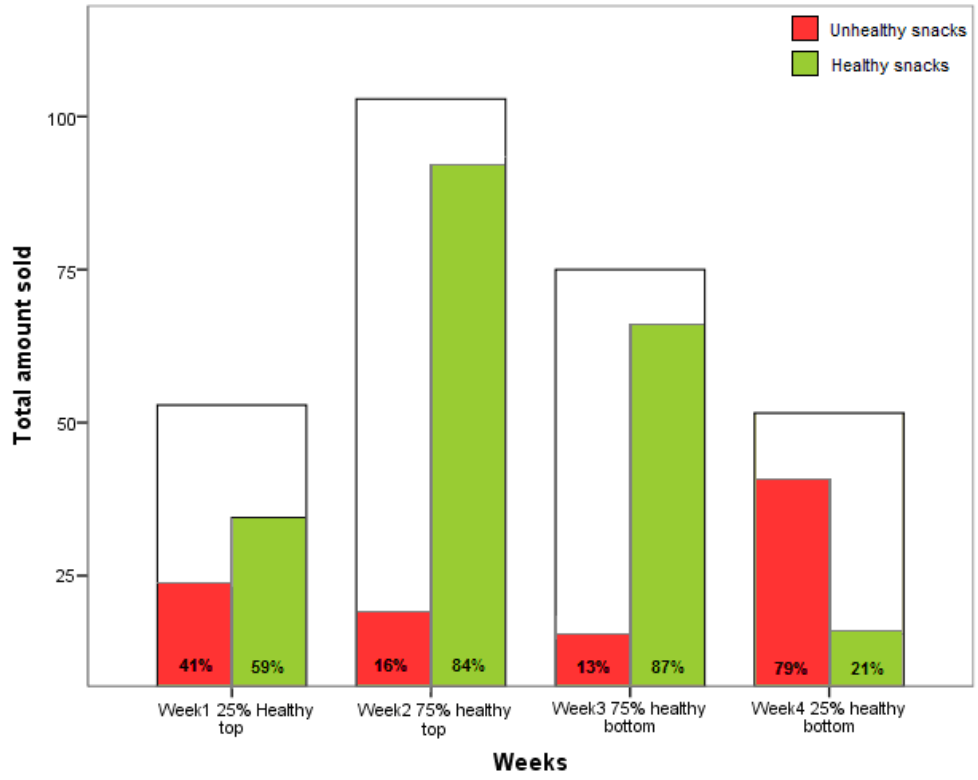

Figure 10. Relative overview of sold snacks

In the following parts we will take a closer look at the shelf differences of the conditions and how this influences snack choice. As stated before the hypothesis that will be tested are the hypothesis concerning shelf differences (i.e., H1 – H3).

Hypothesis 1 states that 'Consumers are more likely to choose a healthy product when the majority (75%) of the shelf consists of healthy snack products compared to the situation where the majority (75%) consists of unhealthy snacks, irrespective of shelf location'. 156 healthy snacks have been sold in the 75% healthy conditions and 44 healthy snack products have been sold in the 25% healthy snack conditions. Proportion turned out to be a significant influence when it comes to snack choice, $F(1, 28)= 6.24$, $p=.02$. This means that consumers are more likely to choose a healthy product when the majority (75%) of the shelf consists of healthy snack products compared to the situation where the majority (75%) consists of unhealthy snacks.

Hypothesis 2 states that 'Consumers are more likely to choose a healthy product when those are positioned on the top shelves compared with the situation when they are on the bottom shelves, irrespective of proportion'. 124 healthy snacks have been sold when the top shelves were filled with healthy snacks. 76 healthy snack products have been sold when the bottom shelves were filled with healthy snacks. Location turned out to be not significant when it comes to snack choice, $F(1, 28)= 1.52$, $p=.23$. This means that consumers are not more likely to choose a healthy product when those are positioned on the top shelves compared with the situation when they are on the bottom shelves.

Hypothesis 3 states that 'Consumers are more likely to choose a healthy product when 75% of the total shelf consists of healthy snacks which are on the top shelves compared to the

situation where they are on the bottom shelves'. In the condition where 75% of the total shelf consisted of healthy snacks which where placed on the top shelves, 91 healthy snacks have been sold. In the condition where 75% of the total shelf consisted of healthy snacks which where placed on the bottom shelves, 65 healthy snacks have been sold. The interaction proportion*location turned out to be not significant when it comes to snack choice, $F(1, 28)= 0.93$, $p=.34$. This means that consumers are not more likely to choose a healthy product when 75% of the total shelf consists of healthy snacks which are on the top shelves compared to the situation where they are on the bottom shelves.

To conclude, we turn to some of the survey data which was gathered the weeks after the experiment was ended. 92 respondents filled in the questionnaire completely, of which 10 were men. Age is 41.4 (SD=11.3). Of this group, 37% noticed the change of assortment at the checkout counter. All respondents wrote that the snack assortment was enlarged or different, although no one noted that the snacks offered changed weekly. Table 11 shows which shelf condition is expected the most at the check out counter according to the participants. As can be seen, the 75% top condition is expected most of all conditions. This is also the condition in which most snacks were sold during the experiment.

Table 11. Shelf at check out expected (SD)?

	25% healthy bottom	**25% healthy top**	**75% healthy top**	**75% healthy bottom**
I would expect such a shelf in the surrounding of the check out	4.7 (1.8)	4.9 (1.8)	5.2 (1.6)	4.9 (1.7)

Items were measured on 7-point scales ranging from 1 (totally disagree) to 7 (totally agree)

5. Discussion

This chapter will discuss the conclusions, implications and limitations of this study. Moreover, recommendations will be presented for future research. The aim of this study was to find out whether the factors *shelf location* and *proportion* of healthy/unhealthy snack products could be altered in the layout of an impulse shelf at the check-out counter of a canteen, in order to increase the relative number of sold healthy snack products. We will first discuss the conclusions of the lab study. After, we will discuss the conclusions of the field study.

Lab study
Looking at the data of the lab study we can conclude that proportion of healthy/unhealthy snack products is a good tool to use in order to increase the relative number of chosen healthy snacks. Consumers that are exposed to a shelf with 75% of the assortment consisting of healthy snacks are 3.64 times more likely to choose a healthy snack than consumers who are exposed to a shelf with 25% of the assortment consisting of healthy snack products. This finding can be linked to the study of Chandon *et al*., (2009) although they looked at product levels instead of product groups (i.e., healthy products vs. unhealthy products). These authors found that the number of facings strongly influences attention and evaluation of a product and consequently improves the chances of buying [46].
Although it is more likely for consumers to pick a healthy product from a shelf with 75% healthy snacks compared to a shelf with 25% healthy snacks, the products in the 75% healthy conditions are overall defined as less attractive and more surprising than in the 25% healthy conditions.

Shelf location however does not have any effect on the relative number of sold healthy snack products, although this probably has to do with the way the snacks were presented (see limitation section). This is in contrast with previous findings from Drèze, Hoch and Purk (1994), Nierop, Fok and Franses (2006) and Chandon *et al*., (2009) who claim that the best shelf position is (slightly below) eye level on the top shelves [46, 45, 72].
Overall, this means that the extent to which this particular nudge influences consumers to buy healthier snacks at impulse shelves, is quite large due to the effects of the factor proportion.

Another interest of this study was to gain more knowledge about whether of not nudging works better for specific individuals. It seems that nudging does not work better for specific individuals. Differences in self-control, restrained eating styles and hunger do not have any effects on reactions to nudging. This is in contrast with the findings of Weijzen, de Graaf and Dijksterhuis (2007), who claim that consumers with feelings of hunger are more inclined to gave in to impulse buying which often opposes long-term health goals and state that high levels of self-control enhance sticking to choices with long-term desirable characteristics that correspond with health goals [64].

To conclude, this particular default nudge did not limit lab study respondents' feelings of autonomy, consumers felt free to chose their snack and did not felt helped or controlled whatsoever. Therefore, it seems that nudging them this way does not give feelings of

patronization, a claim which is made often by critics of nudging, like the authors Booth (2011) and Wells (2010) [53, 54].

Field study
Concerning the factors proportion and location the same appears as in the lab study. Again, like in the lab study, proportion of healthy/unhealthy snack products is a good tool to use in order to increase the relative number of sold healthy snacks. Like in the lab study this finding can be linked to the study of Chandon *et al*., (2009) although they looked at product levels instead of product groups (i.e., healthy products vs. unhealthy products). These authors found that the number of facings strongly influences attention and evaluation of a product and consequently improves the chances of buying [46]. Also in this experiment location did not have an effect on the purchase behaviour of consumers. This is in contrast with previous findings from Drèze, Hoch and Purk (1994), Nierop, Fok and Franses (2006) and Chandon *et al*., (2009) who claim that the best shelf position is (slightly below) eye level on the top shelves [46, 45, 72]. Furthermore, it seems that healthy snacks like, little cucumbers and tomatoes used in the field experiment are pretty popular among hospital staff.

Implications
This section will discuss the practical implications of this study.

Proportion of healthy/unhealthy snack products turns out to be a suitable factor in order to change peoples choice behaviour towards a more preferred and healthier snack choice. Self-service restaurant, school canteens, grocery stores and gas station shops can alter the proportion of healthy/unhealthy snacks at their impulse shelves at the check out in order to make healthy snacks the default option. As mentioned before, these days snacking accounts for a substantial part of daily calorie intake, snacking episodes and amount of snacks per episode have increased [34]. As far as we know, there are only a limited amount of field studies available that put this concept of default nudging to the test. More research has to be done in order to create stable results and develop nudges that push consumers towards a healthy snack choice.

Another matter that results from the field study is the fact that snack vegetables and fruits are quite popular among hospital staff. The introduction of these healthy snacks in other catering businesses could be interesting for entrepreneurs as well as customers.

Limitations and future research
First of all, the lab study has a number of limitations. There are a couple of obvious matters, like the fact that respondents do not represent Dutch society, they did not intended to buy the chosen product and the products are not presented in a way that they are displayed in a real shopping situation. We chose to assign the healthy and unhealthy snacks randomly to the different conditions because we were not interested in the differences between individual products but strictly in the difference between healthy and unhealthy products. However, looking back, some products could be more or less preferred by respondents which could have an effect on the outcome.
Besides these obvious limitations there are also some less obvious ones:

- We did not find any effects as far as shelf location is concerned. This can be caused due to the way of presenting the impulse shelf in the online survey. Every condition is presented on screen, manipulating the place on the shelf (i.e., top half of the screen versus the bottom half of the screen) will not be as likely to influence choice behaviour as compared to a real offline impulse shelf where you have to look up and down, bent over and reach up to see and select a snack product.
- We measured participants' self-control by letting them answer a self-control scale. However, we should not have asked them these questions right after they made their snack choice, due to a possible priming effect. We probably did not measure self-control as a stable characteristic. We should have incorporated the self-control scale well before or well after they made their snack choice.
- Not every product in the lab study has the same measures. For instance, an orange is bigger than a muesli bar, and a bag of Beatz is bigger than a ginger bread. However, we tried to make the images of the snacks as much the same size as possible. In future research actual sizes could be taken into account for more true to nature outcomes.

The field study did also have a number of limitations. Like in the lab study, the sample (i.e., hospital staff) do not represent Dutch society and the products are probably not presented in a way that they are displayed in a real shopping situation. Again, in this experiment, we chose to assign the healthy and unhealthy snacks randomly to the different conditions because we were not interested in the differences between individual products but strictly in the difference between healthy and unhealthy products. However, looking back, some products could be more or less preferred by respondents which could have an effect on the outcome.
Besides these obvious limitations there are also some less obvious ones:

- De Gelderse Vallei is a hospital that has a very special interest in nutrition. The hospital positions itself as 'the nutrition hospital' in the Netherlands. This may make the staff working at this hospital more aware of health in relation to their food choices. And in this way, this could have impacted the results of the field study, in that healthy foods are more appreciated than could be expected in regular hospitals.
- The daily counting of sold snacks was done by employees of the canteen. It is possible that minor mistakes have been made in this task . This could have had an influence on the data gathering and subsequently on the results, although we have no signals that is occurred.
- We were unable to determine the amount of unique visitors a day. We could only make estimations on the bases of the amount of transactions provided by the check-out. Our data does not show it when customers purchase goods multiple times a day.
- We have tried to alienate the factor price in this study. Therefore, all products are being sold for €0,85, except for fresh fruits (i.e., apples, oranges and bananas) which are sold for €0,50. This was possible because the hospital also has its own pricing policy which is almost at cost price. Most self-service restaurants and canteens have a profit policy and therefore do not maintain these relatively low prices.

This study aimed to study the influence of proportion as well as shelf location of healthy and unhealthy snacks on consumer choice behaviour. Shelf location does not have an effect on snack choice but proportion does. This partly supports previous research in this domain. This

lab study showed that this particular default nudge does not limit consumers' feelings of autonomy. Consumers felt free to chose their snack and did not felt helped or controlled whatsoever. Therefore, it seems that nudging them this way does not give feelings of patronization.

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Appendices

Appendix A *'Het Voedingscentrum' snack-group system*

Er is een onderscheid gemaakt door middel van drie categorieën, namelijk:

- Bij voorkeur (A): deze producten hebben een positieve invloed op het realiseren van een voeding die is gericht op de preventie van chronische ziekten.
- Middenweg (B): deze producten hebben een neutrale invloed op het realiseren van een voeding die is gericht op de preventie van chronische ziekten.
- Bij uitzondering (C): deze producten hebben een negatieve invloed op het realiseren van een voeding die is gericht op de preventie van chronische ziekten.

Table 12. Snack group system of Dutch Nutrition Centre

Hoofdgroep	Definitie	(A) voorkeur	(B) middenweg	(C) bij uitzondering
Groente en fruit	Alle groente en fruit ook die waarbij het totale eetbare gedeelte van het uitgangsproduct nog in het eindproduct aanwezig is (en dus niet door bijv. filtratie is verdwenen).	Onbewerkte groente en fruit	Bewerkte groente en fruit VV: ≤ 1,1 g/100 g TV: ≤ 0,1 g/100 g VZ: ≥ 1,3 g/100 kcal Na: ≤ 200 mg/100 g TS: ≤ 2,5 g/100 g	Bewerkte groente en fruit VV: > 1,1 g/100 g TV: > 0,1 g/100 g VZ: < 1,3 g/100 kcal Na: > 200 mg/100 g TS: > 2,5 g/100 g
Kaas	Alle soorten kaas, inclusief smeerkaas, roomkaas, al dan niet met toevoegingen. Kaassubstituten.	VV: ≤ 12g/100 g TV: niet toegevoegd Na: ≤ 900 mg/100 g TS: niet toegevoegd	VV: ≤ 16 g/100 g TV: niet toegevoegd Na: ≤ 900 mg/100 g TS: niet toegevoegd	VV: > 16 g/100 g TV: wel toegevoegd Na: > 900 mg/100 g TS: wel toegevoegd
Snacks	Alle hartige, zoete en ijsproducten die vooral bedoeld zijn om tussen de maaltijden door te gebruiken (hartige snacks (chips, noten en zoutjes, gefrituurde snacks), koeken, gebak, snoep, chocolade, ijs, ook toetjes die niet op basis van zuivel zijn).	EN: ≤ 75 kcal/portie VV: ≤ 13 en% TV: ≤ 1,3 en% Na: ≤ 400 mg/100 g TS: ≤ 20 gr/100 g	EN: ≤ 110 kcal/portie VV: ≤ 1,3 en% d TV: ≤ 1,3 en% d Na: ≤ 400 mg/100 g TS: ≤ 20 gr/100 g	EN: > 110 kcal/portie VV: > 13 en% d TV: > 1,3 en% d Na: > 400 mg/100 g TS: > 20 gr/100 g

EN Energie
NA Natrium
TS Toegevoegd suiker
TV Transvetzuren
VV Verzadigd vet
VZ Voedingsvezel

Appendix B *Restrained scale (Van Strien, 1986)*

1. Wanneer je iets zwaarder bent geworden, eet je dan minder als dat je gewoonlijk doet?
2. Probeer je minder te eten tijdens maaltijden dan dat je eigenlijk zou willen?
3. Hoe vaak weiger je eten of drinken omdat je bang bent dat je zwaarder wordt?

4. Houd je exact bij wat je eet?
5. Eet je opzettelijk producten waarvan je afvalt?
6. Wanneer je teveel hebt gegeten, eet je dan de daarop volgende dagen minder?

7. Eet je opzettelijk minder om te voorkomen dat je zwaarder wordt?
8. Hoe vaak probeer je geen tussendoortjes te nemen omdat je op je gewicht let?

9. Hoe vaak probeer je 's avonds niet te eten omdat je op je gewicht let?
10. Houd je rekening met je gewicht wanneer je eet?

Appendix C *Self-control scale (Tangney et al., 2004)*

1. Ik ben goed in het weerstaan van verleidingen
2. Ik vind het moeilijk om slechte gewoonten af te leren
3. Ik ben lui
4. Ik zeg vaak ongepaste dingen
5. Ik doe dingen waarvan ik weet dat ze slecht voor me zijn, als ze leuk zijn

6. Ik weiger dingen die slecht voor me zijn
7. Ik zou graag willen dat ik meer zelfdiscipline had

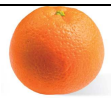
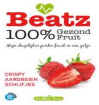
8. Ze zeggen dat ik een ijzeren zelfdiscipline heb
9. Plezier en lol staan mij soms in de weg wanneer ik dingen moet afmaken

10. Ik heb problemen met concentratie
11. Ik kan effectief toewerken naar lange termijn doelen
12. Ik kan soms niet met bepaalde dingen stoppen, zelfs als ik weet dat ze slecht zijn
13. Ik handel vaak zonder alle alternatieven mee te nemen in mijn overwegingen

Appendix D *Field study condition 25% healthy of total shelf space positioned on top*

 **Beatz Ananas Fruitcrisps**	 **Snack Tomaat**	 **Appel**	 **Balisto Groen**
 **Chocoprince koek**	 **Bifi worst**	 **Snack-A-jack Cheese**	 **Snelle Jelle**
 **Mars**	 **Rolo**	 **Skittles Fruit**	 **Twix**
 **Peijenburg Complete start**	 **Hero B'tween**	 **Chips paprika**	 **Snickers**

Appendix E *Field study condition 75% healthy of total shelf space positioned on top*

 Balisto Groen	 Snack Komkommer	 Beatz Banaan Fruitcrisps	 Sinaasappel
 Beatz Aardbei Fruitcrisps	 Appel	 Peijenburg Happers	 Snack Paprika
 Banaan	 Beatz Ananas Fruitcrisps	 Snack Tomaat	 Beatz Appel Fruitcrisps
 Peijenburg Complete start	 Bifi worst	 Snack-A-jack Cheese	 Mars

Appendix F *Field study condition 75% healthy of total shelf space positioned on bottom*

 **Chocoprince koek**	 **Bifi worst**	 **Mars**	 **Hero B'tween**
 **Beatz Aardbei Fruitcrisps**	 **Snack Komkommer**	 **Beatz Ananas Fruitcrisps**	 **Peijenburg Happers**
 **Appel**	 **Balisto Groen**	 **Snack Tomaat**	 **Beatz Banaan Fruitcrisps**
 **Snack Paprika**	 **Banaan**	 **Beatz Appel Fruitcrisps**	 **Sinaasappel**

Appendix G *Field study condition 25% healthy of total shelf space positioned on bottom*

 **Peijenburg Complete start**	 **Snack-A-jack Cheese**	 **Chips paprika**	 **Snickers**
 **Mars**	 **Bifi worst**	 **Hero B'tween**	 **Snelle Jelle**
 **Chocoprince koek**	 **Rolo**	 **Skittles Fruit**	 **Twix**
 **Snack Komkommer**	 **Balisto Groen**	 **Beatz Appel Fruitcrisps**	 **Banaan**