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MASTER'S THESIS MARKETING

How effective could a color-coded and rated labelling format be in helping consumers distinguish between healthful and less healthful product variants within a product category.

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ABSTRACT

The current study has evaluated the color-coded and rated nutrition label on its ability to help consumers differentiate between healthier and less healthful variants of the same product category. The aim was to examine whether or not significant differences exist between the perceived healthiness of products that were presented with the color-coded and rated nutrition label in comparison with the perceived healthiness of products that were presented with no labelling. For this study, the interesting part of the perceived healthiness of these products is the difference between the healthful and less healthful variants within a product category. The mean difference was calculated for each stimuli in order to compare the size of the difference of stimulus 1: no labelling with stimulus 2: label and 3: label incl. endorsement. Results indicated that the size of perceived healthiness between healthful and less healthful product variants within the same product category differentiated significantly more when the color coded and rated label was presented in comparison to when no labelling was presented. The color-coded and rated label, with or without endorsement, helped participants to differentiate between healthful and less healthful product variants more than if nothing was presented. Next to these main findings the label could also be tested per product, resulting in a significantly increased perceived healthiness for healthful product variants and a decreased perceived healthiness for less healthful product variants. Additionally purchase intention moved with approximately 10% towards the healthful product variant after seeing stimulus 2 (label) or 3 (label incl. endorsement) compared to what they had chosen after they saw stimulus 1 (baseline).

PREFACE

This master's thesis is written in order to obtain a master's degree in Economics & Business: specialization Marketing at the Erasmus School of Economics.

Therefore I would like to express my gratitude to my supervisor and research coach Dr. B. Donkers. I experienced his assistance and guidance throughout the years as a great help and support.

I wish to express my greatest thanks to my parents for always supporting me and giving me this invaluable opportunity. Finally I am deeply grateful for all the other people who supported me in a direct or indirect way.

I want to make a final note that this thesis is solely made by the author but that large parts of the text are based on existing literature, where considerable efforts has been put into providing references to these sources.

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1. INTRODUCTION

There is a vast amount of academic research that describes the effect of various nutrients and energy intake on health and life expectancy. The most prominent dietary factor that is associated with the risks of food-related diseases and disorders is excessive calorie intake (Barger et al., 2003; Smith et al., 2004; Martin et al., 2006). Other specific nutrients that increase the risk of chronic diseases are saturated fats, cholesterol and trans-fats (Grundy, 1999; Wijendran and Hayes, 2004) and diets high in sugar increase the risk of diabetes (Schulze and Hu, 2005). In contrast other academic studies found that our health benefits from the intake of vegetables and fruit (Heber, 2004), fish (Carpentier et al., 2006) and nuts (Hu and Stampfer, 1999). In addition a study in the Netherlands found that obese among kids between two and eighteen has been multiplied with factor seven in the past thirty years. 56% of those kids already have higher blood pressure and 67% has one or multiple cardiovascular risk factors (van Dommelen et al., 2014).

New public health strategies are needed to fight these diseases that are highly related to the intake of our daily food. One way to help consumers reduce the intake of these negative nutrients and increase the intake of positive nutrients is to motivate consumers to make more healthful choices. A major instrument in trying to help the consumer to distinguish more healthful products from less healthful ones is making the nutritional composition of foods transparent. This can be done by nutrition labelling, especially front-of-pack (Feunekes et al., 2007). Nutrition labels, back or front-of-pack, can help the consumer compare between food products and keep a check on the negative ingredients like fat, salt and added sugars.

Back-of-pack

Most pre-packed foods consist of some information about the nutrient content on the back of the packaging. This information is usually placed within a table and consists of the amounts of the nutrition in the product together with the energy, in kilojoules (kJ) or kilocalories (kcal). These nutrients include information on salt, sugars, protein, sodium, (saturated) fat and carbohydrate fat . The nutrition information is presented on the package per 100 grams and sometimes per portion of the food. (appendix 1).

Front-of-pack

Front-of-pack (FOP) nutrition labels (appendix 2) are designed to summarize the whole nutritional profile and provide an overall interpretation of the healthiness of the product in order to improve consumers' decision-making, without the need of detailed nutritional knowledge. These labels could be categorized in two groups:

- simple labels; *summary* nutrition systems which are employing a single rating to a food product (e.g. guiding stars, NuVal, check-mark/ tick symbols and simple traffic light)

- complex labels; *nutrient-specific* systems display a series of nutrients on the label and the respective amounts (e.g. multiple traffic light, wheel of health, GDA, %DI, traffic light GDA)

Back-of-pack (BOP) nutrition information labels were created to help consumers make healthier choices, however research suggests that the majority find it confusing to understand. Previous research indicates that nutrition information on packages asks for a high level in literacy and numeracy skills, but even people with higher literacy struggle to interpret the labels (Rothman et al., 2006). Furthermore it is found that especially older consumers and consumers with low education and lower levels of income have a hard time in understanding the nutrition labels (Cowburn & Stockley, 2005). The most common difficulty under consumers was the conversion of information from 'g per 100 g' to 'g per serving'. According to different studies (Geiger, Wyse , Parent, & Hansen, 1991; Scott & Worsley, 1994) a front-of-pack label in addition to the traditional back-of-pack numerical nutrition fact box may be more effective than a back-of-pack fact box alone.

Consumers like simplified front-of-pack information that provide them with knowledge about food healthiness, but differ in preference. Differences can be related to the completeness of information, ease of use and not being persuaded into behaving in a certain way (Grunert & Wills, 2007). There is a multitude of front-of-pack nutrition labels that aspire to help people make a more healthful choice. The verdict is still out as to which of these nutrition labelling formats does help the consumer to differentiate between less healthful and healthful product(s) (variants) at its best (Feunekes et al., 2007).

Inspired out of a total different field I came across another nutrition labelling format. An independent mobile application, called Boodschapp, provides insight into nutrition information for almost all products in the Dutch supermarkets (Boodschapp B.V., 2014). Next to informing the user about nutrition information the application also rates the products on a scale from 1.0 (worse/ very unhealthful) to 10.0 (best/ very healthful). In addition to the ratings, the background of the rating is either green (≥ 7,5), yellow (7,5-5,5) or red (≤5,5) (appendix 3). Every product is tested on a minimum of 8 criteria and a maximum of 16. The possible criteria's are amount of calories, fat, saturated fat, salt, sugar, added sugar, fibers, added fibers, vegetables, omega 3-fat, vitamin C, calcium, iron, dairy, purity and the presence of a durability label. So this summary nutrition labelling format also includes the healthful nutrients, whereas the majority of the nutrient-specific labels only give information about the bad nutrients. Including this extra information is a big plus in reviewing the product according to Edge (2010). The rating and color-coding has been developed by independent food experts and thus could easily be used for this research.

A rating system with a color-coded background has not yet been tested as a front-of-pack nutrition label and should be investigated in order to see if this format could compete with the existing ones. A great first step to do this is testing the format on perceived healthiness (ability to help consumers differentiate between healthier and less healthful products of the same product category). This factor is of great importance to the success of a front-of-pack nutrition label. Eight popular front-of-pack nutrition labels have already been tested at the hand of this factor (Feunekes et al., 2007).

Therefore the objective of this paper is to investigate how effective a color-coded and rated labelling format could be in helping consumers distinguish between healthful and less healthful product variants within a product category.

These insights might be particularly valuable for academic literature, as it might broadens the knowledge of front-of-pack nutrition labels as well as it brings attention to healthiness of food products, which is important due to the various diseases that are related to our daily food intake. Additionally, this study could make a contribution to develop and refine food labelling policies.

This master's thesis is divided in four main parts. The previous academic literature is discussed in chapter two which will provide a theoretical background for the conceptual framework and hypotheses. The methodology is discussed in chapter three, followed by the analysis and results in chapter four. In the fifth and last part of this thesis the conclusions are presented as well as the managerial implications, limitations and recommendations for future research.

2. THEORETICAL BACKGROUND

Before starting to discuss the theory, it is useful to consider which types of effects are of interest. In the paper of Feunekes et al. (2007) the impact of eight front-of-pack nutrition labelling formats were investigated across four European countries. According to the authors of the paper the labeling formats should first met the basic requirement in order to become accepted by consumers. In the first study of that paper, the different formats were tested on the following requirement; perceived healthiness (ability to help consumers differentiate between healthier and less healthful product variants of the same product category). The second study measured the effect of the different formats on decision-making when taking into account the shopping environment(usage intention and process time). Considering the fact that the front-of-pack nutrition label, that will be tested in this paper, is new and not yet investigated, this study will test the basic requirement of front-of-pack nutrition labelling formats according to Feunekes et al. (2007).

2.1 Effectiveness of front-of-pack nutrition labels

While research indicated that diseases related to our daily food intake have shown an immense growth as discussed in the introduction, the attention for the populations' health has also grown substantially. On the one side producers and retailers should improve their product compositions and on the other hand consumers should also be motivated to make healthier choices. New forms of front-of-pack labelling are viewed as potential tools for improving the nutrition of the population. (Nestle and Jacobson, 2000). In addition Cowburn & Stockley. (2005) found that ''improvements in nutrition labelling could make a small but important contribution towards making the existing point-of-purchase environment more conducive to the selection of healthful choices''. Furthermore these authors found that most consumers claimed to look at nutrition labels often or at least sometimes during food purchasing. In an extensive review of consumer food labeling research, Grunert and Wills (2007) concluded that consumers are generally aware of the overall link between food and health and are interested in receiving nutrition information on food packages.

Consistent to this outcome participants from the study of Kelly et al. (2009) indicated strong support for the inclusion of nutrient information on negative nutrients on the front of packages. Results from a study by Viswanathan & Hastak (2002) suggested that some benchmarks can help consumers put nutrition information into context.

Consumers will process the information on a package better when they are exposed to a combination of a short health claim on the front-of-pack together with full health claims on the back-of-pack it (Wansink, 2003). In general consumers see health claims as useful and view food as more healthful if it carries a health claim (Williams, 2005). Especially claims on the front-of-pack have been found to create favorable judgments about a product (Drichoutis, Lazaridis, & Nayga, 2006). Another study, by Kozup, Creyer and Burton (2003), found that consumers are more beneficial towards the product, nutrition and purchase intentions when nutrition information or health claims are presented. Also the consumers perceive risks of chronic diseases to be lower.

In the previously mentioned studies, the effectiveness of front-of-pack labels, health claims and nutrition information has been explained as a positive impact on the healthiness of consumers' purchase behavior. Nevertheless, there is also a negative impact concerning food labelling. Taste suggestiveness has proven to be a main issue. A label can be so powerful that some people convince themselves that they do not like the taste due to presence of a certain nutrition claim. This

phenomenon could be due to the fact that consumers may think that healthful food is not likely to taste good (Wansink & Park, 2002). There will always be a taste-nutrition trade off. In addition to this outcome, Drichoutis et al. (2006) discovered that consumers may choose for an instant satisfaction of a tasteful product instead of looking at the long run benefits of a healthful product. While doing groceries, a low-involvement situation, consumers attach more value to extrinsic cues (price, promotion etc.) rather than intrinsic cues (color, freshness, visible fat etc.) to evaluate quality. Nutrition labelling could be such an extrinsic cue which may influence the taste as less flavorful (Wansink et al., 2004). A main challenge for the food industry and probably the government as well is how to position the nutrition claims in the market, to reduce negative taste suggestiveness cues.

With the overall effect of front-of-pack labels discussed, we dig a little bit deeper into particular elements of front-of-pack nutrition labels. As discussed in the introduction, front-of-pack nutrition labels can be divided into two groups; simple labels that are based on a summary nutrition system and complex labels that are based on a nutrient-specific system. The color-coded and rated label, that is used by the application Boodschapp, can be considered as a simple label as it provides the product with a single rating for the overall product. The label also contains the elements traffic color-coding and ratings. In the next chapters the color-coded and rated nutrition labelling format will be taken apart in all its factors in order to support each factor with a theoretical foundation.

2.1.1 Summary nutrition system

In order to make more healthful choices the consumer has to take into account several nutrients simultaneously which could lead to confusion. Consumers find it difficult to make these comparisons and therefore they tend to use a single nutrient (like sugar) as a measure to compare products on overall health. This way consumers could easily make the wrong choice – products low in salt could well be high in other bad nutrients, such as sugar or fat (Black & Rayner, 1992).

As long as the additional costs do not outweigh the additional benefit consumers will seek and process information (Stigler, 1961). In this context, a simplified nutrition label, such as the one used by Boodschapp, may reduce the costs of information acquired by consumers and enable them to make more informed and healthful food choices. Simple labels reduce the cognitive effort and the time needed to process the information compared to more complex labels (Geiger et al., 1991; Scott & Worsley, 1994). If decisions are made quick, such as in a shopping environment, a simpler front-of-pack labelling format seems more appropriate (Feunekes et al., 2008). In addition, research by Hoyer (1984) showed that consumers take buying decisions in a supermarket in seconds rather than minutes.

2.1.2 Traffic light color-coding

The traffic light color-coded system, that is used in the nutrition label in the application Boodschapp, has already been used by several other front-of-pack nutrition labels such as the multiple traffic light, the simple traffic light, the wheel of health and the traffic light GDA (appendix 2). According to a study by the FSA in 2005, traffic-light-color-coding was a major contributing factor for consumers in making a healthier choice in the supermarket. In this study the authors tested three color-coded based labels (color-coded GDA and multiple and simple traffic-light). Because of this study the multiple traffic light format, which provides products with a green, yellow or red stamp regarding to the amounts of sugar, salt and (saturated) fat, is recommended by the UK Food Standards Agency (FSA, 2005). Later the British government has announced it will support a single front-of-pack food labelling scheme that includes traffic-light-colors (British Heart Foundation, 2013).

In consequence of that research, a recent study by the Dutch consumer scientist, van Herpen, has indicated that a traffic light color-coding system communicates best of all front-of-pack nutrition labelling formats. The results in the study showed that the multiple traffic light is best able to distinguish between more and less healthful products and between more and less healthful options in the same product category. Still, effectiveness in communicating healthfulness does not necessarily imply that healthful choices will be stimulated (van Herpen et al., 2014).

Contrarily to the above mentioned studies, Thorndike et al., (2012) tested a simple color-coding format, such as the simple traffic light, in the main cafeteria at Massachusetts General Hospital. Packages were provided with a red (unhealthful), yellow (less healthful) or green (healthful) label in order to inform the consumers about the healthiness of the items. As a result the authors found that the color-coded labelling of all foods and beverages led consumers to purchase more of the healthful and fewer of the unhealthful food products. More specifically, during the study, sales of all red products decreased 9,2 percent, with red beverages purchases dropping 16,5 percent; while green product sales increased 4,5 percent, with a 9,6 increase in beverages.

Critics, on the other hand, argue that the use of just three signaling colors oversimplifies complex dietary relationships and that this leads to an oversimplified, unrealistic and consumer unfriendly labelling: good products vs. bad products (German Nutrition Society, 2008; European Food Information Council, 2008).

2.1.3 Ratings

In contrast to color-coding, ratings are not commonly used in front-of-pack nutrition labels. However, in some U.S. supermarkets a front-of-pack nutrition label, called NuVal (appendix 2), is successfully in use. The system consists of an overall food rating of 1 to 100; the higher the rating the healthier the nutrition of the food product. The scientist who investigated this label, Dr. Katz, mentioned that people who eat foods with higher NuVal scores have lower BMI and lower risk of cardiovascular disease and death. Furthermore, products that are highly rated by the NuVal system (Katz et al., 2010) are responsible for an increase in purchase of healthful products according to analysis of sales data in the United States. Sales volume of NuVal products scoring 50 to 100 outsold products with low scores (Katz et al., 2010). Another important benefit of the NuVal rating system is that such nutrient profiling systems eliminate confusion among subgroups since almost everyone is able to count up to 100 (Katz et al., 2010).

2.1.4 Endorsement

An endorsement is a form of public support or approval (including demonstrations, verbal statements, depictions of the name, signature, likeness, other identifying personal characteristics of an individual or the name or seal of an organization) given to something or someone, such as politicians, services or products. The party, who supports the endorsed product, service or politician with his message, will be called the endorser and may be an individual, group, or institution (Federal Trade Commission, 2009).

The purpose of a product endorsement is to increase the credibility, attractiveness and/ or likeability of the endorsed product. The endorser's qualities should operate in a transferable way and should support the endorsed product in its message (Erdogan, 1999).

An endorsement is able to give credibility and substance to the endorsed product, service, politician or in this case the health label and usually plays only a minor driver role (Aaker & Joachimsthaler, 2000). A study of confectionary brands in the UK suggests that endorsers do add extra value to the product. In this study nine confectionery products were endorsed by one of six corporate endorsers (Terry's, Nestle, Walls, Cadbury, Mars and a baseline which was 'no endorsement'). The results indicated that sales went for all products when a corporate endorsement was present. (Saunders & Guoqun, 1997).

More specifically, endorsements by organizations are viewed as reliable. Their judgments are taken for granted because of the collective experience it represents. These experiences exceed that of any individual and these experiences are generally free of the sort of subjective factors that vary from individual to individual. In this case the expertise from the endorser, a Dutch food healthf organization, should operate in a transferable way with respect to the endorsed product, the color-coded and rated label (Federal Trade Commission, 2009).

In the field of front-of-pack nutrition labelling formats, Feunekes et al. (2007) found that endorsement by national and international health organizations strongly increased the labelling formats' credibility. The nutrition labelling format, Smileys, was perceived to be far more credible when it was endorsed by an international or national organization in the area of health and nutrition compared to when no endorsement was presented with the label.

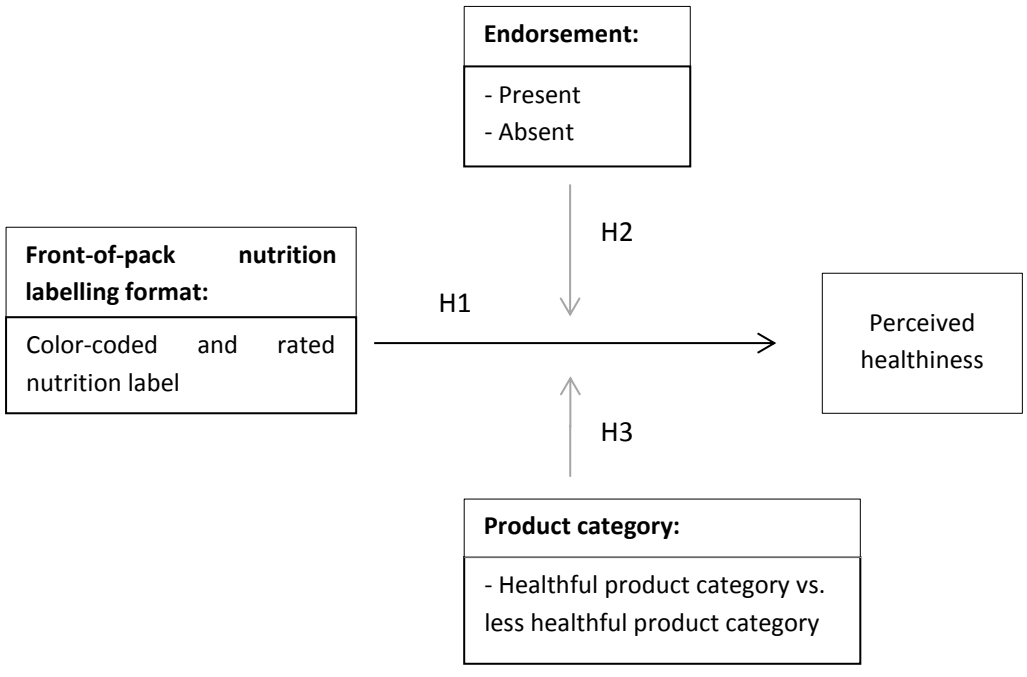
2.2 Hypotheses

As discussed in the previous chapter, academic literature has unambiguously verified that front-of-pack nutrition labelling formats, health claims and nutrition information have a positive impact on the consumers' perceived healthiness (distinction between healthful and less healthful variants within a product category) of a food product (Cowburn & Stockley (2005), Kelly et al. (2009), Wansink, (2003), Williams, (2005), Drichoutis, Lazaridis, & Nayga, (2006), Kozup, Creyer and Burton (2003). Also consumers indicated that they are generally aware of the link between food and health and are interested in nutrition information on food packages (Grunert and Wills, 2007).

In the literature overview of Hersey et al. (2011) it is concluded that in general results found that the complex format: 'multiple traffic light' performed better than a simple summary format consisting of a single check. However, there have only been a few studies comparing a multiple traffic light format to a continuous summary rating system, such as a simple combined color-coded and rated nutrition labelling format. The color-coded and rated nutrition label, used in Boodschapp, consists out of the same colors that are used in the multiple traffic light format and works with a summary rating system, which reduces cognitive effort and time needed (Geiger et al., 1991; Scott & Worsley, 1994), thus could have great potential in being a promising front-of-pack nutrition label.

The aim of the current study is to evaluate the color-coded and rated nutrition label on its ability to help consumers differentiate between healthier and less healthful variants of the same product category, to see if this labelling format meets the basic requirement (Feunekes et al., 2007). In addition to these main effects, the presence of endorsement is also tested and hypothesized to moderate the main effects of the front-of-pack nutrition label on perceived healthiness. Together with the possible moderation effect of product category characteristics (healthful vs. less healthful), this gives the following conceptual framework:

FIGURE 1: Theoretical framework



The following paragraphs describe this framework and the hypotheses thoroughly in order to explain the reasoning behind each hypothesis.

2.2.1 Perceived healthiness

It has been investigated that front-of-pack labels can be supportive for consumers in making a healthier choice in the supermarket (Cowburn & Stockley (2005), Kelly et al. (2009), Wansink, (2003), Williams, (2005), Drichoutis, Lazaridis, & Nayga, (2006), Kozup, Creyer and Burton (2003). More specifically Feunekes et al. (2007) showed that eight tested labelling formats improved the perceived healthiness of a food product compared to 'no labelling'. The mean difference in perceived healthiness between the healthier and the less healthful variants of the same product category for each labelling format was calculated. The size of this difference indicated to what extent the labelling formats helped consumers to differentiate between more healthful and less healthful product variants.

An important task for a nutrition label is to provide transparency in the nutrient content and communicate the healthfulness of products in a way that is meaningful and understandable to the consumer. Ideally, such transparency should be provided at two levels. First, at a food category level, nutrition labels may help identify healthier from less healthful categories (e.g. the product categories: yoghurt and cake). Secondly, within each category, nutrition labels should help identify the relative healthfulness of different product variants (e.g. low-fat yoghurt and low-fat yoghurt red fruit) (van Herpen et al., 2014). In this study I focus on the 'within category comparisons'. A less greater effect of a helping health label is expected for the 'across categories comparisons' , as consumers may have more strongly held beliefs of how healthful a category is (e.g. yoghurt is more healthful than cake) than about how healthful individual variants within a category are (e.g. whether one type of yoghurt is more healthful than another). (van Herpen et al., 2014).

The color-coded and rated nutrition label, used by Boodschapp (appendix 1), consists of three elements that are widely used by known front-of-pack nutrition labels (appendix 2). The first element that the label has adopted is the 'summary nutrient system', as the label provides the product with a single rating for the overall product. Front-of-pack labelling formats, based on a summary nutrient system, seem more appropriate in a shopping environment where quick decisions are made (Feunekes et al., 2007; Hoyer (1984), as it reduces cognitive effort and time needed (Geiger et al., 1991; Scott & Worsley, 1994). The second adopted element is 'traffic light color-coding', which means in this case that the background of the label could be either green (healthful), yellow (less healthful) or red (unhealthful), depending on the healthiness of the food product. According to a study by the FSA in 2005, traffic light color-coding was an important contributing factor for consumers in making a healthier choice in the supermarket. In a totally different setting, namely a hospital cafeteria, a traffic light color-coding system has led consumers to purchase more of the healthful and fewer of the unhealthful items. Although a simple color-coded nutrition labelling format based on a summary nutrient system seems to have great benefits to be a promising front-of-pack nutrition label, the comparative simple traffic light format performed clearly lower on consumer friendliness and improving the perceived healthiness than the multiple traffic light format (FSA, 2005; Hersey et al. 2011). Only two percent of the people preferred the simple traffic light when it came to consumer liking and the label generated a significantly lower level of correct answers, meaning they perceived healthiness not as well as the other tested formats. It seems like such a color-coded format

is just too simple in providing a clear image of the nutrition information. Labelling schemes, like the simple traffic-light, lacking reference point information are less effective when no comparison product is available (van Herpen et al., 2014). In context of this study, a welcome addition to a color-coded nutrition labelling format could be ratings, which could be used as a reference point (1; very unhealthful/ bad and 10; very healthful/ good). Thus, the third adopted element of the color-coded and rated nutrition label are 'ratings'. Not much is known about ratings in food labelling because there is only one known front-of-pack labelling format that uses this element. However, studies that investigated this rating system, have found that products that are highly rated by the NuVal system (Katz et al., 2010) are responsible for an increase in purchase of healthful products according to analysis of sales data in the United States. Another important benefit of the NuVal rating system is that such nutrient profiling systems eliminate confusion among subgroups because everyone is able to count up to 100 (Katz et al., 2010). Using the Dutch grading system in the color-coded and rated label should have the same effect while everyone can also count up to 10.

All in all, with the color-coded and rated nutrition label based on these three proven elements it can be expected that the label has great potential to be a promising front-of-pack nutrition labelling format. According to Feunekes et al. (2007) and Van Herpen et al. (2014) the labeling formats should first met the basic requirement, distinction in healthful and less healthful product variants, in order to become accepted by consumers. Therefore the following hypotheses are developed:

H1: A food product with the color-coded and rated nutrition label allows consumers better to distinguish between healthful and less healthful product variants within the same product category in comparison with food products without labelling.

2.2.2 The moderating effect of endorsement.

As described in the theoretical background, an endorsement by an established organization provides credibility and substance to the endorsed service (Aaker & Joachimsthaler, 2000). In the field of front-of-pack nutrition labelling formats, Feunekes et al. (2007) found that endorsement by national and international health organizations strongly increased the labelling formats' credibility. So it is expected that an endorsement by a national health organization positively moderates the main effect of the color-coded and rated nutrition label on perceived healthiness and thereby leads to the following hypothesis:

H2: A color-coded and rated nutrition label with endorsement has a greater positive impact on the consumers' perceived healthiness, compared to a color-coded and rated label without endorsement.

2.2.3 The moderating effect of product category

Food products differ in healthiness. Various studies prove that our health benefits from the intake of vegetables and fruit (Heber, 2004), fish (Carpentier et al., 2006) and nuts (Hu and Stampfer, 1999). On the other hand, products with high amounts of calories, (saturated) fat, sugar or salt increase the risk of chronic diseases, cardiovascular diseases, type 2 diabetes, stroke, cancers and possibly neurodegenerative disorders (Barger et al., 2003; Smith et al., 2004; Martin et al., 2006; Grundy, 1999; Wijendran and Hayes, 2004).

In the study of Feunekes et al., (2007) the labelling formats differentiated most between less and healthful product variants for the healthful product category dairy drinks and least for the unhealthful product category, spreads. In other words this means that the labelling formats' ability to help consumers differentiate between healthful and less healthful variants of the same product category is more effective in healthful product categories. This leads to the following hypothesis:

H3: It is expected that the color-coded and rated nutrition label is better able to help consumers distinguish between more and less healthful product variants within a more healthful product category than within a less healthful product category.

3. METHODOLOGY

The aim of this chapter is to give a clear description of how this research is constructed. The research design will be motivated as well as the design for the survey and the measures.

3.1 Research design

As described before, there are many forms of front-of-pack labelling formats in use by different supermarkets. Within this study the focus will lay on the front-of-pack labelling format: 'color-coded and rated nutrition label' (see appendix 2). The aim of the present study is to evaluate the color-coded and rated nutrition label on its ability to help consumers differentiate between healthier and less healthful variants of the same product category. In addition to this main effect, the presence of endorsement will also be tested to moderate the main effect of the front-of-pack nutrition label. Finally product category will also serve as a moderator effect while it is expected that perceived healthiness of healthful product categories will be effected more by the color-coded and rated nutrition label (Feunekes et al., 2007).

Since the current research is characterized by clearly defined hypotheses that are supported by previous literature, one could define it as a form of descriptive research. In order to measure the ability to help consumers differentiate between food product variants, a quantitative approach was chosen. Due to the fact that the observations of this paper will be made in the same period this study could be defined as cross-sectional. The quantitative approach gives the opportunity to perform statistical techniques. Subsequently it will be possible to test for significant differences in perceived healthiness with the help of IBM SPSS 20.

3.2 Survey design

In order to obtain the information needed to test the hypotheses a survey research in the form of an online questionnaire is chosen. In this survey both the direct as the moderating effects are captured. In order to measure perceived healthiness and answer hypothesis one, two and three, respondents must rate different food products with and without the color-coded and rated nutrition label. To correctly measure H1 and H2, two questionnaires have been conducted. This way, any differences in responses could only be explained by the differences in the stimuli images. So there are two different questionnaires, one for the regular label and one for the regular label with endorsement. These two questionnaires have the exact same questions, only use different stimuli images.

3.2.1 Online survey

As previously mentioned, the research was conducted online. First a pre-test was done among ten people to prevent errors and misspelling in the final surveys. Participants were randomly assigned to one out of two surveys (see appendix 5). The survey starts with a short introduction about the researcher together with a short thank you message. After the opening text, a second block is shown that describes the context of the survey that respondents must keep in mind when answering the questions. In order to prevent respondents from being too focused on the subject of this research, the actual purpose was not revealed completely. Respondents are told that the research is about shopping behavior regarding to different products. This lack of detailed information about the research objects conceals the true research concept, while legitimizing the questions about their perceived healthiness of the different food products. In each survey the participants were exposed to eight pictures of pre-packaged food products and had to rate the healthfulness of these

products on a 7-point Likert scale (from 1= 'very unhealthful' to 7= 'very healthful'). In the first part, the participants rated the products without being exposed to any labelling, except for the nutrient content (see appendix 6). To simulate an in-store situation at its best, the nutrient content was not immediately visible just like in a supermarket setting where the nutrient content is hidden at the back of the package. The extra information became available in a pop-up window by clicking on the link below the product image. This way the participant had to make an effort to see the nutrient content just like a consumer has to make an effort in the supermarket by taking the product out of the shelf and look at the back of the package. After this first stimulus, respondents were asked to fill in some socio-demographic information, in order to get their mind off the subject. The reason for this distraction is to prevent a bias in the survey. Naturally this information will also be used as explanatory information. Moreover, the participants needed to rate the same products again in the next part, where the products were provided with the color-coded and rated nutrition label (with endorsement). At last the participants were asked to answer food-related questions in order to understand and classify the results. The survey was constructed in Qualtrics (Qualtrics Labs, Inc. , 2014) where all questions were set to 'forced response' in order to prevent missing information from participants.

3.2.2 Participants

This survey is spread in the Dutch language within the network of the researcher through the social media platforms Facebook and LinkedIn (see appendix 4). In addition to this population both surveys were also distributed across different Dutch food related LinkedIn groups such as, JUMBO SUPERMARKTEN, Eten, drinken en genieten, Voeding Nu and Voeding, vitaliteit & Gezondheid. More than 100 random selected members of these groups have been approached and invited to participate in this research. They were contacted through a personalized message and the response rate was surprisingly good, since many members responded to the request. Both surveys were launched at May 16 and were closed at May 23. It was fairly easy to obtain enough respondents. People on LinkedIn and Facebook were eager to fill in the survey from the beginning. Around the date of May 20 a personal reminder was sent to all Facebook and LinkedIn connections. This gave the respondent count a great incentive and made sure that the study collected enough respondents in order to proceed to the analyzing part.

3.2.3 Products

For two product categories a healthful and a less healthful variant of the same product category were selected by using the scores from the independent mobile food comparison application Boodschapp. The scores in this application are carefully constructed by an independent and professional team of dietitians. In order to test H3, participants had to rate two product variants of a healthful product category and two product variants of a less healthful product category. In this study dairy drinks represents the healthful product category and snacks/ chips represents the less healthful product category. For dairy drinks, the more healthful variant was 'low-fat yoghurt' and the less healthful variant 'low-fat yoghurt red fruit'. For snacks/ chips the more healthful variant was 'mini-muffins apple crumble' and the less healthful variant 'full-cream butter apple cake'. In the application, Boodschapp, the healthier perceived product category indeed shows more high rated 'green' products than the less healthful perceived product category. For all variants the healthier product variant had a higher rating than the less healthful variant, thus indicating that the difference in healthfulness between the product categories is plausible and the more healthful product category can safely be called that way.

In order to avoid bias regarding to brand preferences no products of popular brands were included. All products in this research are from the house brand of Albert Heijn to eliminate unwanted brand loyalty influences.

3.2.4 Label

In the third part of each survey participants had to rate the healthfulness of the products with the help of the color-coded and rated label or the color-coded and rated label with endorsement, depending on which survey they had to fill in. In an attempt to help the participant better distinguish between healthful and less healthful product variants the color-coded and rated nutrition label was attached to the product. The label that participants got to see in this part of the survey showed a score of the product on a scale from 1.0 (worse/ very unhealthful) to 10.0 (best/ very healthful). In addition to the ratings, the background of the rating is either green (≥ 7,5), yellow (7,5-5,5) or red (≤5,5).

In the survey with endorsement as extra incentive, the label is enhanced with the name of the Dutch national nutrition organization: 'Voedingscentrum' (see appendix 7). The presence of the endorsement was also supported by the following text: 'U ziet bij de volgende producten een uitvergroting van het gezondheidslabel van de Stichting Voedingscentrum Nederland op de voorkant van de verpakking van het product.'

As discussed in previous chapters the scores on the label are derived from the mobile food comparison application Boodschapp. The differences between the variants in scores between the product categories are selected as close as possible, still it needed a little correction through Adobe Photoshop CS4 to get the differences between the variants between dairy drinks and snacks/ cake at an equal level (see table 1 and 2).

TABLE 1: Scores per product for 'dairy drinks'

Product	Score	Score after correction
Low-fat yoghurt	8.9	9.4
Low-fat yoghurt red fruit	7.4	7.4
Difference between variants	1.5	2

TABLE 2: Scores per product for 'snacks/ chips'

Product	Score	Score after correction
Mini-muffins apple crumble	6.2	-
Full-cream butter apple cake	4.2	-
Difference between variants	2	-

3.3 Measures

This research tests both the direct effect of the presence of the color-coded and rated label on consumers' perceived healthiness of food products, as well as the moderating effects of the presence of an endorsement on the label and the difference in product category. This chapter describes the independent, dependent and moderating variables which were identified to test for these relationships.

3.3.1 Perceived healthiness measures

In the first block of the questionnaire respondents were asked how healthy four presented products were to them on a 7-point Likert scale with extremes 1 (very unhealthy) and 7 (very healthy). This first stimulus consisted of the healthful and less healthful variants of dairy drinks, respectively AH low-fat yoghurt, AH low-fat yoghurt red fruit and the healthful and less healthful variants of snacks/ chips, respectively AH mini-muffins apple crumble and AH full-cream butter apple cake. In this first block the respondents got to see pictures of the products without any labelling except for the link to the nutrient content. The stimulus in this first block is called baseline for the reason that nothing was added to the product pictures. In the third block of the questionnaire respondents were asked again how healthy the same four presented products were to them on a 7-point Likert scale. The only difference was that the four products were presented with a label in one survey and with a label incl. endorsement in the other survey.

TABLE 3: Perceived healthiness variables

Product	**Stimulus 1: Baseline**	**Stimulus 2: Label**	**Stimulus 3: Label incl. endorsement**
Low-fat yoghurt	PH1BY	PH2LY	PH3LEY
Low-fat yoghurt red fruit	PH1BYRF	PH2LYRF	PH3LEYRF
Mini-muffins apple crumble	PH1BMM	PH2LMM	PH3LEMM
Full-cream butter apple cake	PH1BFC	PH2LFC	PH3LEFC

Note: for clarification see appendix 8

For this study, the interesting part of the perceived healthiness of these products is the difference between the healthful and less healthful variants within a product category. The mean difference will be calculated for each stimuli in order to compare the size of the difference of stimulus 1: baseline with stimulus 2: label and 3: label incl. endorsement. The size of these differences indicated to what extent the color-coded and rated labelling format (with endorsement) helped consumers to differentiate between healthier and less healthful product variants. These variables were added to the dataset in order to perform tests on these differences.

TABLE 4: Difference in perceived healthiness variables

Product	Stimulus 1: Baseline	Stimulus 2: Label	Stimulus 3: Label incl. endorsement
Dairy drinks	PH1BY - PH1BYRF = PH1DD	PH2LY - PH2LYRF= PH2DD	PH3LEY - PH3LEYRF = PH3DD
Snacks/ chips	PH1BMM - PH1BFC = PH1SC	PH2LMM – PH2LFC = PH2SC	PH3LEMM – PH3LEFC = PH3SC

Note: for clarification see appendix 8

3.3.2 Purchase intention

Besides the questions about perceived healthiness participants had to choose which variant they would have bought if they were in a supermarket. The question was asked after stimulus 1, 2 and 3 in order to test if participants would make a different choice after seeing the products with the color-coded and rated label.

3.3.3 Product category

In hypothesis 3 it is stated that the color-coded and rated label is expected to have more effect for the healthful product category then it would for the less healthful product category. To test this hypothesis the mean differences between the product categories will be compared.

3.3.4 Background variables

The socio-demographic variables were measured in block two of the questionnaire and consisted of questions about gender, age, education, household income and composition, profession and origin. Variables regarding health and nutrition could be found in block four of the questionnaire and consisted the following questions:

Nutritional knowledge was measured with the question: 'How would you describe your knowledge about health and nutrition issues?', with extremes 1 (very bad) and 5 (very good).

Healthiness of diet was measured with the question: 'How would you describe your diet?', with extremes 1 (very bad) and 5 (very good).

Nutrient content table reading was measured with the question: 'Do you read the table with nutrient content at the back of the package?', with extremes 1 (Never) and 4 (Always).

Label reading was measured with the question: 'Do you look at the health label at the front of the package?', with extremes 1(Never) and 4 (Always).

Attitude towards healthy eating was measured with the question: 'Which one of the following statements describes your attitude towards healthy eating?'. Participants answered these question by choosing one of the four statements: 'Have to follow a special diet because of a special health need', 'Eat a healthy diet because it helps me to keep me fit and well', 'Try to eat healthy diet but find it hard to stick to' or 'Eat what I like and do not worry about how healthy it is.'

Participants were also asked: 'When comparing these products what were your assumptions?'. The following options were available to choose from: 'I assumed the color-coded and rated label helped me to compare yoghurt with yoghurt and cake with cake'. 'I assumed the color-coded and rated label helped me to compare all kinds of products with each other' or 'I did not think about it really'.

Furthermore it was measured if participants were thought a good rating (and green background) would imply that the product would be less tasteful in comparison with a low rating (and red or yellow background). In the last question of the questionnaire participants were asked if they are experiencing any form of color-blindness. This question was added to the survey because the label contains a green, yellow or red background. In the Netherlands 4.11 % of the population suffers from color-blindness.

4. ANALYSIS AND RESULTS

In this chapter the analysis and results will be described. Also the steps that were performed prior to analyzing will be highlighted. At last all three hypotheses will be answered and other findings such as purchase intention and effect of the label per product will be presented.

4.1 Dataset

At the end of the data collection a total of 367 surveys (label: 191, endorsement: 176) were started and therefore also recorded. The combined and cleaned database contained 313 Dutch respondents (label: 159, endorsement: 154). No skips were added to the questionnaire and all questions were set to 'forced response' in order to avoid large amounts of missing data, thus improving the quality of the data.

4.2 Cleaning the data

4.2.1 Data view

In order to further improve the dataset it was necessary to clean the data from early dropouts which did not added any value. 38 of all respondents who started dropped out without filling in any of the questions. Obviously these recorded respondents contained no relevant data and therefore they were deleted from this study. This high amount of dropouts might partly be explained by the fact that people have tried to fill in the survey on their mobile device. Approximately fifteen people have indicated that they first tried to open the questionnaire on their mobile device, but due to the large text in the questions the participants could not fully read the questions and needed to complete the questionnaire on a computer. Another 16 surveys were deleted because they were abruptly quitted somewhere in the beginning of the questionnaire.

4.2.2 Variable view

Qualtrics records all blocks in the survey as variables. This means that blocks with an explanatory or introducing text were also recorded as variables. Subsequently the cleaned and combined dataset only contains variables of the questions that were asked in the questionnaire in combination with a ResponseID and IPadress in order to distinguish the participants from each other. Automatic included variables such as ResponseSet, StartDate, EndDate and Finished were deleted to keep the dataset well-ordered.

Another problem that occurred during the merging of the surveys relating to variables was that the two datasets contained exactly the same questions (only with different stimuli in block 3), but somehow Qualtrics named some of the variables different per survey. This way it was not possible to merge those variables correctly. In order to fix this problem the variables in question were transformed (see appendix 9).

4.3 Population

As displayed in the table below the population in this study mainly consists of native Dutch respondents. Other notable observations are that most of the participants are student and the mean age is situated between 18 and 34.

TABLE 5: Demographic characteristics of the study population

Characteristics	N	N (%)	Characteristics	N	N (%)
Gender			€40.000 - €50.000	34	10.9
Male	148	47.3	€50.000 - €60.000	21	6.7
Female	165	52.7	€60.000 - €70.000	18	5.8
Age			Above €70.000	25	8.0
Under 18	14	4.5	**Household composition**		
18-24	143	45.7	With my parents	124	39.6
25-34	95	30.4	Alone, without children	46	14.7
35-44	29	9.3	Alone, with children	3	1.0
45-54	14	4.5	Together, with partner and without children	71	22.7
55-64	18	5.8	Together, with partner and with children	61	19.5
Education			**Situation**		
Elementary school	2	0.6	Student	226	72.2
MAVO/ MULO/ VMBO	24	7.7	Other	87	27.8
HAVO	18	5.8	**Ethnic group**		
VWO/ Athenaeum/ Gymnasium	13	4.2	Native	260	83.1
MBO	84	26.8	Moroccan	5	1.6
HBO	106	33.9	Surinamese	4	1.3
WO	63	20.1	Asian	3	1.0
Household income			Antillean/ Aruban	2	0.6
Under €10.000	60	19.2	Other, non-western	4	1.3
€10.000 - €20.000	37	11.8	Other, western	29	9.3
€20.000 - €30.000	33	10.5	Turkish	6	1.9
€30.000 - €40.000	85	27.2			

4.4 Perceived healthiness

As described in the methodology chapter, in part one and three of the questionnaire respondents were asked to rate the healthiness of certain products on a 7-point Likert scale. These products were either carrying the color-coded and rated label (stimulus 2), the color-coded and rated label with endorsement (stimulus 3) or nothing at all (stimulus 1: baseline).

4.4.1 Mean scores

In the table below all means for the perceived healthiness of the products are shown.

TABLE 6: Mean scores and mean score differences for perceived healthiness from all stimuli

Variables	**Baseline (n=159)**	**Label (n=159)**
Low-fat yoghurt	5.65	5.98
Low-fat yoghurt red fruit	4.78	4.58
Mean difference perceived healthiness dairy drinks	0.8742	1.4025
Variables	**Baseline (n=159)**	**Label (n=159)**
Mini muffins apple-crumble	2.41	2.96
Full cream butter apple cake	2.14	2.07
Mean difference perceived healthiness snacks/ chips	0.2642	0.8931
Variables	**Baseline (n=154)**	**Label with endorsement (n=154)**
Low-fat yoghurt	5.76	6.09
Low-fat yoghurt red fruit	4.67	4.64
Mean difference perceived healthiness dairy drinks	1.0909	1.4545
Variables	**Baseline (n=154)**	**Label with endorsement (n=154)**
Mini muffins apple-crumble	2.23	2.90
Full cream butter apple cake	2.10	1.97
Mean difference perceived healthiness snacks/ chips	0.1299	0.9286

Note: Mean scores could vary from 1.0 (very unhealthy) till 7.0 (very healthy)

In all of these cases the mean score of the healthful variant with presentation of the label (with endorsement) scores higher than the baseline mean score of the healthful variant. All less healthful variants with presentation of the label (with endorsement) have lower mean scores than the baseline mean scores of the less healthful variants. Apparently respondents rated healthful variants higher and less healthful variants lower after seeing the color-coded and rated label (with endorsement), thus indicating that the color-coded and rated label helped people to distinguish between healthful and less healthful product variants within a product category. As mentioned earlier in methodology the interesting part in perceived healthiness for this study would be the difference between the healthful and less healthful product variants in the same product category. By calculating this difference it could easily be seen if people really noticed any difference in health within a product category. The larger the difference, the better participants could distinguish the healthful and less healthful product variants. In table 6 the mean differences for perceived healthiness are calculated

between the healthful and less healthful variant. Mean differences for both product categories have expanded when participants got to see stimulus 2 (label) and 3 (label with endorsement) in comparison to the first stimulus (baseline).

4.4.2 H1 'Perceived healthiness'

At first sight the mean differences of perceived healthiness between products presented with the color-coded and rated label (with endorsement)(stimulus 2 and 3) and the baseline (stimulus 1) seem to differ in benefit of the products presented with the label (with endorsement). A Paired-Samples T Test is performed to test these mean score differences for significances.

TABLE 7: Mean score differences of perceived healthiness between products presented with the color-coded and rated label (stimulus 2) and the baseline (stimulus 1)

Product category	Mean difference	Standard Deviation	T-value	Significance level (2-tailed)
Dairy drinks	-0.52830	1.06028	-6.283	0.00
Snacks/ chips	-0.62893	0.89692	-8.842	0.00

Note: $p<0.05$

TABLE 8: Mean score differences of perceived healthiness between products presented with the color-coded and rated label with endorsement (stimulus 3) and the baseline (stimulus 1)

Product category	Mean difference	Standard Deviation	T-value	Significance level (2-tailed)
Dairy drinks	-0.36364	0.96892	-4.657	0.00
Snacks/ chips	-0.79870	1.11660	-8.877	0.00

Note: $p<0.05$

All mean differences turn out to be significant ($0.00 < \alpha = 0\ .05$), which indicates that the size of perceived healthiness between healthful and less healthful product variants within the product categories differentiated significantly more when the color coded and rated label and the color-coded and rated label with endorsement were presented to the participants of this study. The color-coded and rated label, with or without endorsement, helped participants to differentiate between healthful and less healthful product variants more than if nothing was presented. All in all, hypothesis 1, a food product with the color-coded and rated nutrition label allows consumers better to distinguish between healthful and less healthful product variants within the same product category in comparison with food products without labelling, is not rejected.

4.4.3 H2 'The moderating effect of endorsement'

To further check the hypotheses, the mean differences of stimulus 2 (products presented with the label) and stimulus 3 (products presented with the label incl. endorsement) will be compared in order to answer hypothesis 2. An Independent-Samples T Test is used to test if the mean differences of perceived healthiness from the products that included endorsement in the label were significantly higher than the mean differences of perceived healthiness from products that only were presented with the regular color-coded and rated label. In other words does an added endorsement in the label come with a greater effect on the mean difference of the perceived healthiness from that particular product than when an endorsement is absent?

TABLE 9: Mean score differences of perceived healthiness between products presented with the color-coded and rated label (stimulus 2) and products presented with the color-coded and rated label including endorsement (stimulus 3)

	Levene's Test for Equality of Variances			**T-test for Equality of Means**	
Product category		**F**	**Sig.**	**Mean difference**	**Significance level (2-tailed)**
Dairy drinks	Equal variances assumed	0.007	0.933	-0,05203	0.657
Snacks/ chips	Equal variances assumed	0.408	0.524	-0.03549	0.728

Note: $p<0.05$

The outcome of Levene's Test for Equality of Variances determines if a T-test for equal or unequal variance should be chosen. In this case equal variances are assumed according to F=0.007 and F=0.408 with a significance of respectively 0.933 and 0.524. Both numbers exceed $\alpha = 0.05$ which means that the variances do not differ significantly.

There are no significant values for this T-test. When looking at the table the significance levels 0.657 for dairy drinks and 0.728 for snacks/ chips both exceed $\alpha = 0.05$. A color-coded and rated label with endorsement has no greater positive impact on the perceived healthiness of the product, compared to a color-coded and rated label without endorsement. The presence of an endorsement on the label did not matter to the participants. Thus hypothesis 2, A color-coded and rated nutrition label with endorsement has a greater positive impact on the consumers' perceived healthiness, compared to a color-coded and rated label without endorsement could be rejected.

4.4.4 H3 'The moderating effect of product category'

Finally the third and last hypothesis will be answered. It is expected that the color-coded and rated label is better able to help consumers distinguish between more and less healthful product variants within a more healthful product category than within a less healthful product category. A Paired-Samples T Test is performed in order to test if this expectation is correct.

TABLE 10: Difference in perceived healthiness between healthful and less healthful product category

Variable	Mean difference	Standard Deviation	T-value	Significance level (2-tailed)
Dairy drinks vs. Snacks/ chips	0.10063	1.36036	0.933	0.352

Note: p<0.05

As well as the presence of endorsement in the second hypothesis, the mean difference for this third hypothesis is not significant (0.352 > α = 0.05). A color-coded and rated label is not better able to help consumers distinguish between more and less healthful product variants within a more healthful product category (dairy drinks) in comparison with a less healthful product category (snacks/ chips). Thus hypothesis 3 could be rejected.

4.5 Other findings

In addition to the three hypotheses the survey also consisted of background and food-related questions. It is possible that one of these variables could influence or predict the mean differences of perceived healthiness. Besides these background and food-related questions the survey also contained questions regarding to purchase intention.

4.5.1 Regression for perceived healthiness

In order to measure the possible impact that different social-demographic or food-related variables could have on the mean differences of perceived healthiness between products presented with the color-coded and rated label (with endorsement)(stimulus 2 and 3) and the baseline (stimulus 1) it is chosen to perform a multiple linear regression. The regression analyses consist of the socio-demographic variables or food-related variables as independent variables and the dairy drinks or snacks/ chips mean score difference of perceived healthiness between products presented with the color-coded and rated label (stimulus 2) and the baseline (stimulus 1) as dependent variable. In short the mean difference between products presented with stimulus and those without.

Basic general linear regression model

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \ldots + \beta nXn + \varepsilon$$

Healthful product category: 'dairy drinks'

Socio demographics

Mean score difference between stimulus 1 and 2 = β0 + β1 gender + β2 age + β3 education β4 combined household income + β5 student + β6 non-western foreigner + β7 western foreigner + ε

TABLE 11: Results of regression model (with socio-demographic variables) of the mean score difference between stimulus 1 and 2 for dairy drinks

Variable	B	Std. Error	β	Sig.
Gender	0.172	0.118	0.084	0.144
Age	0.018	0.058	0.021	0.756
Education	0.151	0.041	0.214	*0.000*
Combined household income	-0.018	0.033	-0.037	0.592
Student	0.130	0.148	0.057	0.378
Non-western foreigner	-0.247	0.227	-0.062	0.277
Western foreigner	-0.053	0.205	-0.015	0.795

Note: $p < 0.05$ | $R^2 = 0.056$

The explanation level of this model is very low (5.6%) so these socio-demographic variables are not very useful for the explanation of the mean difference of dairy drinks. Only the variable education is significant and does predict mean difference of dairy drinks a little. In the next regression model with food-related variables education is also included.

Food-related + education

Mean score difference between stimulus 1 and 2 = β0 + β1 education + β2 knowledge food healthfulness + β3 dietary pattern + β4 nutrient content reading + β5 label looking + β6 attention for healthy eating + β7 label helping + β8 label no idea + β9 tastefulness of healthful products + ε

TABLE 12: Results of regression model (with food related variables + education) of the mean score difference between stimulus 1 and 2 for dairy drinks

Variable	B	Std. Error	β	Sig.
Education	0.091	0.040	0.129	*0.023*
Knowledge food healthfulness	0.018	0.090	0.013	0.842
Dietary pattern	-0.035	0.089	-0,025	0.692
Nutrient content reading	0.347	0.085	0.269	*0.000*
Label looking	-0.011	0.079	-0.008	0.892
Attention for healthy eating	0.015	0.083	0.011	0.862
Label helping	-0.448	0.158	-0.172	*0.005*
Label no idea	-0.325	0.132	-0.157	*0.015*
Tastefulness of healthful products	-0.107	0.140	-0.042	0.447

Note: $p < 0.05$| $R^2 = 0.133$

The explanation level is a bit higher than the regression model for socio-demographic variables only, but still low (13.3%). Education is also significant in this model together with nutrient content reading, label helping and label no idea. Regarding education, the higher the education, the more likely it is consumers will be influenced by the color-coded and rated label (B=0.091). In other words, higher educated consumers will perceive the healthiness of the product category dairy drinks higher if they are exposed to an accompanied label. The size regarding to healthfulness between healthful and less healthful product variants within dairy drinks is larger when exposed to a label in comparison with the baseline. Another positive explanatory variable in this model is nutrient content reading. This effect is even greater than education(B=0.347). If a consumer reads the nutrient content on the back of the package, they will also much more likely be influenced by the color-coded and rated label in the healthful product category dairy drinks. The 'label helping' and 'label no idea' variables do both have a negative impact on the dependent variable. For 'label no idea' it appears to be reasonable because if you do not have any idea what the label stands for you do not let it influence your decision regarding to healthiness of the product. Unfortunately the explanation value is 13.3% so actually these variables do explain the dependent variable not so much.

Less healthful product category: 'snacks/ chips'

Socio demographics

Mean score difference between stimulus 1 and 2 = β0 + β1 gender + β2 age + β3 education β4 combined household income + β5 student + β6 non-western foreigner + β7 western foreigner + ε

TABLE 13: Results of regression model (with socio-demographic variables) of the mean score difference between stimulus 1 and 2 for snacks/ chips

Variable	B	Std. Error	β	Sig.
Gender	0.190	0.104	-0.106	0.070
Age	-0.070	0.052	-0.092	0.175
Education	0.036	0.036	0.058	0.323
Combined household income	-0.004	0.030	-0.011	0.880
Student	-0.136	0.131	-0.068	0.299
Non-western foreigner	-0.361	0.201	-0.104	0.074
Western foreigner	0.046	0.182	0.015	0.802

Note: $p < 0.05$ | $R^2 = 0.030$

None of the socio-demographic variables in the above regression model have a significant influence on the dependent variable for snacks/ chips.

Food-related

Mean score difference between stimulus 1 and 2 = β0 + β1 knowledge food healthfulness + β2 dietary pattern + β3 nutrient content reading + β4 label looking + β5 attention for healthy eating + β6 label helping + β7 label + no idea β8 tastefulness of healthful products + ε

TABLE 14: Results of regression model (with food-related variables) of the mean score difference between stimulus 1 and 2 for snacks/ chips

Variable	B	Std. Error	β	Sig.
Knowledge food healthfulness	-0.151	0.081	-0.126	0.064
Dietary pattern	0.027	0.080	0.022	0.739
Nutrient content reading	-0.085	0.078	-0.075	0.281
Label looking	0.049	0.071	0.043	0.492
Attention for healthy eating	-0.039	0.076	-0.034	0.610
Label helping	0.071	0.144	0.031	0.625
Label no idea	-0.284	0.119	-0.157	*0.018*
Tastefulness of healthful products	0.013	0.128	0.006	0.916

Note: $p < 0.05$| $R^2 = 0.048$

Explanation level of this model is just like the regression models of the healthful product category also very low (4.8%). The variable 'label no idea' is the only one that has a significant influence on the dependent variable. This negative impact is reasonable because of the lack of knowledge about what the label stands for.

4.5.2 Effect label per product

The main findings in this study show that the label helps consumers to distinguish less healthful and healthful product variants, but with the findings it could also be measured how the label influences consumers' perceived healthiness per product. Since the results of hypothesis 2 have determined that a label with endorsement does not have a greater impact on the consumers' perceived healthiness, compared to a color-coded and rated label without endorsement, the total amount of participants for the following tests are set to 313 (results of label and label incl. endorsement combined). The mean score for perceived healthiness is shown in the table below together with the difference per product between the mean score for perceived healthiness after participants saw stimulus 1 (no labelling) and stimulus 2 (label) or 3 (label with endorsement). The differences show that the label increases perceived healthiness for the healthful product variants and decreases perceived healthiness for less healthful variants. This could be seen in both product categories.

TABLE 15: Mean scores and mean score differences for perceived healthiness from all stimuli per product

Product	Baseline (n=313)	Label (n=313)	Mean difference perceived healthiness per product
Low-fat yoghurt	5,71	6,04	0.33
Low-fat yoghurt red fruit	4,73	4,61	- 0.12
Mini muffins apple-crumble	2,32	2,93	0.61
Full cream butter apple cake	2,12	2,02	- 0.10

Note: Mean scores could vary from 1.0 (very unhealthy) till 7.0 (very healthy)

A Paired-Samples T Test is performed to test these mean score differences for significances.

TABLE 16: Mean score differences of perceived healthiness per product between products presented with the color-coded and rated label (stimulus 2/3) and the baseline (stimulus 1)

Product	Mean difference	Standard Deviation	T-value	Significance level (2-tailed)
Low-fat yoghurt	0.3291	0.75342	-7.727	0.000
Low-fat yoghurt red fruit	-0.1182	0.91046	2.297	0.022
Mini muffins apple-crumble	0.6102	0.94809	-11.387	0.000
Full cream butter apple cake	-0.1022	0.77362	2.338	0.020

Note: $p<0.05$

All mean differences turn out to be significant (0.000, 0.022, 0.000 and 0.020 < α = 0 .05), which indicates that the label helps consumers to perceive the healthiness of the product better (closer to how healthful the product really is) than without a label when participants compared the healthful and less healthful product variants to each other. For the healthful product variants, low-fat yoghurt and mini-muffins apple-crumble, the label increased the consumers' perceived healthiness significantly and with respect to the less healthful product variants, low-fat yoghurt red fruit and full-cream butter apple cake, the label decreased the consumers' perceived healthiness. So when comparing between a healthful and less healthful product variant within the same product category (dairy drinks), a green label with a 9.4 rating (compared with a yellow label with 7.4) makes consumers perceive healthiness of that product (low-fat yoghurt) higher than when no labelling is presented. At the other hand the yellow label with a 7.4 rating (compared with a green label with 9.4) makes consumers perceive healthiness of that product (low-fat yoghurt red fruit) lower than when no labelling is presented. These effects also agree with the results for the perceived healthiness of the products in the snacks/ chips product category. When comparing between a healthful and less healthful product variant within the same product category (snacks/ chips), a yellow label with a 6.2 rating (compared with a red label with 4.2) makes consumers perceive healthiness of that product (mini-muffins apple crumble) higher than when no labelling is presented. On the contrary the red label with a 4.2 rating (compared with a yellow label with 6.2) makes consumers perceive healthiness of that product (full-cream butter apple cake) lower than when no labelling is presented.

Additionally a regression model is composed to see if the above significant differences of the perceived healthiness per product between baseline and stimulus 2/3 could be explained by the independent socio-demographic and food-related variables. A regression model will be presented for the differences of all four products. This regression is expected to be different from the regression of perceived healthiness of the size between less healthful and healthful product variants because this model tries to explain one label at the time and because the label could differ in color and rating it could also send another message towards the consumer per presented label.

Healthful variant in dairy drinks 'low-fat yoghurt'

Mean score difference low-fat yoghurt between stimulus 1 and 2/3 = β0 + β1 gender + β2 age + β3 education β4 combined household income + β5 student + β6 non-western foreigner + β7 western foreigner + β8 knowledge food healthfulness + β9 dietary pattern + β10 nutrient content reading + β11 label looking + β12 attention for healthy eating + β13 label helping + β14 label no idea + β15 tastefulness of healthful products + ε

TABLE 17: Results of regression model for the difference in perceived healthiness between the low-fat yoghurt with no labelling and low-fat yoghurt presented with the label (with green background color and a 9.4 rating)

Variable	B	Std. Error	β	Sig.
Gender	-0.219	0.092	-0.145	*0.018*
Age	0.010	0.044	0.015	0.822
Education	0.031	0.031	0.060	0.314
Combined household income	-0.046	0.024	-0.127	0.064
Student	0.015	0.109	0.009	0.892
Non-western foreigner	-0.477	0.173	-0.162	*0.006*
Western foreigner	0.171	0.150	0.065	0.254
Knowledge food healthfulness	-0.179	0.069	-0.176	*0.010*
Dietary pattern	0.022	0.069	0.021	0.750
Nutrient content reading	-0.017	0.065	-0.018	0.791
Label looking	0.152	0.063	0.157	*0.017*
Attention for healthy eating	0.043	0.064	0.045	0.503
Label helping	-0.130	0.121	-0.068	0.282
Label no idea	-0.198	0.101	-0.130	0.051
Tastefulness of healthful products	-0.036	0.108	-0.019	0.739

Note: $p < 0.05$ | $R^2 = 0.112$

First the explanation level of this model is with 11.2 % a little low. Out of all socio-demographic and food-related independent variables four turned out to be significant. A woman would significantly less quickly (B=-0.219) perceive the healthful variant low-fat yoghurt as more healthful compared to men when the color-coded and rated label is presented as well as non-western foreign consumers compared to native Dutch people (B=0.477) and people who have indicated to have knowledge about food healthiness compared to those who have less knowledge about food healthiness

(B=0.179). A positive significant impact is also measured. Participants that have indicated they often or always look at front-of-pack labels do significantly perceive healthiness of low-fat yoghurt higher than when participants did not or sometimes look at the label (B=0.152). A legitimate conclusion because if consumers do not look at the label, they could automatically not have been influenced by that health label regarding to perceived healthiness.

Less healthful variant in dairy drinks 'low-fat yoghurt red fruit'

None of the independent variables are significant and thus none of those variables explain the dependent variable of the mean difference between the perceived healthiness of low-fat yoghurt red fruit stimulus 1 and stimulus 2/3 (See appendix 10 for the regression model).

Healthful variant in snacks/ chips 'mini-muffins apple crumble'

Only one independent variable turned out to be significant in this regression model (see appendix 10). Whether you are a student or not turned out to have a significantly (0.029<0.05) positive effect (B=-0.306) on the consumers' perceived healthiness. If you are a student, you are less likely to perceive the mini-muffins apple crumble higher after seeing the product with the yellow label with a 6.2 rating. The fact that only one independent variable explained to dependent variable means also that the explanation percentage of 6.3 could be fully dedicated to the student variable.

Less healthful variant in snacks/ chips 'full-cream butter apple cake'

Just as the healthful variant in snacks/ chips this product, full-cream butter apple cake' did only have one independent variable that turned out to be significant (see appendix 10). Women would in contrast with the healthful product low-fat yoghurt significantly (0.005<0.05) more quickly be influenced by the label for the full-cream butter apple-cake. The label consist of a red background and the rating 4.2. Apparently woman are more likely (B=0.276) to perceive healthiness lower if they are exposed to the red (rating: 4.2) color-coded and rated label compared to men. The fact that only one independent variable explained to dependent variable means also that the explanation percentage of 5.5 could be fully dedicated to the gender variable.

4.5.3 Purchase intention

Next to the tests regarding to the hypotheses and the regression models it is also interesting to know if an increased perceived healthiness for products presented with a label results into healthier purchase behavior. Right after participants saw the two stimuli in their survey they were asked what variant they would buy if they were in the supermarket. In the following crosstabs purchase intention is shown right after stimulus 1 (baseline) and right after stimulus 2 (products presented with the label (incl. endorsement).

TABLE 18: Purchase intention after stimuli 1,2 and 3

		After stimulus 2 (or 3) 'label (incl. endorsement)'		
		Low-fat yoghurt	**Low-fat yoghurt red fruit**	**Total**
After stimulus 1 (baseline)	**Low-fat yoghurt**	159	2	161
	Low-fat yoghurt red fruit	31	121	152
	Total	190	123	313

	Mini-muffins apple crumble	**Full-cream apple cake**	**Total**
Mini-muffins apple crumble	198	5	203
Full-cream apple cake	44	66	110
Total	242	71	313

If consumers had to choose between the healthful and less healthful variants within a product category, a majority would have chosen for the healthful variant from the start (after seeing stimulus 1: baseline). In the product category 'dairy drinks' this is 161 and for 'snacks/ chips' 203. It is interesting to see if participants who first had chosen the less healthful variant have switched to the healthful variant after seeing stimulus 2 (or 3). For dairy drinks this number is 31 and for snacks/ chips 44 towards 2 for dairy drinks and 5 for snacks/ chips in the opposite direction. So roughly 10% of the population would change their purchase intention because they have seen the health label. To see if this difference is significant a Chi-Square Test is performed for both crosstabs (dairy drinks and snacks/ chips).

TABLE 19: Chi-Square Tests 'dairy drinks'

	Value	**df**	**Asymp. Sig. (2-sided)**	**Exact Sig. (2-sided)**
Pearson Chi-Square	201.269[a]	1	0.000	
Continuity Correction[b]	197.998	1	0.000	
Likelihood Ratio	244.157	1	0.000	
Fisher's Exact Test				0.000
N of Valid Cases	313			

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 59,73.
b. Computed only for a 2x2 table
Note: $p < 0.05$

TABLE 20: Chi-Square Tests 'snacks/ chips'

	Value	**df**	**Asymp. Sig. (2-sided)**	**Exact Sig. (2-sided)**
Pearson Chi-Square	134.664[a]	1	0.000	
Continuity Correction[b]	131.404	1	0.000	
Likelihood Ratio	104.201	1	0.000	
Fisher's Exact Test				0.000
N of Valid Cases	313			

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 24,95.
b. Computed only for a 2x2 table
Note: $p < 0.05$

The statistic relation in both crosstabs turned out to be significant (0.000<0.05) and the assumptions are met (0 cells (0,0%) have expected count less than 5). On the basis of a significance level of 0.05, the null hypothesis, variables in this model are independent, will be rejected. So there is a connection between the purchase intention after stimulus 1 and the purchase intention after stimulus 2. It could be safely determined that significantly more people would buy the more healthful product variant after seeing the color-coded and rated label.

5. CONCLUSION

In this chapter the main findings of this study will be discussed as well as the managerial implications, the limitations and recommendations for future research.

5.1 Main findings

As stated earlier the aim of this master's thesis was to examine how effective a color-coded and rated nutrition label (see appendix 7) will be in helping consumers distinguish between healthful and less healthful product variants within a product category.

From the results that were obtained in this research, it becomes clear that a color-coded and rated label, such as used in this study, does help the consumer to distinguish between healthier and less healthful product variants within as well a healthful product category (dairy drinks) as a less healthful product category (snacks/ chips). These results are in line with prior research that have also investigated the effectiveness of front-of-pack nutrition labels on consumers' perceived healthiness (Cowburn & Stockley (2005), Kelly et al. (2009), Wansink, (2003), Williams, (2005), Drichoutis, Lazaridis, & Nayga, (2006), Kozup, Creyer and Burton (2003). According to the outcome of several tests in this study it can be concluded that the color-coded and rated label does meet this basic requirement (distinguish less from healthier variants) to be a potential labelling format.

The color-coded and rated label was tested in this study by letting participants rate the healthfulness of a healthful and less healthful product within the same product category after seeing different stimuli (baseline, label and label incl. endorsement). The interesting part of the perceived healthiness of these products is the difference between the healthful and less healthful variants within a product category. The mean differences were calculated for each stimuli in order to compare the size of the difference of stimulus 1: baseline with stimulus 2: label and 3: label incl. endorsement. The size of these differences indicated to what extent the color-coded and rated labelling format (with endorsement) helped consumers to differentiate between healthier and less healthful product variants. In the figures below the size of the means of the perceived healthiness from the less healthful product variant till the healthful product variant are displayed. It is clearly visible that the size of the perceived healthiness of both product categories increases enormously in the second and third stimuli, implying that consumers have more knowledge about the healthiness of the products than before because of seeing the color-coded and rated label.

FIGURE 2: Size perceived healthiness dairy drinks

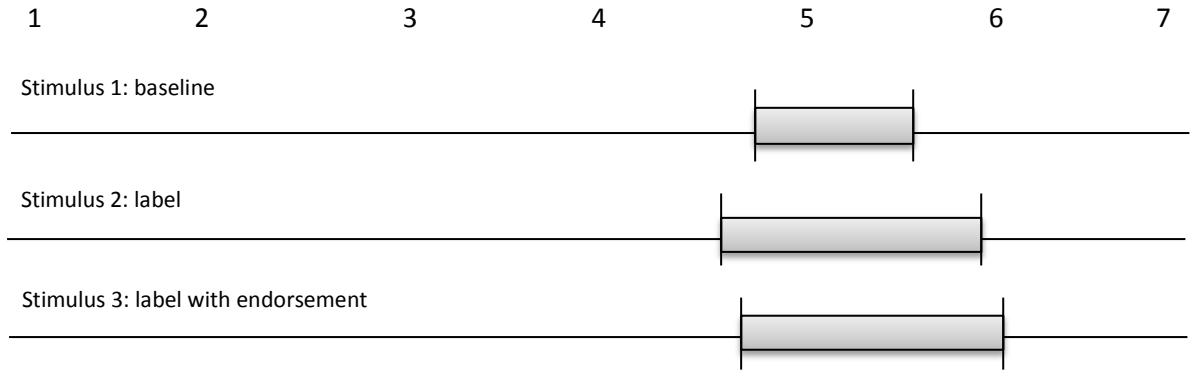
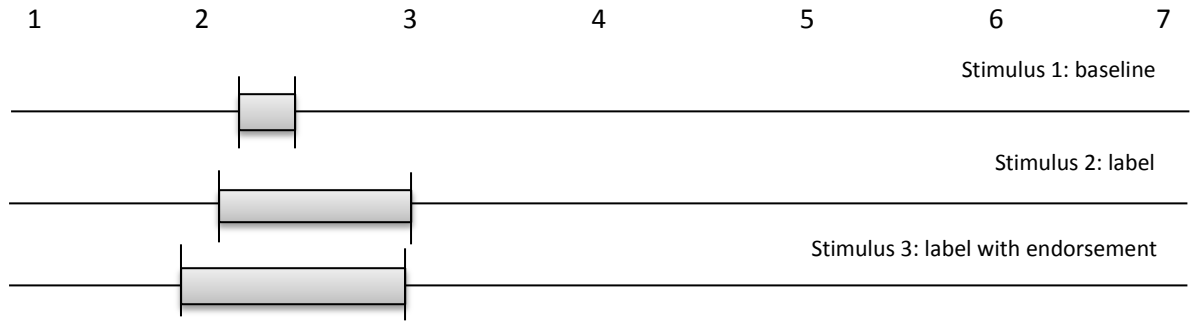


FIGURE 3: Size perceived healthiness snacks/ chips



A Paired-Samples T Test is performed to compare these mean score differences and test them on significances. All mean differences turned out to be significant ($0.00 < \alpha = 0.05$), which indicates that the size of perceived healthiness between healthful and less healthful product variants within the product categories differentiated significantly more when the color coded and rated label (with and without endorsement) were presented in comparison with no labelling.

Contrarily to the above proven effect it did not matter if the color-coded and rated nutrition label was included with an endorsement (the Dutch food organization: 'Voedingscentrum'). Mean score differences of perceived healthiness between products presented with the color-coded and rated label (stimulus 2) and products presented with the color-coded and rated label including endorsement (stimulus 3) turned out to be insignificant for both product categories, which was tested through an Independent- Samples T Test (0.933>0.05; 0.524>0.05).

The other moderating effect, product category, also turned out to be insignificant, which was tested through a Paired-Samples T Test (0.352>0.05). The color-coded and rated nutrition label was not better able to help consumers distinguish between more and less healthful product variants within a more healthful product category (dairy drinks) than within a less healthful product category (snacks/ cake).

As for the other findings in this study. A regression analysis with socio-demographic and food-related variables as independent variables and the mean difference of perceived healthiness of dairy drinks and snacks/ chips as the dependent variable turned out to have very little explanation value. The R Square of all models was situated around 5% which implies that the effect of the independent variables in the model was very low. The most valuable effect that came out of the models was the positive effect of 'nutrient content reading' for the mean difference of perceived healthiness within dairy drinks. If consumers read the nutrient content table on the back of the package, they will more likely (B=0.347) rate the products within the product category 'dairy drinks' higher on healthiness after seeing the color-coded and rated label. Within dairy drinks 'education' had also a positive and significant effect (B=0.091) on the dependent variable. All other variables, except for 'label helping' and 'label no idea' turned out to be not significant.

The main findings in this study show that the label helps consumers to distinguish less healthful and healthful product variants, but with these findings it could also be measured how the label influences consumers' perceived healthiness per product. Through a Paired-Samples T Test this effect is measured and turned out to be significant for every product. So for the healthful product variants, low-fat yoghurt and mini-muffins apple-crumble, the label increased the consumers' perceived

healthiness significantly and with respect to the less healthful product variants, low-fat yoghurt red fruit and full-cream butter apple cake, the label decreased the consumers' perceived healthiness. So if the color-coded and rated label would be added to the package of low-fat yoghurt or mini-muffins apple crumble (the healthful product variants) consumers will perceive these products more healthful than when no labelling is presented on these packages.

Several regression models have been constructed to test the impact of socio-demographic and food-related variables on the above effect. The most significant effects were found in the model for low-fat yoghurt. It can be concluded that women, non-western foreigners and people who had indicated to have knowledge about food healthiness, have a negative impact on the increased perceived healthiness for this product after seeing the product presented with the label. So being a woman, non-western foreigner or someone with knowledge about food healthiness will lead to a less increased perceive healthiness for low-fat yoghurt after seeing it with the green label included with a 9.4 rating. On the other hand, the people who indicated that they look at front-of-pack labels will have a higher increased perceived healthiness for low-fat yoghurt after seeing the product presented with the label. Low-fat yoghurt red fruit had no significant effects that explain the difference in the decreased healthiness after seeing the product presented with the yellow label with a 7.4 rating. The healthful product in snacks/ chips, mini-muffins apple crumble, was explained by one independent variable in the model. If you are a student, you are less likely to perceive this product higher after seeing the product with the yellow label with a 6.2 rating. The most unhealthful product in this study was presented with a red label with a 4.2 rating. In overall the presentation of this label led to a decline in the perceived healthiness of the full-cream butter apple cake. Through the regression it can be concluded that this effect has even a greater positive impact for women. So women would perceive the healthiness of the full-cream butter apple cake lower compared to men after seeing the label, while for the most healthful product in this study, low-fat yoghurt, the variable women had a negative impact on the perceived healthiness, implying that they would be less likely to be influenced by the green label with the 9.4 rating. However the models did have an explanation rate around the 5% so the effect of the label per product could be explained just a little by these variables.

At last purchase intention was also measured with the question which product the participant would buy if they were in a supermarket. They could choose between the healthful an less healthful product variant of the same product category. Purchase intention moved with approximately 10% significantly towards the healthful product variant after seeing stimulus 2 (label) or 3 (label incl. endorsement) compared to what they had chosen after they saw stimulus 1 (baseline: no labelling). So this would imply that a color-coded and rated label would also help consumers (10%) to make a healthier choice.

The overall conclusion of this report is that the investigated color-coded and rated nutrition label has proven to be effective in communicating healthfulness of food products to consumers in a way that they could easily identify less healthful product variants from more healthful product variants. Other finding indicated that the purchase intention for the healthful product variants also increased and the perceived healthiness of the healthful product variants separately also raised significantly while the perceived healthiness of the less healthful product variants separately decreased significantly after seeing the product presented with the color-coded and rated label.

5.2 Managerial implications

The results of this study will be relevant for researchers that are interested in front-of-pack labels as well as the government and managements in FMCG. Eventually this research and the investigated color-coded and rated nutrition label should act as a tool to prevent obesity and all other kind of food-related diseases in order to help the society get more healthy.

Although the attention of healthful food products is rising for several years there is still a lot of progress to obtain in this field. A major instrument in motivating consumers to make healthier choices or at least make them aware of the healthiness between products are the front-of-pack labels.

Governments from all over the world are already trying to implement a consistent, and understandable label, but encountering a lot of resistance from producers and supermarkets. The British government has finally announced it will backing a single front-of-pack food labelling scheme that includes traffic light colors (British Heart Foundation, 2013). This decision has been delayed for several years because of the resistance from a powerful lobby, named the CIAA (CEO, 2010). The confederation of the food and drink industries of the EU (CIAA) has spent €1 billion opposing proposals for front-of-pack labels, that consisted of a traffic light system. Instead they would like to see a system based on guideline daily amounts, which is far less understandable and notable than a front-of-pack label with traffic lights. So every scientific research in favor of a notable and understandable front-of-pack label is helpful. The color-coded and rated label in this study is derived from a mobile food comparison application and the rating system is formed by independent dietitians. Maybe if this application gains popularity it could act as a domino effect for this label as well.

Managements of supermarkets and producers in FMCG could also benefit from a front-of pack nutrition label because the label could act as an extra motivator for the consumer to choose that particular product, on condition that the products are healthful and receive a good rating. If a supermarket or a producer could state that its products are healthful and consumers see this as reliable cause of the independent health label it could serve as an unique selling point.

There is a multitude of front-of-pack nutrition labels that aspire to help people make a more healthful choice. Until the government and food organizations and companies hasn't decide what nutrition labelling format will be consequently implemented the verdict is still out as to which of these nutrition labelling formats will be chosen as the standard in the food branch.

5.3 Limitations

Firstly this study tests the effect of the color-coded and rated label within two distinct product categories: dairy drinks and snacks/chips. Although the healthiness of these product categories is verified within the independent mobile application Boodschapp and it is common sense that dairy drinks are healthier than snacks/ chips it is not necessarily true. Amounts, variety of diet, specific health needs and multiple other food-related habits could make a difference in perceived healthiness of a product category per individual.

The method that is used to acquire the date could also be considered as a possible limitation. By using pictures of products standing all alone, a shopping experience is merely simulated. Also the presented label is enlarged to make it readable for the participants. In a real life shopping setting the

products would stand in a product shelve with other products, making it a lot harder to focus on one specific product and its label. This kind of distractors (together with time, noise etc.) could not be simulated in an online setting. Due to time and money constraint the research could not be carried out in a real life offline supermarket setting. Next to the time and money constraint, convincing data would be needed to persuade supermarkets to cooperate in the research and supermarkets may not be that enthusiastic about health labels on their products due to possible dropping sales for some products.

The explanatory factor (R^2) was around 5% which indicates that the effects are explaining just a slight part of the dependent variable. In order to increase this number, a future questionnaire should contain other useful questions such as BMI, respondents' lifestyle etc.

Participants may also not understand nutrition information while they say they do. They had the possibility during each stimuli to click towards nutrient content but it is not known if they understand those numbers. Also they could misinterpret the rating system behind the label. It is intended to only compare the ratings with products within the same product category and not to compare for example yoghurt (dairy drinks) with cake (snacks/ chips).

Because of the fact that the respondents or this study are originating from the researchers' network, it is not legitimate to generalize the findings of this research for the whole population. Next to the fact that the geographical locations of the respondents are mostly situated around Rotterdam the average age of the respondents is also too young to generalize it to the whole Dutch population.

At last the rating system is derived from the Dutch grading system at schools. So the grades are familiar in the Netherlands, but in other countries they would need another grading system.

5.4 Future research

In addition of the distracting limitation future research should focus on a study in a real life supermarket setting instead of an online survey. The survey will contain less bias and it will give the researcher more credible data. Also actual behavior could be measured because the researcher could see what the consumer purchases or could even have access to supermarket sales. In an experimental setting other factors could also be included, which, for instance, could be useful when the researcher wants to investigate how effective promotion aids are in supporting a health label.

Now that the label is tested against a baseline (no labelling at all) a next step could be to test it with other existing front-of-pack labels to see what label is more effective regarding to healthfulness or what label is more liked by consumers. Another next step is to dig deeper into the working parts of this label. How effective are the background traffic colors in this label and is the label more effective if it shows a red color and a bad rating instead of a green color and a good rating could be potential research questions for a future study.

REFERENCES

Aaker, D.A. & E. Joachimsthaler, E. (2000). Brand Leadership. New York: Harvard Business School Press.

Barger, J.L., Walford, R.L. & Weindruch, R. (2003). The retardation of aging by caloric restriction: its significance in the transgenic era. Experimental Gerontology, 38, 1343-1351.

Black, A. & Rayner, M. (1992). Just read the label. London: The Stationary Office.

Boodschapp B.V. (2014). Verantwoording scores. Internet. http://boodschapp.nl/assets/pdf/verantwoording_1.3.pdf [accessed March 2014].

British Heart Foundation (2013). Food labelling. Internet. http://www.bhf.org.uk/get-involved/campaigning/food-labelling.aspx [accessed March 2014].

Carpentier, Y.A., Portois, L. & Malaisse, W.J. (2006). N-3 fatty acids and the metabolic syndrome. American Journal of Clinical Nutrition, 83, 1499-1504.

CEO (2010). A red light for consumer information. Internet. http://corporateeurope.org/sites/default/files/sites/default/files/files/article/ceo-food-labelling.pdf [accessed June 2014].

Cowburn, G. & Stockley L. (2005). Consumer understanding and use of nutrition labeling: a systematic review. Public Health Nutrition, 8, 21-8.

Drichoutis, A.C., Lazaridis, P. & Nayga, R.M. (2006). Consumers' Use of Nutritional Labels: a review of research studies and issues. Academy of Marketing Science Review, 2006, 9.

Edge, M. S. (2010). International Food Information Council Foundation front of pack labeling consumer research project. Consumer behavior research and front of package nutrition rating systems and symbols: what do consumers know, understand, and use? Washington, DC.

Erdogan, B.Z. (1999). Celebrity Endorsement: A Literature Review. Journal of Marketing Management, 15, 291-314

European Food Information Council. (2008). European consumers spill the beans on food labels. Internet. http://www.eufic.org/page/de/fftid/european-consumers-spill-the-beanson-food-labels/ [accessed April 2014].

Federal Trade Commission (2009). Guides Concerning the Use of Endorsements and Testimonials in Advertising. Internet. http://www.ftc.gov/sites/default/files/attachments/press-releases/ftc-publishes-final-guides-governing-endorsements-testimonials/091005revisedendorsementguides.pdf [accessed April 2014]

Feunekes, G. I. J., Gortemaker, I. A., Willems, A. A., Lion, R., & van den Kommer, M. (2008). Front-of-pack nutrition labelling: Testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. Appetite, 50, 57-70.

FSA. (2005). Quantitative evaluation of alternative food signposting concepts. Internet. http://multimedia.food.gov.uk/multimedia/pdfs/signpostquanresearch.pdf [accessed March 2014].

Geiger, C.J., Wyse, B.W., Parent C.R., Hansen R.G. (1991). Nutrition labels in bar graph format deemed most useful for consumer purchase decisions using adaptive conjoint analysis. Journal of American Dietetic Association, 91, 800-807.

German Nutrition Society. (2008). Stellungnahme der Deutschen Gesellschaft für Ernährung zur erweiterten Nährwertinformation auf der Basis des ‘’1 plus 4“–Modells. Internet. http://www.dge.de/pdf/ws/DGEStellungnahme-LM-Kennzeichnung-2008-09-09.pdf [accessed April 2014].

Grundy, S.M. (1999). The optimal ratio of fat-to-carbohydrate in the diet. Annual Review of Nutrition. 19, 325-341.

Grunert, K. & Wills, J. (2007). A review of European research on consumer response to nutrition information on food labels. Journal of Public Health, 15, 385-399.

Hersey, J.E., Wohlgenant, K.C., Kosa, K.M., Arsenault, J.E., Muth, M.K. (2011). Policy Research for Front of Package Nutrition Labeling: environmental scan and literature review. Internet. http://aspe.hhs.gov/sp/reports/2011/FOPNutritionLabelingLitRev/. [accessed March 2014].

Heber, D., (2004). Vegetables, fruits and phytoestrogens in the prevention of diseases. Journal of Postgraduation Medicine, 50, 145-149.

Hoyer, W. D. (1984). An examination of consumer decision making for a common repeat purchase product. Journal of Consumer Research, 11, 822-829.

Hu, F.B. & Stampfer, M.J. (1999). Nut consumption and risk of coronary heart disease: a review of epidemiologic evidence. Current Atherosclerosis Reports, 1, 204–209.

Katz, D.L., Njike V.Y., Rhee L.Q., Reingold A., Ayoob K.T. (2010). Performance characteristics of NuVal and the Overall Nutritional Quality Index. American Journal Clinical Nutrition, 91, 1102-1108.

Kelly, B., Hughes, C., Chapman, C., Louie, Jimmy C-Y, Dixon, H., Crawford, J., King, L., Daube, M. & Slevin, T. (2009). Consumer testing of the acceptability and effectiveness of front-of-pack food labelling systems for the Australian grocery market. Health Promotion International, 24, 120-129.

Kozup, J.C., Creyer, E.H., & Burton, S. (2003). Making healthful food choices: the Influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items. Journal of Marketing, 67, 19-34.

Martin, B., Mattson, M.P., Maudsley, S. (2006). Caloric restriction and intermittent fasting: two potential diets for successful brain aging. Ageing Research Reviews, 5, 332-353.

Nestle, M. & Jacobson, M. F. (2000) Halting the obesity epidemic: a public health policy approach. Public Health Report, 115, 12-24.

Qualtrics Labs, Inc. (2014) Qualtrics Software, Provo, UT: Qualtrics Research Suite.

Rothman R.L., Housam R., Weiss H., Davis, D., Gregory, R., Gebretsadik, T., Shintani, A. & Elasy, T.A. (2006). Patient understanding of food labels: the role of literacy and numeracy. American Journal of Preventive Medicine, 31, 391-398.

Saunders, J. & Guoqun, F. (1997). Dual Branding: how corporate names add value. Journal of Product and Brand Management, 6, 40-48.

Schulze, M.B., Hu, F.B. (2005). Primary prevention of diabetes: what can be done and how much can be prevented? Annual Review of Public Health, 26, 445-467.

Scott, V., & Worsley, A. F. (1994). Ticks, claims, tables and food groups: a comparison for nutrition labelling. Health Promotion International, 9, 27-37.

Smith, J.V., Heilbronn, L.K. & Ravussin, E. (2004). Energy restriction and aging. Current Opinion in Clinical and Metabolic Care, 7, 615-622.

Stigler G.J. (1961). The economics of information. Journal of Political Economy, 693, 213-225.

Thorndike, A.N., Sonnenberg, L., Riis, J., Barraclough, S. & Levy, D.E. (2012). A two phase labeling and choice architecture intervention to improve healthful food and beverage choices. American Journal of Public Health, 102, 527-533.

Van Dommelen, P., Schönbeck Y., Van Buuren, S., Hirasing, R.A. (2014). Trends in a life threatening condition: morbid obesity in Dutch, Turkish and Moroccan Children in The Netherlands. Public Library of Science One, 9.

Van Herpen, E., Hieke, S. & Van Trijp, H.C.M. (2014). Inferring product healthfulness from nutrition labelling. The influence of reference points. Appetite, 72, 138-149.

Viswanathan, M., & Hastak, M. (2002). The role of summary information in facilitating consumers' comprehension of nutrition information. Journal of Public Policy and Marketing, 21, 305-318.

Wansink, B. (2003). How do front and back package labels influence beliefs about health claims? Journal of Consumer Affairs, 37, 305-316.

Wansink, B. & Park, S.B. (2002). Sensory suggestiveness and labeling: do soy labels bias taste? Journal of Sensory Studies, 7, 483-491.

Wansink, B., Van Ittersum, K. & Painter, J.E. (2004). How diet and health labels influence taste and satiation. Journal of Food Science, 69, 340.

Wijendran, V. & Hayes, K.C. (2004). Dietary n-6 and n-3 fatty acid balance and cardiovascular health. Annual Review Nutrition, 24, 597-615.

Williams, P. (2005). Nutrition science and policy. Consumer understanding and use of health claims for foods. Nutrition Reviews, 63, 256-264.

APPENDIX 1 | Back-of-pack nutrition labelling format

Nutrition

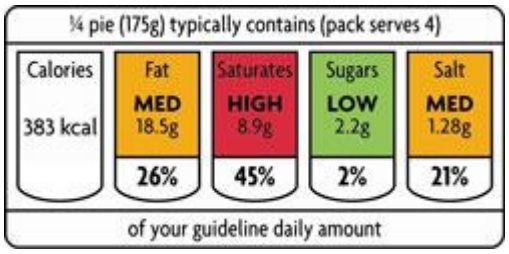
Typical values	100g contains	Each slice (typically 44g) contains	% RI*	RI* for an average adult
Energy	985kJ 235kcal	435kJ 105kcal	5%	8400kJ 2000kcal
Fat	1.5g	0.7g	1%	70g
of which saturates	0.3g	0.1g	1%	20g
Carbohydrate	45.5g	20.0g		
of which sugars	3.8g	1.7g	2%	90g
Fibre	2.8g	1.2g		
Protein	7.7g	3.4g		
Salt	1.0g	0.4g	7%	6g

This pack contains 16 servings

*Reference intake of an average adult (8400kJ / 2000kcal)

APPENDIX 2 | Front-of-pack nutrition labelling formats

Name	Type	Description	Example of Symbol
Multiple traffic light (TL)	Nutrient specific	TL symbols usually display a ranking of total fat, saturated fat, sugar, sodium, and sometimes energy as high, medium, or low. Levels are assigned color codes of red, amber, and green, respectively. There are many versions of TL symbols that are most widely used in the UK and other parts of Europe. Several of the Australian studies tested UK TL labels.	
Wheel of Health	Nutrient specific	Circular version of the TL symbol used in the UK.	
Guideline daily amount (GDA)	Nutrient specific	GDA (also referred to as %GDA) schemes display nutrients per portion and include the amount in grams and as a percentage of a person's guideline daily amount for each nutrient. This symbol is used in the U.S., UK, and other parts of Europe.	
Percent daily intake (%DI)	Nutrient specific	%DI schemes display the same information as GDA schemes and are used in Australia and New Zealand.	

Name	Type	Description	Example of Symbol
Traffic light GDA (TL-GDA)	Nutrient specific	The TL-GDA is a combination of the TL and GDA schemes and is often used in Europe. However, note that some versions of this scheme include text that corresponds to the TL colors indicating "high," "medium," or "low" levels of nutrients, while other versions do not include this text. This symbol is sometimes referred to as a colored GDA.	
"Check-mark" symbols also referred to as "Tick" symbols	Summary (binary)	"Check-mark" stamps are either present or absent on food products. There are many types of check stamps used in different countries. For example, the *Choices* program using the Healthful Choice or *Choices* logo has countries participating on all continents, some of which include the Netherlands, Belgium, and Brazil. The Smart Choices program in the U.S., as well as the Australian/New Zealand National Heart Foundation, uses a "check-mark" symbol.	
NuVal	Summary (graded)	Shelf-tag system displayed in some U.S. supermarkets indicating overall food rating of 1 to 100; the higher the rating the more nutritious the food product.	

Name	Type	Description	Example of Symbol
Guiding Stars	Summary (graded)	Shelf-tag system found in some U.S. supermarkets indicating 1, 2, or 3 stars; the higher the rating the more nutritious the food product. The system has also been expanded outside the grocery environment to restaurants, school cafeterias, and hospitals.	
Simple traffic light	Summary (graded)	Packages were provided with a red (unhealthful), yellow (less healthful) or green (healthful) label in order to inform the consumers about the healthiness of the items in a hospital cafeteria in the US.	

Hersey et al, 2011

APPENDIX 3 | Color-coded and rated nutrition label Boodschapp

Color-coded and rated nutrition label	Summary (graded)	Color-coded and rated nutrition labelling in use by a Dutch mobile application, Boodschapp. This independent application provides the consumer with ratings of products in a supermarket to help them make a healthier choice. The ratings consists of a green, yellow or red background to emphasize healthiness.	

APPENDIX 4 | Messages used to collect responses

Facebook

Hey ….. ,

Ik ben momenteel bezig met mijn afstudeeronderzoek naar de houding van consumenten tegenover gezonde en ongezonde producten. Zou je mij wellicht kunnen helpen met afstuderen door mijn vragenlijst (zie link hieronder) in te vullen? Het duurt slechts 5 minuutjes!

Link naar vragenlijst: https://qtrial2014.az1.qualtrics.com/SE/?SID=SV_bphMs18b2Urmyfb

Alvast enorm bedankt!

Stefan

LinkedIn

Beste ….. ,

Ik ben momenteel bezig met mijn afstudeeronderzoek naar de houding van consumenten tegenover gezonde en ongezonde producten. Jij hebt vast ook wel eens in de supermarkt gestaan met de afweging tussen een gezond en ongezond product. Zou je mij dan wellicht kunnen helpen met afstuderen door mijn vragenlijst (zie link hieronder) in te vullen? De vragenlijst neemt slechts 5 minuten van je tijd in beslag en je zou me er enorm mee helpen!

Link naar de vragenlijst: https://qtrial2014.az1.qualtrics.com/SE/?SID=SV_bphMs18b2Urmyfb

Heb je vragen en/ of opmerkingen of ben je geïnteresseerd in de eindresultaten, neem dan gerust contact op met mij.

Bij voorbaat dank voor uw tijd en moeite!

Met vriendelijke groet,

Stefan Sallevelt

APPENDIX 5 | Questionnaire

Intro

Block 1: Stimulus 1 'baseline'

Geef aan hoe gezond of ongezond u de volgende producten ervaart op een schaal van 1 (heel ongezond) tot 7 (heel gezond), in vergelijking met andere producten in dezelfde productcategorie.

1. Hoe gezond of ongezond waardeert u de volgende producten (yoghurt), in vergelijking met andere producten in dezelfde productcategorie (zuivelproducten)?

	Heel ongezond	Ongezond	Enigszins ongezond	Neutraal	Enigszins gezond	Gezond	Heel gezond
AH Magere yoghurt 	○	○	○	○	○	○	○
AH Magere yoghurt rood fruit 	○	○	○	○	○	○	○

2. Welke van de twee bovenstaande producten zou u kiezen als u in de supermarkt voor dit schap zou staan? (prijzen van de producten kunnen als gelijk worden beschouwd)

- ○ AH Magere yoghurt
- ○ AH Magere yoghurt rood fruit

3. Hoe gezond of ongezond waardeert u de volgende producten (cake), in vergelijking met andere producten in dezelfde productcategorie (snacks/ chips)?

	Heel ongezond	Ongezond	Enigszins ongezond	Neutraal	Enigszins gezond	Gezond	Heel gezond
AH Mini muffins appel-kruimel 	○	○	○	○	○	○	○
AH Roomboter appelcakejes 	○	○	○	○	○	○	○

4. Welke van de twee bovenstaande producten zou u kiezen als u in de supermarkt voor dit schap zou staan? (prijzen van de producten kunnen als gelijk worden beschouwd)

- ○ AH Mini muffins appel-kruimel
- ○ AH Roomboter appelcakejes

>>

Block 2: Socio-demographic questions

De volgende vragen gaan over uw socio-demografische achtergrond.

5. Wat is uw geslacht?

- Vrouw
- Man

6. Wat is uw leeftijd?

- Onder 18
- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- Boven 64

7. Wat is uw hoogst genoten opleiding?

- Basisschool
- MAVO/ MULO/ VMBO
- HAVO
- VWO/ Atheneum/ Gymnasium
- MBO
- HBO
- WO
- Anders

8. Wat is uw gezamenlijke huishoudelijke inkomen per jaar?

- Onder €10.000
- €10.000 - €20.000
- €20.000 - €30.000
- €30.000 - €40.000
- €40.000 - €50.000
- €50.000 - €60.000
- €60.000 - €70.000
- Boven €70.000
- Zeg ik liever niet

9. Wat is uw huidige huishoudelijke samenstelling?

- Bij mijn ouders
- Alleen, zonder kinderen
- Alleen, met kinderen
- Samenwonend, met partner en zonder kinderen
- Samenwonend, met partner en met kinderen
- Anders

10. Welke van de volgende antwoorden geeft het beste uw situatie weer?

- Student
- Full-time werkzaam (meer dan 30 uur)
- Part-time werkzaam
- Op het moment zonder werk
- Met pensioen
- Anders

11. Tot welke etnische groepering rekent u zichzelf?

- ○ Autochtoon
- ○ Marokkaans
- ○ Turks
- ○ Surinaams
- ○ Antilliaans/ Arubaans
- ○ Aziatisch
- ○ Anders, westers
- ○ Anders, niet-westers

>>

Block 3: Stimulus 2 'label' or stimulus 3 'label incl. endorsement'

U ziet bij de volgende producten een uitvergroting van een gezondheidslabel op de voorkant van de verpakking van het product.

Dit label geeft met een kleur (groen=gezond, geel=minder gezond en rood=ongezond) en een cijfer aan hoe gezond of ongezond een product is. Hierbij geeft het cijfer 1 aan dat een product zeer ongezond is in vergelijking met producten in dezelfde productcategorie en een 10 dat het product zeer gezond is in vergelijking met producten in dezelfde productcategorie.

Geef aan hoe gezond of ongezond u de volgende producten ervaart op een schaal van 1 (heel ongezond) tot 7 (heel gezond), in vergelijking met andere producten in dezelfde productcategorie.

12. Hoe gezond of ongezond waardeert u de volgende producten (yoghurt), in vergelijking met andere producten in dezelfde productcategorie (zuivelproducten)?

	Heel ongezond	Ongezond	Enigszins ongezond	Neutraal	Enigszins gezond	Gezond	Heel gezond
AH Magere yoghurt 	○	○	○	○	○	○	○
AH Magere yoghurt rood fruit 	○	○	○	○	○	○	○

13. Welke van de twee bovenstaande producten zou u kiezen als u in de supermarkt voor dit schap zou staan? (prijzen van de producten kunnen als gelijk worden beschouwd)

- AH Magere yoghurt
- AH Magere yoghurt rood fruit

14. Hoe gezond of ongezond waardeert u de volgende producten (cake), in vergelijking met andere producten in dezelfde productcategorie (snacks/ chips)?

	Heel ongezond	Ongezond	Enigszins ongezond	Neutraal	Enigszins gezond	Gezond	Heel gezond
AH Mini muffins appel-kruimel 	○	○	○	○	○	○	○
AH Roomboter appelcakejes 	○	○	○	○	○	○	○

15. Welke van de twee bovenstaande producten zou u kiezen als u in de supermarkt voor dit schap zou staan? (prijzen van de producten kunnen als gelijk worden beschouwd)

- AH Mini muffins appel-kruimel
- AH Roomboter appelcakejes

>>

U ziet bij de volgende producten een uitvergroting van het gezondheidslabel van de Stichting Voedingscentrum Nederland op de voorkant van de verpakking van het product.

Dit label geeft met een kleur (groen=gezond, geel=minder gezond en rood=ongezond) en een cijfer aan hoe gezond of ongezond een product is. Hierbij geeft het cijfer 1 aan dat een product zeer ongezond is in vergelijking met producten in dezelfde productcategorie en een 10 dat het product zeer gezond is in vergelijking met producten in dezelfde productcategorie.

Geef aan hoe gezond of ongezond u de volgende producten ervaart op een schaal van 1 (heel ongezond) tot 7 (heel gezond), in vergelijking met andere producten in dezelfde productcategorie.

12. Hoe gezond of ongezond waardeert u de volgende producten (yoghurt), in vergelijking met andere producten in dezelfde productcategorie (zuivelproducten)?

	Heel ongezond	Ongezond	Enigszins ongezond	Neutraal	Enigszins gezond	Gezond	Heel gezond
AH Magere yoghurt 	○	○	○	○	○	○	○
AH Magere yoghurt rood fruit 	○	○	○	○	○	○	○

13. Welke van de twee bovenstaande producten zou u kiezen als u in de supermarkt voor dit schap zou staan? (prijzen van de producten kunnen als gelijk worden beschouwd)

- AH Magere yoghurt
- AH Magere yoghurt rood fruit

14. Hoe gezond of ongezond waardeert u de volgende producten (cake), in vergelijking met andere producten in dezelfde productcategorie (snacks/ chips)?

	Heel ongezond	Ongezond	Enigszins ongezond	Neutraal	Enigszins gezond	Gezond	Heel gezond
AH Mini muffins appel-kruimel 	○	○	○	○	○	○	○
AH Roomboter appelcakejes 	○	○	○	○	○	○	○

15. Welke van de twee bovenstaande producten zou u kiezen als u in de supermarkt voor dit schap zou staan? (prijzen van de producten kunnen als gelijk worden beschouwd)

- AH Mini muffins appel-kruimel
- AH Roomboter appelcakejes

>>

Block 4: Food-related questions

De volgende vragen gaan over uw houding tegenover voedingsgerelateerde onderwerpen.

16. Hoe zou u uw kennis over gezondheids- en voedingskwesties over het algemeen beschrijven?

	Zeer slecht	Slecht	Neutraal	Goed	Zeer goed
Mijn kennis over gezondheids- en voedingskwesties is	○	○	○	○	○

17. Hoe zou u uw voedingspatroon over het algemeen beschrijven?

	Zeer slecht	Slecht	Neutraal	Goed	Zeer goed
Ik vind mijn voedingspatroon	○	○	○	○	○

18. Leest u de tabel met voedingswaarde op de achterkant van de verpakking?

	Nooit	Soms	Vaak	Altijd
Voedingswaarde tabellen op de achterkant van de verpakking lees ik	○	○	○	○

19. Kijkt u naar het gezondheidslabel (zoals het ik-kies-bewust-logo) op de voorkant van de verpakking, indien deze aanwezig is?

	Nooit	Soms	Vaak	Altijd
Gezondheidslabels op de voorkant van de verpakking bekijk ik	○	○	○	○

20. Welke van de volgende opmerkingen beschrijft het beste uw persoonlijke situatie wat betreft het letten op gezond eten?

- Volg een speciaal dieet door een specifieke gezondheidsbehoefte
- Volg een gezond dieet omdat het me fit en scherp houdt
- Probeer om gezond te eten, maar heb moeite mij daar aan te houden
- Eet waar ik zin in heb en maak me geen zorgen over hoe gezond een bepaald product is.

21. Wat was uw veronderstelling tijdens het vergelijken van de producten?

- Ik nam aan dat het gezondheidslabel me zou helpen bij het vergelijken van yoghurt met yoghurt (of andere zuivelproducten) en cake met cake (of andere snacks/ chips)
- Ik nam aan dat het gezondheidslabel me zou helpen bij het vergelijken van een bepaald voedselproduct met elk ander voedselproduct (bv. yoghurt met cake)
- Ik stond er eigenlijk niet zo bij stil

22. Denkt u dat een product met een hoog cijfer (en groene achtergrond) minder smaakvol is dan een product met een laag cijfer (en gele of rode achtergrond) ?

- Ja
- Nee

23. Bent u kleurenblind?

- Ja, ik kan alleen de kleuren groen en rood niet (goed) zien en/ of onderscheiden
- Ja, ik kan andere kleuren niet (goed) zien en/ of onderscheiden
- Ja, ik kan helemaal geen kleuren zien en/ of onderscheiden
- Nee
- Weet ik niet
- Dit zeg ik liever niet

>>

Outro


qualtrics
Nogmaals bedankt voor uw deelname aan dit onderzoek!
Mocht u nog vragen en/ of opmerkingen hebben dan kunt u altijd mailen naar stefansallevelt@live.nl

APPENDIX 6 | Nutrient content

Low-fat yoghurt

Voedingswaarde
(per portie van 150 ml.)

energie	**54** kcal
eiwit	**7.5** gr.
koolhydraten	**6** gr.
suikers	**6** gr.
vet	**0** gr.
verzadigd vet	**0** gr.
vezels	**0** gr.
zout	**0.2** gr.

Low-fat yoghurt red fruit

Voedingswaarde
(per portie van 150 ml.)

energie	**111** kcal
eiwit	**5.3** gr.
koolhydraten	**22.5** gr.
suikers	**16.5** gr.
vet	**0** gr.
verzadigd vet	**0** gr.
vezels	**0.2** gr.
zout	**0.3** gr.

Mini-muffins apple crumble

Voedingswaarde
(per portie van 50 gr.)

energie	**205** kcal
eiwit	**2.3** gr.
koolhydraten	**24** gr.
suikers	**16** gr.
vet	**11** gr.
verzadigd vet	**1.5** gr.
vezels	**0.4** gr.
zout	**0.3** gr.

Full-cream butter apple cake

Voedingswaarde
(per portie van 40 gr.)

energie	**160** kcal
eiwit	**1.6** gr.
koolhydraten	**20.8** gr.
suikers	**12.8** gr.
vet	**8** gr.
verzadigd vet	**5.2** gr.
vezels	**0.4** gr.
zout	**0.2** gr.

APPENDIX 7 | Labels

Product pictures with label

Dairy drinks

Low-fat yoghurt

Low-fat yoghurt red fruit

Low fat yoghurt after correction

Snacks/ chips

Mini-muffins apple crumble

Full-cream butter apple cake

Product pictures with label incl. endorsement

Dairy drinks

Low-fat yoghurt

Low-fat yoghurt red fruit

Low fat yoghurt after correction

Snacks/ chips

Mini-muffins apple crumble

Full-cream butter apple cake

APPENDIX 8 | Clarification perceived healthiness variables

Perceived healthiness variables

PH1BY	Perceived healthiness of low-fat yoghurt after seeing stimulus 1: baseline
PH2LY	Perceived healthiness of low-fat yoghurt after seeing stimulus 2: label
PH3LEY	Perceived healthiness of low-fat yoghurt after seeing stimulus 3: label incl. endorsement
PH1BYRF	Perceived healthiness of low-fat yoghurt red fruit after seeing stimulus 1: baseline
PH2LYRF	Perceived healthiness of low-fat yoghurt red fruit after seeing stimulus 2: label
PH3LEYRF	Perceived healthiness of low-fat yoghurt red fruit after seeing stimulus 3: label incl. endorsement
PH1BMM	Perceived healthiness of mini muffins apple crumble after seeing stimulus 1: baseline
PH2LMM	Perceived healthiness of mini muffins apple crumble after seeing stimulus 2: label
PH3LEMM	Perceived healthiness of mini muffins apple crumble after seeing stimulus 3: label incl. endorsement
PH1BFC	Perceived healthiness of full cream butter apple cake after seeing stimulus 1: baseline
PH2LFC	Perceived healthiness of full cream butter apple cake after seeing stimulus 2: label
PH3LEFC	Perceived healthiness of full cream butter apple cake after seeing stimulus 3: label incl. endorsement

Difference in perceived healthiness variables

PH1DD (PH1BY - PH1BYRF)	Perceived healthiness of dairy drinks (the difference between low-fat yoghurt and low-fat yoghurt red fruit) after seeing stimulus 1: baseline
PH2DD (PH2LY - PH2LYRF)	Perceived healthiness of dairy drinks (the difference between low-fat yoghurt and low-fat yoghurt red fruit) after seeing stimulus 2: label
PH3DD (PH3LEY - PH3LEYRF)	Perceived healthiness of dairy drinks (the difference between low-fat yoghurt and low-fat yoghurt red fruit) after seeing stimulus 3: label incl. endorsement
PH1SC (PH1BMM - PH1BFC)	Perceived healthiness of snacks/ chips (the difference between mini muffins apple crumble and full-cream butter apple cake) after seeing stimulus 1: baseline
PH2SC (PH2LMM – PH2LFC)	Perceived healthiness of snacks/ chips (the difference between mini muffins apple crumble and full-cream butter apple cake) after seeing stimulus 2: label
PH3SC (PH3LEMM – PH3LEFC)	Perceived healthiness of snacks/ chips (the difference between mini muffins apple crumble and full-cream butter apple cake) after seeing stimulus 3: label incl. endorsement

APPENDIX 9 | Transformed and recoded variables

Transformation Q1

1. How healthy or unhealthy do you rate the following products (yoghurt), in comparison with other products in the same product category (dairy drinks)?-AH Magere yoghurt (Low-fat yoghurt)

	Dataset: stimulus label	**Dataset: stimulus label with endorsement**
Qualtrics: variable name	Q.2.2_11	Q2.2_5
Qualtrics: variable name after transform	Q2.2_5	Q2.2_5
Item	PH1BY	PH1BY

Transformation Q14

14. How healthy or unhealthy do you rate the following products (cake), in comparison with other products in the same product category (snacks/ chips)?-AH Mini muffins appel-kruimel (Mini muffins apple-crumble)

	Dataset: stimulus label	**Dataset: stimulus label with endorsement**
Qualtrics: variable name	Q.4.4_3	Q4.4_1
Qualtrics: variable name after transform	Q2.2_5	Q2.2_5
Item	PH2LMM	PH3LMM

Besides these variables above, two answer possibilities did also not seem to be equal in both datasets:

Recodify Q12

12. How healthy or unhealthy do you rate the following products (yoghurt), in comparison with other products in the same product category (dairy drinks)?-AH Magere yoghurt (Low-fat yoghurt)

Dataset: stimulus label	**Dataset: stimulus label with endorsement**
6: healthy	7: healthy
7: very healthy	8: very healthy

Recoded value in dataset 'stimulus label with endorsement' : (7=6) and (8=7)

Recodify Q23

23. Are you suffering from color-blindness?

Dataset: stimulus label	Dataset: stimulus label with endorsement
3: Yes, I can't see and/ or distinguish different	3: No
4: No	4: I'd rather not say
5: I don't know	5: Yes, I can't see and/ or distinguish different
6: I'd rather not say	6: I don't know

Recoded value in dataset 'stimulus label with endorsement' : (4=3) and (5=6). Other variables than 'No' or 'I don't know' did not matter because they scored 0,thus were not relevant.

APPENDIX 10 | Regression models: effect label per product

Results of regression model for the difference in perceived healthiness between the low-fat yoghurt red fruit with no labelling and low-fat yoghurt red fruit presented with the label (with yellow background color and a 7.4 rating)

Variable	B	Std. Error	β	Sig.
Gender	0.012	0.114	0.007	0.918
Age	0.008	0.054	0.010	0.888
Education	0.074	0.039	0.120	0.055
Combined household income	-0.038	0.030	-0.088	0.218
Student	-0.055	0.136	-0.028	0.685
Non-western foreigner	-0.056	0.215	-0.016	0.795
Western foreigner	0.211	0.186	0.067	0.257
Knowledge food healthfulness	-0.086	0.086	-0.071	0.320
Dietary pattern	-0.066	0.085	-0.053	0.441
Nutrient content reading	-0.061	0.081	-0.054	0.453
Label looking	0.062	0.079	0.054	0.435
Attention for healthy eating	-0.084	0.080	-0.074	0.294
Label helping	0.017	0.150	0.007	0.912
Label no idea	0.171	0.125	0.095	0.171
Tastefulness of healthful products	0.002	0.134	0.001	0.986

Note: $p < 0.05$ | $R^2 = 0.033$

Results of regression model for the difference in perceived healthiness between the mini-muffins apple crumble with no labelling and mini-muffins apple crumble presented with the label (with yellow background color and a 6.2 rating)

Variable	B	Std. Error	β	Sig.
Gender	-0.129	0.118	-0.069	0.273
Age	-0.093	0.056	-0.117	0.096
Education	0.042	0.040	0.065	0.288
Combined household income	0.000	0.031	0.000	0.995
Student	-0.306	0.140	-0.146	*0.029*
Non-western foreigner	-0.174	0.221	-0.048	0.432
Western foreigner	-0.095	0.191	-0.029	0.618
Knowledge food healthfulness	-0.116	0.089	-0.091	0.194
Dietary pattern	-0.054	0.088	-0.042	0.539
Nutrient content reading	-0.030	0.083	-0.026	0.716
Label looking	0.135	0.081	0.112	0.098
Attention for healthy eating	-0.001	0.082	-0.001	0.990
Label helping	-0.007	0.155	-0.003	0.965
Label no idea	-0.185	0.129	-0.098	0.151
Tastefulness of healthful products	-0.057	0.138	-0.024	0.680

Note: $p < 0.05$ | $R^2 = 0.063$

Results of regression model for the difference in perceived healthiness between the full-cream butter apple cake with no labelling and full-cream butter apple cake presented with the label (with yellow background color and a 4.2 rating)

Variable	B	Std. Error	β	Sig.
Gender	0.276	0.098	0.178	*0.005*
Age	-0.054	0.046	-0.082	0.245
Education	0.026	0.033	0.049	0.427
Combined household income	0.009	0.026	0.024	0.739
Student	-0.106	0.116	-0.061	0.360
Non-western foreigner	0.254	0.183	0.084	0.167
Western foreigner	-0.095	0.159	-0.035	0.549
Knowledge food healthfulness	0.023	0.074	0.022	0.759
Dietary pattern	-0.075	0.073	-0.070	0.307
Nutrient content reading	0.027	0.069	0.027	0.697
Label looking	-0.098	0.067	-0.099	0.147
Attention for healthy eating	-0.004	0.068	-0.004	0.956
Label helping	-0.095	0.128	-0.048	0.457
Label no idea	0.056	0.107	0.036	0.598
Tastefulness of healthful products	-0.074	0.114	-0.038	0.516

Note: $p < 0.05$ | $R^2 = 0.055$