Making healthy behavior more accessible

The effects of nutrition shelf labels and a goal priming message on attitude, perceived behavioral control and healthy decision making in the supermarket

Date: 20-05-2019
Word count: 12.504
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ABSTRACT

***Objective**: Consumers aim at adopting a healthier lifestyle but in practice often fail to succeed in making healthier decisions in the supermarket. According to market research, this is caused by a lack of understanding of nutrition information. This study focused on measuring the effectiveness of simplified nutrition labels on shelves and of a health supporting goal priming message on attitude and healthy decision making in the supermarket. Also the effect of nutrition labels on perceived behavioral control (PBC) was measured. **Method**: This online experiment aimed at resembling a realistic supermarket setting containing an interactive dairy section. The experiment had a 2 (nutrition label vs no label) x 2 (goal priming message vs no message) between-subjects design. Labels were placed around the shelf price tags. The goal priming was placed on the floor in front of the dairy aisle. Participants were asked to view the dairy section screen and thereafter choose a product of their preference. Additional questions were about their attitude and PBC. **Results**: Results showed that there were no main effects and no interaction-effects of both nutrition labels and a goal priming message on healthy decision making. Also, there was no effect of nutrition labels on PBC and attitude. There was in fact a negative effect of a goal priming message on attitude. **Conclusions**: Results suggest that goal priming messages are not as effective as expected. There is reason to believe that the ineffectiveness of nutrition labels was related to the fact that it was tested in the dairy section. Actually, for several reasons it might be beneficial to replace a goal priming message with another technique that helps strengthening self-regulating skills. Combining nutrition labels and such technique might be able to positively influence healthy behavior in the supermarket.*

Keywords: nutrition labels; goal priming message; healthy, supermarket

1. Introduction

Obesity is currently one of the main Western diseases with 48.7 percent of adults in the Netherlands being overweight and 13.9 percent suffering from obesity (Gezondheidsenquête/Leefstijlmonitor CBS in cooperation with RIVM, as cited in Volksgezondheidenzorg.info, n.d.). This rate has increased to such a large extent despite the efforts of the local government, noncommercial businesses, primary schools and high schools, who all focused this last decade on providing tools to stimulate healthy decision making. Also although 94 percent of the Dutch consumers express the willingness to improve their health (Gfk & Rabo Research, 2016), in practice this has previously not been enough to diminish the number of overweight and obesity to large extent in the Netherlands.

Former research (Gfk & Rabo Research, 2016) that mapped public opinion towards and strategies regarding healthy behavior, showed that 86 percent of consumers attempt to eat healthier by narrowing down their unhealthy product purchases. In practice, they often aim to accomplish this goal by consulting food labels. Actually, these food labels are the main source of information regarding product healthiness for 72 percent of the consumers that attempts to narrow down unhealthy purchases. This finding explains why consumers, besides taking into account price and taste (Kalnikaitė, Bird, & Rogers, 2013), frequently consult nutritional value information on labels before making a decision in the supermarket (Food Marketing Institute, as cited in Sutherland, Kaley, & Fischer, 2010; Grunert, Fernández-Celemín, Wills, Storcksdieck genannt Bonsmann, & Nureeva, 2010). Still, one third of the Dutch population says not to have enough nutrition knowledge to determine whether a product is healthy or not (GfK & Rabo Research, 2016). In this, the Dutch are not the only population that battles with this problem. Interestingly, it has been shown that in the United States and in other European countries food labels are often considered incomprehensible and overly complicated as well (Cowburn & Stockley, 2005). This issue points out the need for a label that is easy to understand and therefore makes healthy food behavior more accessible for the general population.

Yet, the places where the actual food decisions are made — e.g. supermarkets — against all odds have only implemented limited strategies to guide consumers through this process. Instead, supermarkets appeared to take a neutral stand in food advocacy, promoting both healthy and unhealthy food products, while food manufacturers were given the responsibility to help consumers distinguish healthy from unhealthy products. However, food manufacturers have doubtful priorities regarding the content they place on their products, since profit is often prioritized in their marketing strategies. Also, food manufacturers frequently use different kinds of labels, which causes more mental chaos with consumers (Lobstein and Davies, 2009). Fortunately, recent developments in the Netherlands have attempted to create order in this chaos. One such development is the implementation of a unified sugar guideline in the shelves of a front running supermarket

chain, namely Albert Heijn. These guideline labels are placed around the price tags of products. The sugar guideline aims at facilitating better understanding of the nutritional levels of sugar content for different products by providing consumers with summarized information. This facilitation was accomplished by making use of the Multiple Traffic Light System (MTLS).

The MTLS is a system that is based on the Traffic Light System (TLS) that was developed in the UK (Government United Kingdom, 2013). It provides a method for showing easily understandable nutrient specific guidelines for otherwise complicated information. These guidelines not only simplify information through a rating of a products most defining nutrients, but also uses a color spectrum – i.e. green, amber and red – to characterize these ratings. Here, green refers to good, amber to neutral and red to bad levels of nutritional value. Thus, the MTLS is a method for portraying simplified nutrition information per product through text and color and by that facilitates the ease within which products can be evaluated.

Previously, most studies tested MTLS labels on product packages. However, hardly any research has been conducted on measuring the effect of the MTLS labels on shelves. In order to develop an effective and universal supermarket strategy for profiling summarized product information, there is great value in first investigating whether the effectiveness of MTLS labels is also observed when these labels are placed on shelves. In order to provide an extensive image of the effectiveness of MTLS nutrition labels, not only healthy decision making, but also attitude towards healthy eating behavior and perceived behavioral control over healthy eating are included in this study.

Next to the use of nutrition labels, there are also opportunities in the use of textual messages that support healthy behavior. These messages could be used to prime behavioral goals. Goal priming is the phenomenon in which an external cue triggers the activation of a goal that is set by the external environment. This influences mental processing and behavior that contribute to goal achievement (Custers & Aarts, 2005). There is reason to believe that a textual goal priming message in the supermarket might influence attitude towards healthy behavior and healthy decision making in the supermarket.

To this date, no studies have yet focused on measuring the combined effect of nutrition labels and goal priming messages. Intriguingly, if this content would appear to be more effective together than separately, this would give new insights in effective in-store health promotions.

RQ: To what extent do nutrition labels and goal priming messages influence attitude towards healthy eating behavior and healthy decision making in the supermarket and to what extent do nutrition labels influence perceived behavioral control over healthy eating?

This study is renewing because it tests MTLS nutrition labels on shelves. Besides the fact that this specific type of label has not been tested yet, this study is also renewing because of the setting of the experiment. This study took into account prior research limitations on the field of goal priming messages, and was for that reason especially focused on creating a realistic supermarket environment online. On that account, this study is more realistic than most prior studies that measure the effect of goal priming messages online. In addition to the scientific purposes, this study might serve practical purposes for supermarket strategies involving the promotion of healthy behavior in-store.

2. Literature review

This literature review consists of three sections, starting with an explanation of the Theory of Planned Behavioral, which relates to the dependent variables of this study. Next, the theoretical framework regarding the nutrition labels and goal priming messages and the relation they hold with the dependent variables was explained. Last but not least, existing literature regarding the expected interaction-effect between nutrition labels and goal priming messages is discussed.

2.1 The Theory of Planned Behavior

The Theory of Planned Behavior (TPB; Ajzen, 1991; figure 1) finds its' roots in the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and is a leading model in explaining and forecasting consumer behavior. As opposed to the TRA, which only takes complete volitional control into account by measuring the attitude and subjective norm, the TPB takes both complete volitional and incomplete volitional control into account, by including 'Perceived Behavioral Control' (PBC) as a predictor. PBC relates to the belief in whether someone possesses the resources and opportunities to perform certain behavior (Ragin, 2010). Within the TPB, PBC together with the attitude and subjective norm influences behavior through intention. Next, PBC also directly affects behavior without the mediating role of intention. Ajzen (1991) states with his TPB that an increase in attitude, subjective norms and PBC lead to an increase in intention, which will positively affect

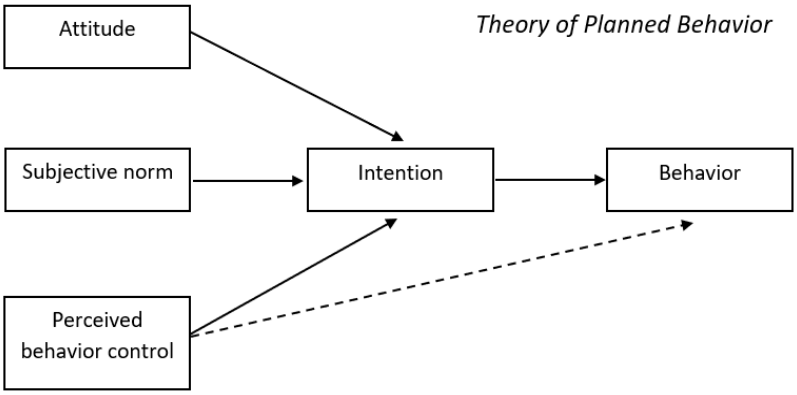


Figure 1 - Theory of Planned Behavior. Adapted from "The Theory of Planned Behavior," by I. Ajzen, 1991, *Organizational Behavior and Human Decision Processes, 50*, p. 182. Copyright 1991 by Academic Press, Inc.

behavior. At the same time, PBC also directly influences behavior positively.

2.2 Nutrition labels

Based on the Command on Nutritional Value Information Declaration in the Netherlands (NVWA, n.d.) and the Nutritional Labeling and Education Act in the United States (FDA, 1995), food manufacturers are required to provide consumers with nutritional value information on the package of their food items. Therefore, food manufacturers provide this information most of the time on the side or backside of their food packages in order to meet the requirements but not let it overshadow their own marketing and sales strategy. On the contrary, the nutritional values that food manufacturers do build their marketing and sales strategy around, are often emphasized on a more prominent place: the Front-Of-Package (FOP). Positioning information on a place where consumers notice it more, such as on the FOP or on shelves, is an interesting strategy for persuading consumers into purchase for the reason that it decreases consumers' effort to make a healthy decision.

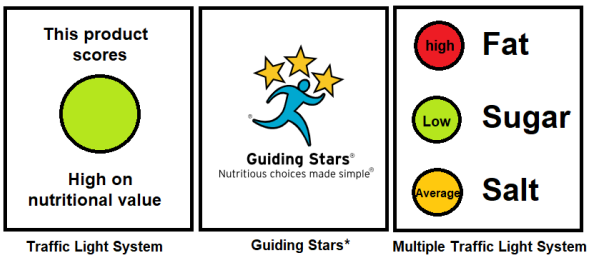
There are three types of information-processing efforts — also known as costs — that are identified for consumers who want to build their purchase decision upon nutritional value information (Russo, Staelin, Nolan, Russell, & Metcalf, 1986): the collection effort, the computation effort and the comprehension effort.

1. *The collection effort*
   This cost is based upon the effort someone experiences when gathering the most important information for well-considered decision making. This effort reduces as it gets easier to gather the information someone wants to base a decision on.
2. *The computation effort*
   This cost might be experienced after the collection effort. It is defined as the effort it takes to draw a conclusion on the overall nutritional value of a product based on the available information. Beside the fact that this is perceived as an effort, correct interpretation also demands high numeracy skills (Rothman et al., 2006). Summarized nutritional information therefore not only reduces computation effort but also the likelihood of incorrect calculations.
3. *The comprehension effort*
   This cost can be defined as the effort it takes to draw conclusions about a product based on its nutrients. For example, consumers can see that a product is high in fibre or fat, but they need actual comprehension of the nutrients in order to find out whether this is a good or a bad thing. Often, comprehension effort is therefore based on more factors, such as for example nutrition knowledge.

According to the theory of information-processing efforts (Russo et al., 1986), consumers always weigh up the perceived benefits against the associated costs. To make sure that the benefits outweigh the costs, two strategies can be applied: Increasing the benefits or decreasing the costs. According to Russo et al. (1986) decreasing the costs is the more successful strategy. Labels that are placed on a prominent location, such as on shelves, help to decrease the collection effort. This collection effort is decreased by providing information at the point-of-purchase on different products, which gives consumers easy access to the required information for making a deliberate food choice. This might argue why FOP and shelf labels are effectively increasing healthy decisions (Cameron, Charlton, Ngan, & Sacks, 2016; Graham, Heidrick, & Hodgin, 2015).

Still, although the location of information is of great importance for breaking down the collection effort, it is the content or more specifically the guideline format that targets the most efforts, decreasing both the computation and the comprehension effort. There are different possibilities in formatting guideline labels. Often, a distinction is made between summary guidelines and nutrient specific guidelines (Hersey, Wohlgenant, Arsenault, Kosa, & Muth, 2013).

Summary guidelines can be defined as guidelines that show one symbol that represents the rating of a total product. An example of such is the Traffic Light System (TLS; figure 2), which indicates a products' overall health value through the use of one of the three traffic light colors (Sonnenberg, Gelsomin, Levy, Riis, Barraclough, & Thorndike, 2013; Thorndike, Sonnenberg, Riis, Barraclough, & Levy, 2012). Another example are the Guiding stars (Figure 2; Sutherland et al., 2010). These are similar to the traffic light system except for the fact that they indicate the product rating through stars varying between one to three, instead of colors. In practice, summary guideline systems were repeatedly labeled as too simplistic and incomprehensible (Consommation Logement et Cadre de Vie, as cited in Lobstein & Davies, 2009; Consumentenbond, 2016), which makes it an objectionable method for helping consumers in their decision making. Besides, label readers appear to focus particularly on calories, fat and sugar content (Cowburn & Stockley, 2005), which nutrient levels cannot all be separately deduced from a singular label. The concept of nutrient specific guidelines was a beneficial outcome for these limitations. Nutrient specific guidelines are characterized by rating multiple key nutrients separately. An example is the Multiple Traffic Light System (MTLS; Thorndike et al., 2012; Thorndike, Riis, Sonnenberg, Levy, 2014; figure 2). Since the MTLS appears to be a better fit for consumers' needs, this study focuses on the MTLS rather than the TLS.



Figue 2 - Summary guidelines (Traffic Light System and Guiding Stars) and nutrient specific guidelines (Multiple Traffic Light System).
*Source: Reprinted from *Guiding Stars logo* (n.d.), by Guiding Stars. Copyright 2019 by Guiding Stars Guiding Stars Licensing Company. Retrieved from https://guidingstars.com/

Referring back to the information-processing efforts, nutrition labels using the MTLS draw upon computation effort by using a universal method for providing a short overview of the most relevant information about a product. This makes the information comparison friendly. Also, nutrition labels using the MTLS draw upon comprehension effort, by using colors that indicate whether a certain level of a nutritional value is labeled as something good or bad. This diminishes the need for extensive nutritional knowledge in order to make healthy decisions in the supermarket.

2.2.1 Using nutrition labels for influencing perceived behavioral control over healthy eating

The degree of Perceived Behavioral Control (PBC) is based on internal factors (such as skill and knowledge) and external factors (such as available time; Ajzen, 1991; Godin & Kok, 1996). Normally, as relevant skills are less developed and as consumers have less knowledge and time, their PBC decreases.

Actually, nutrition labels could also help consumers improve their PBC over healthy eating by decreasing the relevance of specific internal and external factors. By way of example, nutrition knowledge that might be useful for comprehension effort might become less relevant with nutrition labels, because less knowledge on nutrition is needed for making healthy decisions. After all, the most determining nutrients for indicating a products' healthiness are already included in the nutrition label and the MTLS provides insight in whether these values are good or bad. Also, numeracy skills (Rothman et al., 2006) that in other situations might be useful for decreasing computation effort, are no longer needed in order to make healthy food choices because information on nutritional value per portion can already be incorporated in the label content. Furthermore, the time that is normally spent on comparing products, is decreased because the nutrition label shows comparison friendly information.

Also, the results from the Gfk and Rabo Research (2016) point out that 67 percent of the Dutch population says that their lack of food knowledge — which causes a low PBC (Ajzen, 1991; Godin & Kok, 1996) — prevents them from making healthy decisions. Based on this information and on the information-processing theory (Russo, Staelin, Nolan, Russell, & Metcalf, 1986), it is expected that nutrition labels will positively influence perceived behavioral control.

H1: Nutrition labels on shelves lead to a higher perceived behavioral control over healthy eating, than shelves that do not contain nutrition labels.

2.2.2 Using nutrition labels for influencing attitude towards healthy eating behavior

Attitude towards behavior can be defined as "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188). Attitude is generally acknowledged as one of the main components of the Theory of Planned Behavior, predicting behavior through intention. Therefore, influencing attitudes is of great value to target behavior change.

Past studies that focused on nutrition labels on packages were able to confirm their effect on attitude (Andrews, Burton, & Kees, 2011; Žeželj, Milošević, Stojanović, & Ognjanov, 2012). This could be explained by the TPB, which states that attitude formation comes from behavioral beliefs (Ajzen, 1991; Ajzen & Madden, 1986). Behavioral beliefs are based on the subjectives' view on the probability that the behavior in question will lead to a certain outcome. Also it is based on the evaluation of this outcome. Thus, in this case the behavioral belief comes from the extent to which the consumer thinks that using nutrition labels lead to healthy eating and to the evaluation of this outcome.

Based on the fact that earlier studies on the Dutch population indicated that the mere part of this population held positive beliefs towards a healthy diet and expressed their reliance on nutrition labels for pursuing a healthy diet (Gfk & Rabo Research, 2016), it is forecasted that also nutrition labels on shelves will have a favorable effect on attitude towards healthy eating behavior.

H2: Nutrition labels on shelves lead to a more positive attitude towards healthy eating behavior, than shelves that do not contain nutrition labels.

2.2.3 Using nutrition labels for influencing healthy decision making

Both nutrition labels on shelves (Cawley et al., 2015; Nikolova & Inman, 2015; Sutherland et al., 2010; Thorndike et al., 2012) and FOP nutrition labels (Andrews et al., 2011; Conquest Research, as cited in Kelly et al., 2009; Thorndike et al., 2012; Thorndike, Riis, Sonnenberg, Levy, 2014) show an increase in healthy decision making as compared to the absence of nutrition labels. However, limited studies focused on the effect of MTLS labels on shelves in supermarkets. For example, Thorndike et al. (2012) and Thorndike et al. (2014) focused on MTLS guidelines on shelves, but those were located in hospital cafeteria's. Cawley et al. (2015) focused on nutrition labels on supermarket shelves but they tested labels that incorporated summarized guidelines rather than nutrient specific guidelines. Still, as these constructions do seem to be related to a positive effect, it was expected that nutrition labels on shelves would positively affect healthy decision making.

H3: Nutrition labels on shelves lead to healthier decision making in the supermarket, than shelves that do not contain nutrition labels.

2.3 Goal priming messages

Besides triggering consumers interest through providing nutrition information on shelves, there are also other effective strategies to promote healthy behavior and to positively induce attitude. One of such other strategies is using textual messages that are focused on priming. According to the Spreading-activation theory of Collins and Loftus (1975), priming activates links to concepts that are stored in memory (Andrews, Netemeyer, & Burton, 1998). Certain 'persuasive' messages therefore appear to be effective because they activate existing links to similar concepts in memory.

Amongst the many priming categories, goal priming is one of the most interesting techniques regarding healthy behavior. Goal priming is when an external cue activates a goal and this influences mental processing and behavior in order to achieve that goal (Custers & Aarts, 2005; Figure 3). Placing a textual goal priming message in the supermarket might positively influence healthy behavior because reading the message activates earlier connections from memory and leads people towards performing the necessary behavior in order to acquire that goal. For example, when a message promotes drinking enough water, this activates mental connections related to this goal and might most likely lead to favorable behavior towards obtaining this goal with people that have a positive connection with drinking enough water.

Because of its relevance, after stating out the expectations regarding nutrition labels, this second to last section focuses on enouncing expectations regarding goal priming messages.

Figure 3 – A descriptive model to explain goal priming

2.3.1 Using goal priming messages for influencing healthy decision making

Multiple studies confirmed positive results of goal priming on healthy decision making in supermarkets (Papies & Hamstra, 2010; Papies, Potjes, Keesman, Schwinghammer, & Van Koningsbruggen, 2014; Van

der Laan, Papies, Hooge, & Smeets, 2016). However, these studies resembled rather a supermarket website than an actual supermarket aisle by showing insolated food products in their manipulation (Van der Laan et al., 2016). This context restriction might have affected the extent to which the environment was experienced as a 'real' supermarket. Also, in former experimental conditions only cues for the primed healthy products were included (Papies & Hamstra, 2010), although in a natural environment also cues for desire-products are present. Moreover, they frequently did not place the priming message at the Point-of-Purchase (POP; Papies et al., 2014), although the cues that stimulate desire-products are in a natural environment located on the POP. All these missing characteristics are of great importance for creating a realistic supermarket setting. No literature is available on goal priming messages that took the aforementioned limitations into account.

However, due to the fact that prior literature despite its limitations was able to confirm positive effects of goal priming messages, it is expected that a setting that takes these limitations into consideration, will show positive results as well.

H4: The presence of a goal priming message leads to healthier decision making in the supermarket, than the absence of a goal priming message.

2.3.2 Using goal priming messages for influencing attitude towards healthy eating behavior

Attitudes towards certain objects or behavior can be influenced by goal priming messages. For example, Ferguson and Bargh (2004) measured in a goal priming experiment the effect of goal priming cues on the attitudes towards certain objects. Based on their results, they were able to conclude that objects relevant for the presented goal were seen as more positive than objects that were not relevant for attaining this goal. This can be explained by the behavioral beliefs that antecedent attitude formation according to the TPB. Because people might relate relevant objects to goal achievement, their attitude towards these objects could increase.

It is expected that the effect of goal priming cues on the attitude towards objects, will apply for the attitude towards behavior as well. More specifically, based on former information it is expected that a goal priming message that promotes certain healthy behavior, will positively influence attitude towards healthy behavior because it leads to attaining that goal.

H5: The presence of a goal priming message leads to a more positive attitude towards healthy eating behavior, than the absence of a goal priming message.

2.4 The interaction-effect of nutrition labels and goal priming messages

Referring back to the previous section, this last section aimed at clearly expounding a theoretical framework based on the Goal Conflict Model (Stroebe, Koningsbruggen, Papies, & Aarts, 2013) to argue why an interaction-effect between nutrition labels and a goal priming message is expected.

2.4.1 The Goal Conflict Model

The Goal Conflict Model argues that behavior is determined by one of two conflicting goals (Stroebe et al., 2013). It argues that for example, people with dietary goals find themselves in conflict when they are in an environment containing desirable 'unhealthy' food products. One might remember entering a store with specific intentions and leaving the store with a totally different product than one was intending to buy. The same is applicable in a supermarket environment. People often find themselves in situations in which they beforehand intended to only buy products that would not interfere with their dietary goals, but leave the store with multiple hedonic products that do not positively contribute to their diet. The Goal Conflict Model (see figure 4) states that restrained eaters often have conflicting goals, namely the eating enjoyment goal and the weight control goal. When one enters a store intending to stick to the weight control goal, interference of tempting cues often lead to re-activating the eating enjoyment goal and thereby inhibiting the weight control goal. In other words, when 'sleeping' goals are re-activated, in this case the eating enjoyment goal, they partly replace the internal strength one has to pursuit their initial goal, in this case the weight control goal.

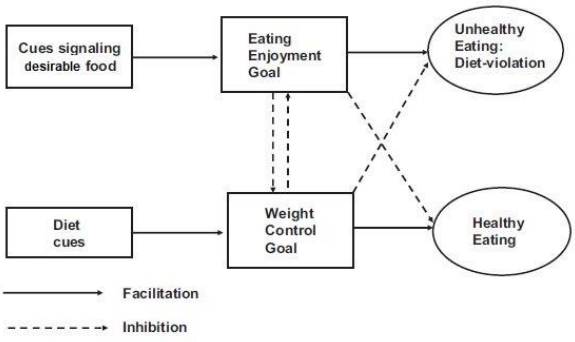


Figure 4 - Schematic illustration of the Goal Conflict Model of eating behavior. Adapted from "Why most dieters fail but some succeed: a goal conflict model of eating behavior," by W. Stroebe, G.M. Van Koningsbruggen, E.K. Papies, and H. Aarts, 2013, *Psychological Review, 120*(1), p. 117. Copyright 2013 by American Psychological Association.

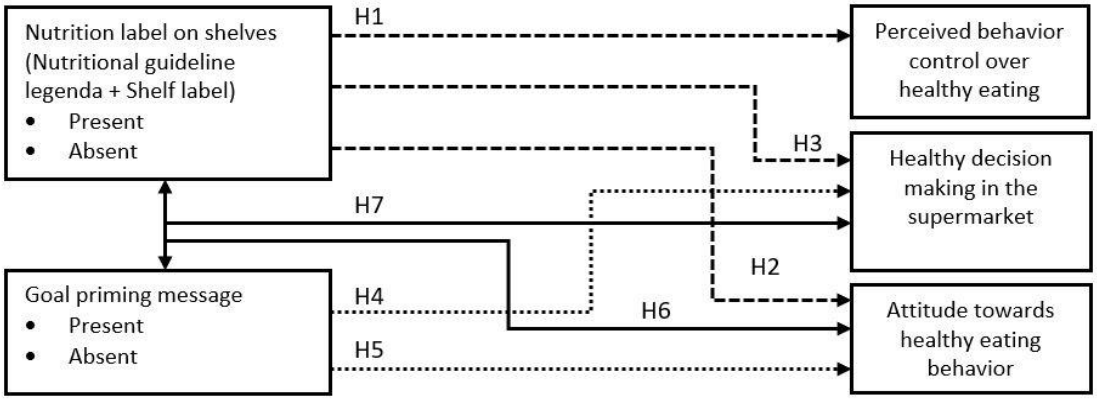


Figure 5 – Conceptual model

Since only one goal can dominate (Shallice, 1972), this frequently means that the weight control goal loses its dominancy to the eating enjoyment goal, thus leading to unhealthy eating.

The Goal Conflict Model explains the importance of cue location and the dominance of health-stimulation cues over desire-stimulating cues. Hedonic food products often draw attention because people are biologically wired to like food that is high in sugar and fats (Pinel, Assanand, & Lehman, 2000). Regarding the fact that weight control often requires more cognitive strength because of the self-regulation skills that one has to apply, it is important that people stay focused on their initial goal. A good strategy for holding people's initial goal, is by extending the cues that prime this initial goal (Papies & Hamstra, 2010; Stroebe et al., 2013) to at least balancing if not dominating desire-stimulating cues on the POP. These cues can trigger mental processes that remind people of their initial goal. A possible effective cue to serve this purpose is the use of nutrition labels.

To conclude, next to the expectation that placing a goal priming message would lead to a higher attitude towards healthy eating and to healthier decision making in the supermarket, it was also expected that complementing this message with nutrition labels would add significant value to attitude and decision making by overpowering the effects of desire stimulating cues on food packages. Thus, it was forecasted that showing a goal priming message as a prime and nutrition labels below each product as additional cues would lead to a more positive attitude and more healthy decision making, than these labels and messages alone.

H6: Combining nutrition labels and a goal priming message has a stronger positive effect on attitude towards healthy eating behavior, than showing only nutrition labels or only a goal priming message.

H7: Combining nutrition labels and a goal priming message has a stronger positive effect on healthy decision making in the supermarket, than showing only nutrition labels or only a goal priming message.

Figure 5 shows an conceptual model in which all previously announced hypothesis are schematically displayed.

3. Method

3.1 Research design

This online experiment measured the effect of nutrition labels (present vs. absent) and goal priming messages (present vs. absent) on attitude and healthy decision making in the supermarket and the effect of nutrition labels on perceived behavioral control. The experiment therefore came down to a 2 x 2 between-subjects design which consisted of the following 4 conditions:

I. A nutrition label (containing a nutritional guideline poster and nutritional guideline shelf labels)
II. A nutrition label (containing a nutritional guideline poster and nutritional guideline shelf labels) + a goal priming message
III. A goal priming message
IV. No intervention

Data was gathered from July 2018 to December 2018 in an online environment. It contained an interactive simulation of the dairy section of a Dutch supermarket.

3.2 Manipulation material

For this experiment, there were two manipulations. The first manipulation was that of the nutrition label combination. This manipulation consisted of the nutritional guideline poster (figure 6) and the nutritional guideline shelf label (figure 7). Thus, these

materials were either both present or both absent since they operated as a pair. The other manipulation consisted out of a goal priming message (figure 8).

3.2.1 Nutrition label combination

The nutrition label manipulation consisted of the nutritional guideline poster and the nutritional guideline shelf label.

The nutritional guideline poster was created to complement the nutritional guideline shelf label, thus providing extra information in order to better understand the shelf labels. It showed how food products were ranked on a scale from low nutritional value to high nutritional value. In the explanation poster, the participants could find short information (on calories) if they wanted to get a quick indication and more elaborated information on specific nutrients (e.g. sugar and fat) if they wanted to read more extensive information on food products.

Although the nutritional guideline poster provides supplementary information on nutritional guidelines, the shelf labels (figure 7) were designed to provide enough information to base a healthy decision on. The upper bar of the shelf label represented the calorie amount, which was indicated through color and words, while the left corner below the calorie indication showed sugar level expressed in cube sugar icons and the right corner below the calorie indication showed fat level expressed in fat drips. The participants were able to see whether a product was high, average or low in calories, sugar and fat through the bar color, which was red, amber or green, respectively to the amount. Next, participants could see calorie indication through words (low, average or high in calories) on the upper bar and sugar and fat indication through the amount of sugar cubes and fat drips (varying between one and three units) on the lower left and right corner.

All the statements visible on the nutritional guideline poster were based on information from scientific research from the Netherlands Nutrition Centre (Voedingscentrum, n.d.), the World Health Organization (2015) and the Food and Agriculture Organization of the United Nations (2010). These sources stated that on average people need 2250 calories (kcal) per day (Voedingscentrum, n.d.), 56 grams of sugar per day (World Health Organization, 2015) and 87 milliliters of fat per day (Food and Agriculture Organization of the United Nations, 2010). Based on these numbers, the total amount of kcal, sugar and fat permitted for dessert, was respectively 280 kcal, 8 grams of sugar and 12 ml of fat. These

Figure 6 - Manipulation material: Nutritional guideline poster

Figure 7 - Manipulation material: Nutritional guideline shelf label

Figure 8 - Manipulation material: Goal priming message

amounts were split into three levels (e.g. low, average and high in nutrition value; table 1). The label of a high level of kcal was given when the dessert contained more than the admitted amount, thus at least 280 kcal. The label of a low level was given when the dessert contained half of the admitted amount or less, thus a maximum of 140 kcal. The label of an average level was given when the dessert contained between 140-280 kcal. These levels were calculated based on the assumption that a portion contains 150 ml or grams. The same method was applied when categorizing the fat and sugar amount into the low, average and high category of that nutrient. The nutrition label content and visualization met the four core principles for front-of-pack labelling using color-coded signals according to the UK Food Standards Agency (as cited in Lobstein & Davies, 2009).

3.2.2 Goal priming message

The goal priming message took the shape of a floor sticker that contained a short sentence that made the participant aware of the value of a conscious choice. More specifically, it contained the following text: "Door een bewuste keuze te maken, voel je je fitter, gemotiveerder en gezonder (by making a conscious choice, you feel more fit, more motivated and healthier)". This message met the guidelines of an effective cue (Papies, 2016), emphasizing the positive effects of a conscious choice and being placed close to the location and time the decision making took place. Next, the cue pointed out which behavior led to obtaining the health goal. This behavior was accessible.

Table 1. Total amount of calories, fats and sugar permitted for a desert.

	Calories (kcal)	Fat (grams)	Sugar (grams)
Low in nut. value	<140	<6	<4
Medium in nut. value	140-280	6-12	4-8
High in nut. value	>280	>12	>8

3.2.3 Manipulation material in a supermarket setting

The manipulation materials shown in figure 6, 7 and 8 were placed in the dairy section of an Albert Heijn supermarket. Nutritional guideline shelf labels were placed around the price tags in the shelves (see attachment 2), while the nutritional guideline poster was placed on the right side of the aisle (see attachment 4) and the goal priming message was placed on the floor in front of the dairy aisle (see attachment 3). With the consent of the supermarket manager, photos were made of the total aisle. Out of the approximately 300 products that were present in the aisle, 112 products were part of the experiment. These products were randomly selected. The 112 products that were part of the experiment were together with the goal priming message and the nutritional guideline poster emphasized by darkening the other food products and the background (see attachment 1). Next, these emphasized entities were made interactive by using Thinklink. This program made it possible to click on the entities in order to see them up close (as in attachment 2). Subsequently, the interactive photos were used to create the online supermarket experiment through the research software program Qualtrics. A simulation of an online supermarket has been proven to be an effective method for conducting research on food decision making (Benn, Webb, Chang, & Reidy, 2015; Heard, Harris, Liu, Schwartz, & Li, 2015; Van Ooijen, Fransen, Verlegh, & Smit, 2016).

3.3 Experimental procedure

For this study, the research software Qualtrics was used for showing the manipulation material, creating the survey and gathering data. The survey contained 50 questions and the experimental environment was constructed as follows.

After the written consent on page 1 where participants had to agree to in order to continue with the experiment, participants were requested to answer two questions of which one on their age and one on their gender on page 2. Participants who did not identify with either males or females were given the opportunity to write down their gender in an empty box. Participants that did not meet the age requirement, were at this point redirected to the end of the survey. Participants that did meet the requirement, could proceed with the experiment on page 3, in which they were shown four atmospheric photos that resembled the walking route from the entrance of the supermarket to the dairy section (see attachment 5). Next, participants entered page 4 in which they saw a photo of the dairy aisle from the condition they were assigned to from far and up close. The first photo on this page showed the total aisle (including the nutrition labels if the participant was in condition I, the goal priming message on the floor if the participant was in condition III or the labels and the claim if the participant was in condition II) and the second photo showed a partial aisle from up close (with the nutritional guideline poster if the participant was in condition I or II; see attachment 6). When entering page 5, the participants saw a photo of the dairy section in which they were able to see a large aisle including the products that are usually located in the diary section, such as custards, yoghurts, milk, quarks et cetera. On this photo only the 112 products that were part of the experiment were clearly visible since the other products and the background were darkened (see attachment 1). Participants were requested to orientate themselves by clicking on products in the 'illuminated' section, which then showed the selected product up close, as in attachment 2. On page 6, the participants could view the same interactive photo but here the participants were requested to choose a snack they would like to eat after dinner in front of the television. This was an open question in which it was requested to first write down the brand, then the product type and then the flavor. It included the example 'Campina chocolade vla (Campina custard chocolate)'. Next, page 7 showed a control question. In the control question, the answer that the participant had given to the former question was repeated and the participant was requested to choose this exact same product out of a list of all available products. Next, all other pages were dedicated to measuring attitude towards healthy eating behavior, perceived behavioral control over healthy eating and nutrition knowledge in that order. More information about these measurements are discussed in the next section.

3.4 Measurement instruments

3.4.1 Attitude

The attitude towards healthy eating behavior was measured through four bipolair seven-point scales: After viewing the diary section, I find healthy eating behavior unimportant-important, unfavorable-favorable, undesirable-desirable and unwise-wise (Orbell, Hodgkins, & Sheeran, 1997). With a factor analysis (see attachment 7, component 1), one new variable named 'Attitude' could be extracted from the four items that were supposed to measure attitude (Eigenvalue = 3.32; Cronbach's alpha = 0.90). With this, these items indicated a high level of internal consistency.

3.4.2 Perceived behavioral control

The perceived behavioral control over healthy eating was measured through five items that were based on the items from Orbell et al. (1997): "After seeing the dairy section, I find it easy to eat healthier", "After seeing the dairy section, I feel like I can eat healthier", "After seeing the dairy section, I have control over whether I eat healthy or not", "After seeing the dairy section, I feel like I am able to eat healthier", "After seeing the dairy section, I know how to eat healthier". Participant could answer to this question by making use of the 7-point scale ranging from 'not at all applicable to me' to 'fully applicable to me'. By running a factor analysis (see attachment 7, component 2), one construct could be extracted from the five items that were supposed to measure PBC (Eigenvalue = 2.66; Cronbach's alpha = 0.81). By deleting the statement "Na het zien van het zuivelschap heb ik zelf controle over het al dan niet gezonder eten (PBC_3)", Cronbach's alpha for this new variable named 'PBC' was maximized to 0.85 (Eigenvalue = 2.61), which indicates a high level of internal consistency.

3.4.3 Intention to eat healthier

In this study, the intention to eat healthier was measured by 3 statements as constructed by Orbell et al. (1997). These constructs were slightly adapted in order to fit the context of this study. The exact statements were "I am planning on eating healthier in the upcoming month than I was the last month", "I have the need to eat healthier than I was last month" and "There is a real chance that I am going to eat healthier in the upcoming month than I was in the last month" and participants were able to state to what extent they agreed on those statements with a 7-points likertscale varying from 'totally disagree' to

'totally agree'. By running a factor analysis (see attachment 7, component 3) one variable with a high level of internal consistency could be extracted from the three items that measured the intention to eat healthier (Eigenvalue = 2.55; Cronbach's alpha = 0.91). This variable was named 'Intention'.

3.4.4 Nutrition knowledge

Nutrition knowledge was measured during this experiment to gain more insight on participants. Nutrition knowledge was measured by 20 dichotomous (true-false) statements. For a list of the statements regarding nutrition knowledge, see attachment 8.

3.5 Analyses

After data collection, data was analyzed through SPSS Statistics version 25.0. Here, first all incomplete survey data was removed from the dataset. Also, when the answer to product choice was valid and complete (e.g. containing brand, product type and flavor and correlated with the product options) but was not the same as the answer to the control question of product choice, the answer to the control question was adjusted in a way that it met the answer from the open question. This method was applied because answers to the control question were used for analysis. In attachment 9 more information can be found on how food products were categorized in order to prepare this data for analysis.

Two-way ANOVA was used to discover to what extent the independent categoric variable 'Nutritional labels' had directly influenced the dependent interval variables 'Perceived behavioral control' (H1), 'Attitude' (H2) and 'Healthy decision making' (H3), and to what extent the independent categoric variable 'Goal priming message' had directly influenced the dependent interval variables 'Healthy decision making in the supermarket' (H4) and 'Attitude' (H5). Also the last two hypotheses measuring an interaction-effect of 'Nutrition label' and a 'Goal Priming Message' on 'Attitude' (H6) and on 'Healthy decision making' (H7) were answered through a Two-way ANOVA. A Two-way ANCOVA was conducted for the same hypothesis in relation to the covariates 'age group' (20-40 and 40-65), 'intention to eat healthier' (low or high) and 'nutrition knowledge' (low or high).

3.6 Participants

This study used a convenience sample and participants were gathered online through social media advertisements and offline by spreading bookmarks with an ad for the supermarket experiment on public locations. Participants were randomly assigned to one of the four conditions mentioned earlier in the research design. Participants (N = 133) consisted out of 44 males (28 within age category 20-40 and 16 within age category 41-65) and 89 females (46 within age category 20-40 and 43 within age category 41-65). The average age was 37,98 (*SD* = 14.46). Gender variances were equally distributed among conditions ($\chi(1) = 1.114$; $p = 0.291$). Also, Levene's test showed that age group variances ($F(3, 129) = 0.329$ $p = 0.804$), nutrition knowledge variances ($F(3, 129) = 0.396$ $p = 0.756$) and intention to eat healthier variances ($F(3, 129) = 0.828$ $p = 0.481$) were equally distributed among conditions.

4. Results

A Two-way ANOVA was conducted to examine the main effects as described in hypothesis 1 to 5 and the interaction-effects of hypothesis 6 and 7. Levene's test showed in the Two-way ANOVA homogeneity of variances for attitude ($F(3, 129) = 2.077$ $p = 0.106$), perceived behavioral control ($F(3, 129) = 1.446$ $p = 0.232$) and healthy decision making in the supermarket ($F(3, 129) = 1.052$ $p = 0.372$). Shapiro-Wilk appeared to be significant for attitude ($p < 0.05$) and healthy decision making ($p < 0.05$), as opposed to its value for perceived behavioral control which was shown to be not significant ($p > 0.05$). The significant values on Shapiro-Wilk regarding in this case attitude and healthy decision making, usually indicate that there is no normal distribution of data. However, each condition contained 30 participants or more, both skewness and kurtosis were within the range of -1 and +1 for all three dependent variables and the Normal Q-Q Plot showed that the data for all 3 dependent variables followed a diagonal line without any irregularities. For that reason, the data did appear to be sufficient enough to conduct the Two-way ANOVA with.

4.1 Effects of nutrition labels

A Two-way ANOVA showed that there was no significant difference in perceived behavioral control between conditions in which nutrition labels were present (*M* = 4.05 *SD* = 1.23) and in which nutrition labels were absent (*M* = 4.08 *SD* = 1.59), $F(1, 129) = 1.161$ $p = 0.283$ (Table 2). Thus, according to this data nutrition labels to not affect perceived behavioral control. For that reason, H1 was rejected. Also with the Two-way ANCOVA, age groups (20-40 or 40-65), nutrition knowledge (low or high) or intention to eat healthier (low or high) as covariates did not make a significant difference.

Additionally, there was no significant difference in attitude between the condition in which nutrition labels were present (*M* = 5.50 *SD* = 1.32) and the condition in which the nutrition labels were absent (*M*

= 5.51 *SD* = 1.17), *F*(1, 129) = 0.368, p = 0.545 (Table 2). This meant that nutrition labels on shelves did not lead to a higher attitude towards healthy eating behavior, than shelves that did not contain nutrition labels. With that, H2 was rejected. Adding nutrition knowledge (low or high), the intention to eat healthier (low or high) or age (20-40 or 40-65) to the Two-Way ANCOVA did not make a difference in the significance of the results.

Furthermore, there was no significant difference in healthy decision making between the condition in which nutrition labels were present (*M* = 3.86 *SD* = 1.36) and the condition in which the nutrition labels were absent (*M* = 3.53 *SD* = 1.16), *F*(1, 129) = 0.614, p = 0.435 (Table 2). This meant that nutrition labels on shelves did not lead to healthier decision making, as compared to shelves that did not have nutrition labels. With that, H3 was rejected. Conducting the Two-way ANCOVA and adding the covariates age, nutrition knowledge and the intention to eat healthier made no difference in the results.

4.2 Effects of a goal priming message

There was no significant effect of a goal priming message on healthy decision making, as shown through the results of the Two-way ANOVA, *F*(1, 129) = 0.722, *p* = 0.397. In other words, the presence of a goal priming message (*M* = 3.49 *SD* = 1.25) did not lead to healthier decision making when comparing it to the absence (*M* = 3.53 *SD* = 1.16) of such message (Table 2). With that, H4 was rejected. Conducting the Two-way ANCOVA and adding the age, nutrition knowledge and intention made no difference in the effect.

Actually, there was a significant difference in attitude between the condition in which the goal priming message was present (*M* = 5.12 *SD* = 1.36) and the condition in which the message was absent (*M* = 5.51 *SD* 1.17), *F*(1, 129) = 4.637, *p* = 0.033, η_p^2 = 0.035 (Table 2). Thus, a goal priming message had a medium sized effect on attitude. More specifically, participants who had seen the goal priming message had a less positive attitude towards healthy eating behavior than participants who had not seen the goal priming message. Therefore, the results not only reject H5, but also show the opposite effect of what was expected.

4.3 Interaction-effects of nutrition labels and a goal priming message

There was no significant interaction-effect between nutrition labels and a goal priming message on attitude, *F*(1, 129) = 0.330 *p* = 0.566 (Table 2 panel A). This means that the presence of nutrition labels did not change the effect of a goal priming message in attitude towards healthy behavior. With that, H6 was rejected. Also adding the 3 covariates being age, nutrition knowledge and intention in the Two-way ANCOVA did not significantly change this effect.

Furthermore, there was no significant interaction-effect between nutrition labels and a goal priming message on healthy decision making in the supermarket, *F*(1, 129) = 0.436 *p* = 0.510 (Table 2 panel A). This means that the presence of nutrition labels, did not change anything in the effect of a goal priming message on healthy decision making. With that, H7 was rejected. Running the Two-way ANCOVA with the aforementioned covariates did not change the effect.

Table 2. Effect of Nutrition Label and Goal Priming Message on Attitude, Perceived Behavioral Control and Healthy Decision Making in the Supermarket

A: ANOVA results

	Univariate F-Value		
Independent variables	**Attitude**	**Perceived behavioral control**	**Healthy decision making**
Main effects			
Nutrition labels (NL)	.368	1.518	.614
Goal priming message (GPM)	4.637*	N/A	.722
Interaction-effect			
NL x GPM	.330	N/A	.436

B: Means

	Nutrition labels		Goal priming message	
Dependent variables	**NL present**	**NL absent**	**GPM present**	**GPM absent**
Attitude	5.50	5.51	5.12	5.51
Perceived behavioral control	4.05	4.08	N/A	N/A
Healthy decision making	3.86	3.53	3.49	3.53

*$p < .05$

Note: Panel A shows the univariate F-values for ANOVA. The Degrees of freedom for NL, GPM and NL x GPM = (1, 129). Panel B shows means. Results are based on 7-point scales.

5. Discussion

5.1 Main findings

Results from this study shed new lights on the use of in-store materials targeting attitude towards healthy eating behavior, perceived behavioral control over healthy eating and healthy decision making in supermarkets. This experiment did not confirm a relation between nutrition labels and a goal priming message on healthy decision making. Also, nutrition labels did not influence attitude and perceived behavioral control. Also, there was no interaction-effect of nutrition labels and a goal priming message on attitude and healthy decision making. A goal priming message did appear to affect attitude towards healthy eating behavior. However, this effect was in contrast with the expectations. More specifically, as opposed to the expectation that a goal priming message has a positive effect on attitude, results show that this message has a negative effect on attitude. Thus, all results were not in line with the expectations based on earlier literature.

5.2 Theoretical contribution

There are several explanations that might clarify why these results diverge from earlier expectations.

5.2.1 Nutrition labels and healthy decision making

A possible explanation for the ineffectiveness of nutrition labels in this experiment might have been related to the health paradox (Horgen & Brownell, 2002). The health paradox argues that 'healthy' products are often presumed to have a bad taste. To explain, Grunert et al. (2010) state that although some consumers take health into consideration when choosing a particular product, only 8 percent of all consumers mentioned reasons for product preferences that were related to their nutritional value. This percentage was easily overshadowed by the 52 percent of reasons that were mentioned in relation to product taste. When connecting this to the health paradox of Horgen and Brownell (2002), it sounds like a plausible reason for the ineffectiveness of nutrition labels. Specifically arguing from this paradox, product attractiveness is undermined when a product is promoted as healthy because its taste – that is perceived as the largest component in its attractiveness – gets devalued. Even in cases in which consumers are striving to improve their health behavior, taste can thus still have a decisive role. Consequently, healthy decision making might not triumph in every product section of the supermarket.

For example, Paquette's literature study (2005) points out that when asking consumers about the food products associated with healthiness, even though often low levels of fat, salt and sugar are named, dairy products were rarely ever mentioned in relation to these guidelines. This might mean that when consumers are asked to make a healthier decision in an alluring section such as the dairy section, people might give in to making less healthy decisions in this section. This could be related to not wanting to settle for a product that is expected to be less tasty when standing in front of the dairy section. Thus, despite all efforts to overshadow desire-stimulating cues with health cues incorporated in nutrition labels, in practice results give the impression that desire-stimulating cues still dominate in the dairy section. Therefore, the eating enjoyment goal gets more priority in the dairy section, than the weight control or health goal.

5.2.2 Nutrition labels and perceived behavioral control

Building forward on the impression that consumers are more vulnerable for tempting cues than foreseen, this might also declare why there is no change in perceived behavioral control after seeing nutrition labels. More particularly, if consumers give in to desire-stimulating cues, even though they also feel the need to eat healthier, these cues overshadow the positive effect of nutrition labels on perceived behavioral control. In other words, although nutrition labels might narrow down collection effort, computation effort and comprehension effort (Russo et al., 1986), this effect might not be reflected in the results due to the shortfall in self-regulating skills that inhabit high perceived behavioral control. This theory is in line with former studies that point out the significant weight of self-regulation skills regarding healthy behavior (Anderson, Winett, & Wojcik, 2007; Fishbach, Friedman, & Kruglanski, 2003).

5.2.3 Nutrition labels and attitude

Although other studies could confirm the effect of nutrition labels on attitude (Andrews et al., 2011; Žeželj et al., 2012), this study was not in alignment with this conclusion. A possible explanation for that effect can be found in the prerequisites of attitude: behavioral beliefs (Ajzen, 1991; Ajzen & Madden, 1986). As mentioned before, a positive attitude was forecasted based on the concept that consumers think that the use of nutrition labels lead to healthy eating and to a positive evaluation of such outcome. However, assuming that the previously mentioned theory regarding the relevance of the health paradox is correct, this could also explain why no effect on attitude could be found. Although consumers might think than nutrition labels add value to healthy decision making, it is possible that they evaluate such outcome as negative due to its implications for eating enjoyment. Consequently, consumers could have negative behavioral beliefs towards healthy eating and

thus express a negative attitude towards healthy eating behavior.

5.2.4 A goal priming message and attitude towards healthy eating behavior

Ferguson and Bargh (2004) argued that consumers are vulnerable for goal priming and therefore objects that are relevant for goal achievement will affect attitude positively. Actually, in contrast to the former study which measured attitude towards objects, this study tested attitude towards behavior. Results from this study showed that a goal priming message has a negative effect on attitude towards healthy eating behavior.

A possible reason for this effect is that prescribing consumers what their goal should be, leads to reactance. The Reactance Theory (Brehm, 1966) states that reactance is the psychological response that many may experience after the feeling of losing freedom over their choice. Consequently, reactance is activating the opposite effect of what was intended as an attempt to regain this freedom. Possibly, because a goal priming message states a clear goal of which is assumed that this will influence consumer behavior, consumers might experience this as if they are forced to act a certain way. Moreover, when consumers experience this goal priming message as imposing, their attitude – which is "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188)" – regarding the healthy eating behavior, may naturally become negative instead of positive because it is associated with compliance.

5.2.5 A goal priming message and healthy decision making

Assuming that the Reactance Theory fit the context of this study, this would also explain why no effect of a goal priming message on healthy decision making could be found. Attitude is according to the TPB (Ajzen, 1991) a determining factor in behavior. As the attitude towards healthy eating behavior is negative, it can be that no effect of a goal priming message on healthy decision making can be found, because the message is perceived as irrelevant for decision making. This would explain why the results regarding healthy decision making for the control group and the intervention group was similar.

Besides, former positive results of a goal priming message were attained in a context that was less realistic than the supermarket context of this study. Thus, it might be that in absence of specific supermarket characteristics, such as the presence of both healthy and unhealthy products, cues for desire-products and a priming message on the POP, a goal priming message would be effective. However, in a real supermarket setting this effectiveness would be less likely to achieve.

5.2.6 The interaction between nutrition labels and a goal priming message regarding healthy decision making

Using goal priming messages and nutrition labels together did not increase the effect as compared to the use of only one of these stimulating materials. This could be explained with help from the Goal Conflict model (Stroebe et al., 2013) that was mentioned earlier. In the theoretical framework, it was discussed that aiming at the resemblance with a real supermarket setting would mean portraying unhealthy products with their cues as well. The Goal Conflict model argues why – in this context – it was even more important to show nutrition labels, namely in order to dominate desire-stimulating cues at the POP. However, in practice it appears that this intervention was not sufficient enough.

No healthier decisions could be made in a supermarket context in which both healthy products and desire-products could be perceived. Also, combining a goal priming message with health-stimulating cues such as nutrition labels, appeared not to affect the attitude towards healthy eating behavior.

5.3 Limitations and future research

Despite the fact that interesting conclusions were drawn based upon the results found in this study, still five important limitations might have influenced these results. In this section this studies' limitations are highlighted to serve the goal of future studies being able to take these limitations into account.

First of all, despite the aim to create a supermarket environment as realistic as possible online, the experimental environment was still artificial. Consequently, this supports internal validity but impedes full external validity. It is interesting to replicate this study in a real supermarket setting to see whether these effects can also be found in such environment.

Secondly, this study only tests the effects for the dairy section. Because it is possible that the effects are context-related, it is valuable to also test the effect in other departments of the supermarket.

Thirdly, this study aimed at gathering a stratified sample representing the Dutch population, according to the Dutch Statistics Netherlands (2018). This would come down to a total of 84 participants in the age

group 20-40 (evenly divided over males and females) and 116 participants in the age group 40-65 (evenly divided over males and females). In practice, only the target for females from the age 20-40 was met. All other categories were underrepresented based on the 200 participants target that was aimed for. Males in the age category of 40-65 were most strongly underrepresented with only 16 out of the intended 58 participants. Consequently, males' sample size only contained half the amount of women's sample size. Despite the fact that all conditions in this study contained enough participants to draw solid conclusions from, the imbalance in demographical characteristics might have influenced the extent to which these conclusions represented the subgroups in the population. Concerning the imbalance in males and females, this does not have to be decisive since females also do more groceries than men (Van Wijk, 2011), but it should be something to take into account.

Fourthly, although aimed for a clear technique in categorizing products into unhealthy to healthy products, it was not taken into account that participants might be focusing more on calories than on sugar and fat, since more space in the labels was dedicated to calories (see figure 7). If this was the case, than calories should have weighted heavier in the categorization of healthy products than sugar and fat. However, in the method applied in this study, calories, sugar and fat weighted equally heavy in product healthiness ratings (see attachment 9). Defaults in this area, could be at the expense of internal validity. Therefore, it is advised to either reserve the same space for each nutrient on a food label in future research or to rate the nutrient weights accordingly.

Fifthly, no questions were asked during the experiment on the health status of the participants. It was important to gather this information in order to see if there was homogeneity of variances during this study regarding health status, for the reason that an imbalance might have affected the external validity of this experiment. Examples that could measure health status are weight, daily physical activities, type of job and eating habits. For future research, it is recommended to take this variable into consideration.

5.4 Conclusions

The aim of this study was to advance healthy behavior and to support consumers in attaining their health goals. Former studies pointed out the likelihood that nutrition labels and a goal priming message would positively influence healthy decision making, attitude and perceived behavioral control. However, when testing these relations online in a realistic supermarket setting, it appears that nutrition labels and a goal priming message have no effect on most of these variables. This can possibly be explained by the Health paradox (Horgen & Brownell, 2002), self-regulating skills, and by the Reactance Theory (Brehm, 1966) and the Goal Conflict model (Stroebe et al., 2013). Only one effect was found, which was the negative effect of a goal priming message on attitude. It is therefore concluded that the use of nutrition labels and a goal priming message might not be enough to go against the desire-related cues of unhealthy products in the supermarket. Based on the results of this study and the related explanations, there is the presumption that a goal priming message should be replaced by another technique that helps consumers in performing healthy behavior by helping them strengthen their self-regulating skills. In that way, supermarket strategists could support consumers in their healthy decision making by neither imposing health goals, nor letting them become victims of uncontrolled tendencies.

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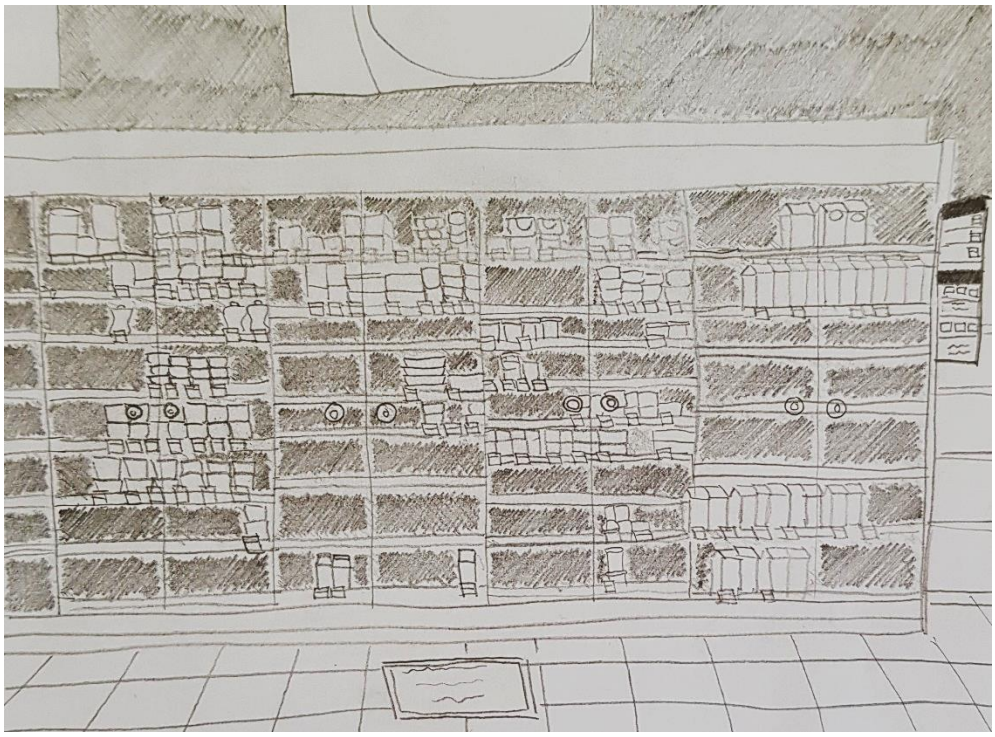
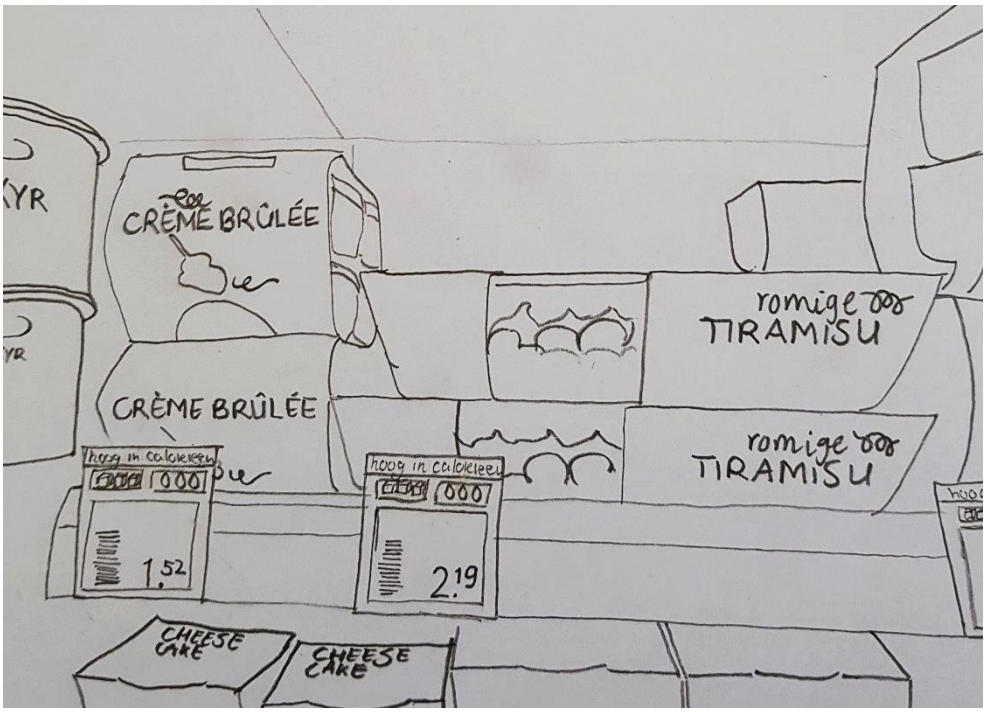
Attachment 1: The dairy section (condition II), as shown during the online experiment. All the products, the nutrition poster (on the right side) and the goal priming floor poster (at the bottom) shown on the picture were visible and clickable in the experiment. Shadows in the dairy section point to products that were darkened in the experiment and not-clickable. N.B. : The picture below is a drawing. In the real experiment, the participant saw a real photo.

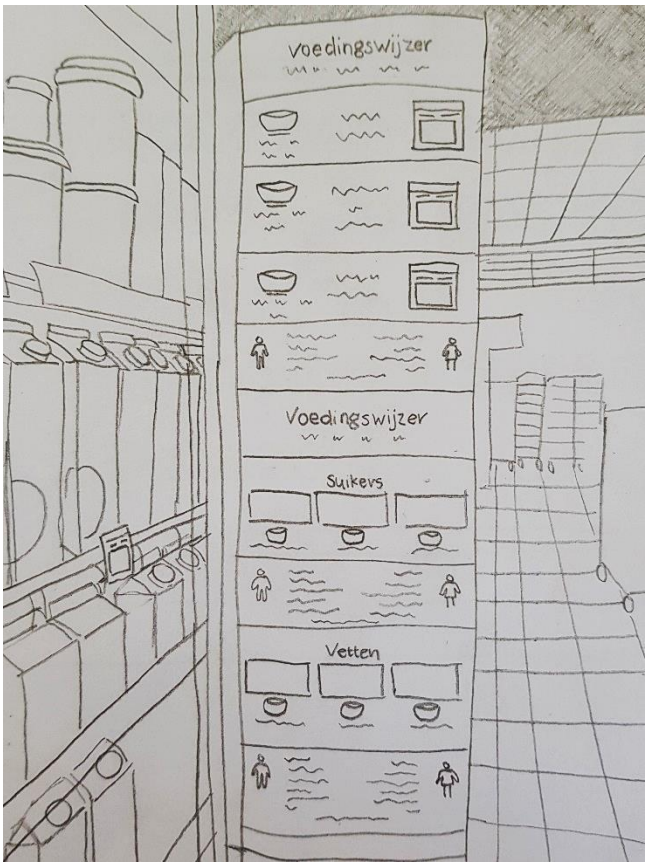


Attachment 2: Nutrition labels in the supermarket experiment setting. This is similar as what is shown when the participant clicks on this product as viewed in attachment 1. N.B. : The picture below is a drawing. In the real experiment, the participant saw a real photo.



Attachment 3: Goal priming message in the supermarket setting. This is similar as what is shown when the participant clicks on this poster as viewed in attachment 1. N.B. : The picture below is a drawing. In the real experiment, the participant saw a real photo.

Attachment 4: Nutritional guideline poster in the supermarket setting. This is similar as what is shown when the participant clicks on this poster as viewed in attachment 1. N.B. : The picture below is a drawing. In the real experiment, the participant saw a real photo.



Attachment 5: Introduction photos of the aisle in the online experiment for condition I. N.B. : The picture below is contains a filter. In the real experiment, the participant saw a real photo.

Attachment 6: Introduction photos of the aisle in the online experiment for condition I. N.B. : The picture below is a drawing. In the real experiment, the participant saw a real photo.

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Op je route vind je het zuivelschap. Hier blijf je stilstaan. Bekijk onderstaande foto's en ga naar volgende.

0% 100%

Attachment 7: Factor analysis for attitude, PBC and intention to eat healthier

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,124	34,368	34,368	4,124	34,368	34,368	3,139	26,159	26,159
2	2,672	22,269	56,637	2,672	22,269	56,637	2,910	24,251	50,410
3	1,881	15,676	72,313	1,881	15,676	72,313	2,628	21,903	72,313
4	,826	6,883	79,196						
5	,492	4,097	83,293						
6	,442	3,687	86,980						
7	,360	2,999	89,979						
8	,340	2,837	92,815						
9	,259	2,159	94,975						
10	,240	2,003	96,978						
11	,211	1,762	98,740						
12	,151	1,260	100,000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component		
	1	2	3
Attitude_3 Na het zien van het zuivelschap, vind ik gezond eetgedrag ... - Onwenselijk:Wenselijk	,904		
Attitude_4 Na het zien van het zuivelschap, vind ik gezond eetgedrag ... - Onverstandig:Verstandig	,891		
Attitude_2 Na het zien van het zuivelschap, vind ik gezond eetgedrag ... - Ongunstig:Gunstig	,842		
Attitude_1 Na het zien van het zuivelschap, vind ik gezond eetgedrag ... - Onbelangrijk:Belangrijk	,792		,195
PBC_2 Na het zien van het zuivelschap, - Heb ik het gevoel dat ik gezonder kan gaan eten.		,810	,231
PBC_4 Na het zien van het zuivelschap, - Heb ik het idee dat ik in staat ben om gezonder te gaan eten.	,161	,808	,223
PBC_5 Na het zien van het zuivelschap, - Weet ik hoe ik gezonder kan gaan eten.		,805	
PBC_1 Na het zien van het zuivelschap, - Vind ik het makkelijk om gezonder te gaan eten.		,801	
PBC_3 Na het zien van het zuivelschap, - Heb ik zelf controle over het al dan niet gezonder eten.	,243	,507	
IntentieGE_2 In welke mate heb je de intentie om gezond te eten? - Ik heb de behoefte om gezonder te gaan eten dan de afgelopen maand			,912
IntentieGE_1 In welke mate heb je de intentie om gezond te eten? - Ik ben van plan de komende maand gezonder te gaan eten dan de afgelopen maand	,193		,911
IntentieGE_3 In welke mate heb je de intentie om gezond te eten? - De kans is groot dat ik de komende maand gezonder ga eten dan de afgelopen maand	,209		,874

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Attachment 8: Questions to measure nutrition knowledge

Question 1:
Calories exist out of proteins, sugars and fats (false = 2e antwoord)
Question 2:
Proteins are healthy, because they help with muscle recovery (true = 1e antwoord)
Question 3:
Only people that work out more than 2 times a week need proteins (false)
Question 4:
100 grams of fat contain less calories than 100 grams of fibre (false)
Question 5:
Fat is always bad for your health. This is the reason why it is best to avoid it as much as possible (false)
Question 6:
A man needs on average 2500 calories per day. A woman needs on average 2000 calories per day (true)
Question 7:
A balanced diet means you need to consume all sorts of foods in the same quantities (false)
Question 8:
When you pick a desert, you only have to watch the sugar amount (false)
Question 9:
Carbs provide you with energy faster than proteins and fats (true)
Question 10:
If you want to live healthier, it is better to no eat after dinner independent on what it is (false)
Question 11:
If you want to live healthier by watching your calorie-intake, it is best to stay as far away from the dairy section as possible (false)
Question 12:
Eating 400 carbs always give you a saturated feeling, independent on where these carbs came from (false)
Question 13:
100 grams of custard contains in general the same amount of calories as 100 grams of pudding (false)
Question 14:
100 grams of sugar contain the same amount of calories as 100 grams of fat (false)
Question 15:
100 grams of sugar contain the same amount of calories as 100 grams of proteins (true)
Question 16:
100 grams of proteins contain the same amount of calories as 100 grams of fat (false)
Question 17:
If you want to eat healthier, you need to eat as much of dairy products as fruits and vegetables (false)
Question 18:
Your metabolism slows down as you get older (true)
Question 19:
In essence, every human body is the same and therefore everyone should be able to have the same food pattern (false)
Question 20:
A daily calorie deficit does not lead to a weight decrease (false)

Attachment 9: Food categorization

Food categorization

Food products were categorized based on calories, fats and sugar. On each nutritional value, food items could score low (green), average (amber) or high (red). For analysis, the total value of each product was then calculated to indicate the total degree of healthiness of each product. This categorization was applied as followed.

1. Food products where participants could choose from, were rated 1 point for red nutrients, 2 points for amber nutrients and 3 points for green nutrients.

	Calories (kcal)	Fat (grams)	Sugar (grams)
Red, 1 point	<140	<6	<4
Amber, 2 points	140-280	6-12	4-8
Green, 3 points	>280	>12	>8

Example: Product X scores a total of 6 points: 2 points on calories, 1 point on sugar and 3 points on fat.

2. Next, the total score for each product was calculated. Product scores could range from 3 (in case a product scores red on all nutritional values) to 9 (in case a product scores green on all nutritional values). A product that scores 3 points, was rated with value 1. A product that scored 9 points was rated with value 7. Thus, products with higher scores were found to be healthier than products with lower scores.

Example: Product X (score 6) was rated with value 4.

When all 112 products were categorized on the degree of healthiness, these products could be divided into 7 levels of healthiness. In practice, all products were assigned to the values 1 to 6.

Value	Amount of products
1	7
2	7
3	34
4	21
5	26
6	17
7	0
	N = 112