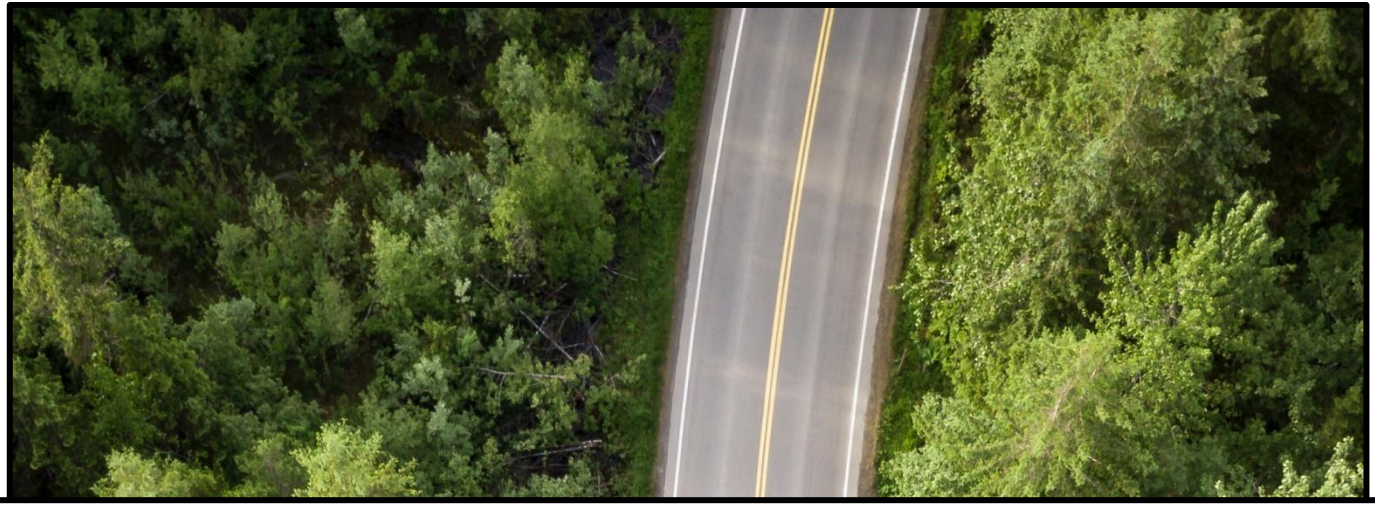
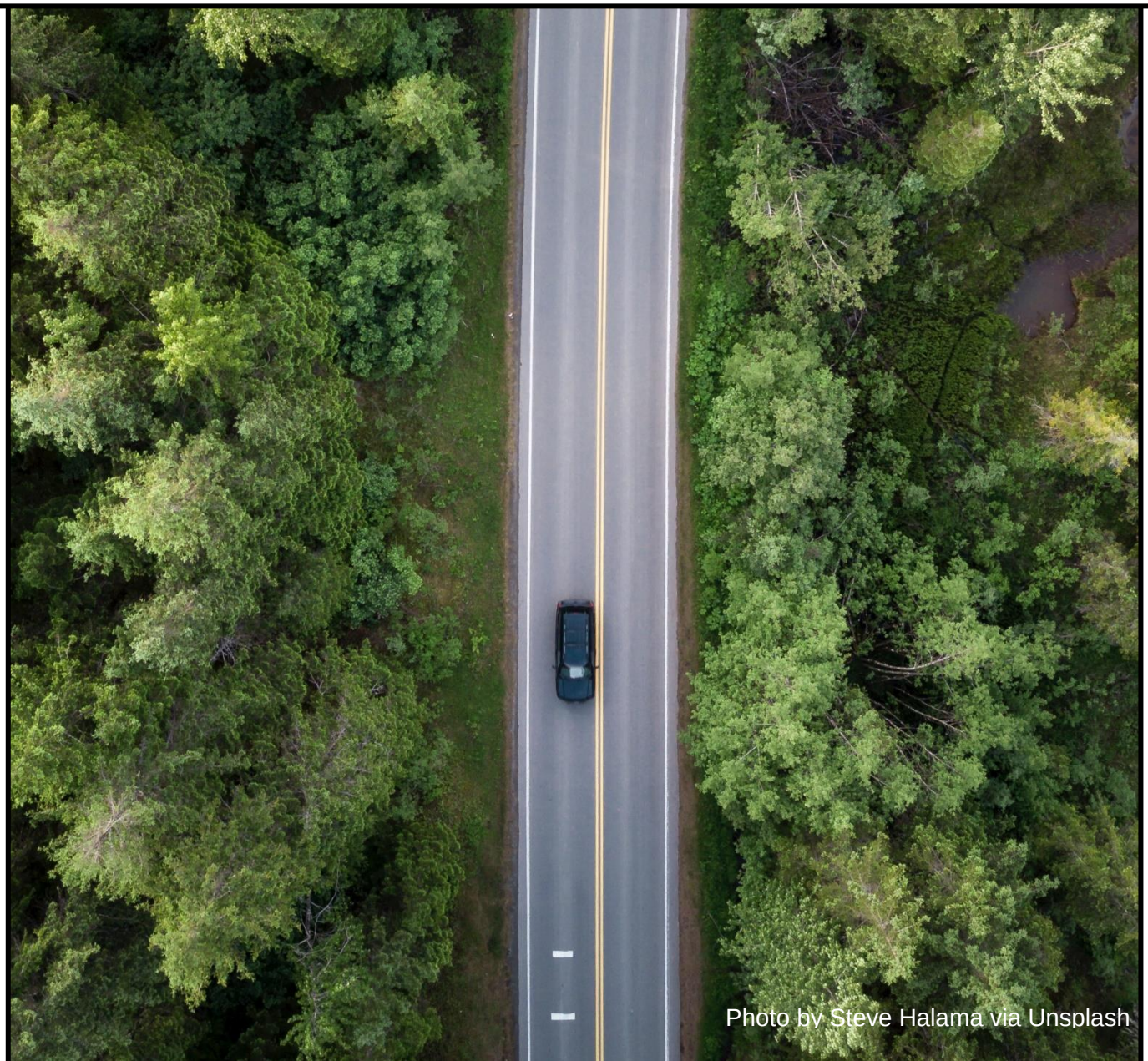


Is this the road towards healthier diets?

The expected (way of) use of the Multiple Traffic Light (MTL) front-of-pack (FOP) label by Dutch adult consumers when it would be implemented in the Netherlands



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Wageningen University – Department of Social Sciences

Master thesis

The expected (way of) use of the Multiple Traffic Light (MTL) front-of-pack (FOP) label by Dutch adult consumers when it would be implemented in the Netherlands

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Abstract

[Background] As the Choices Logo will be removed from the packaging in supermarkets in the Netherlands, there is room for a new front-of-pack (FOP) label. The FOP label that is now central in this debate, is the Multiple Traffic Light (MTL) label. **[Research objective]** The objective of this study was to find out, what the expected use and expected way of use is of the MTL label by Dutch adult consumers, when it would be implemented in the Netherlands. Regarding the way of use, the relative importance of the various colours and nutrients of the MTL label in how Dutch adult consumers judge the healthfulness of food products by using the MTL label, also called the determinance of the colours and nutrients of the MTL label, were central. Moreover, the study investigated whether this differs between food product categories and depends on how important consumers consider the various nutrients of the MTL label to be regarding health. **[Methods]** The study consisted of a choice-based conjoint experiment incorporated into an online questionnaire. In the experiment, the participants had to choose 18 times between two MTL labels regarding which MTL label represented the most healthful food product. The MTL labels differed regarding the colours red, amber and green (levels) that were assigned to the nutrients fat, saturated fat, sugar and salt (attributes). Food product category was used as a between-subjects design factor. The food product categories used were bread, pizza, cookies and yoghurt. After the conjoint experiment, questions on demographics were asked. Moreover, questions were asked on perceived importance of the various nutrients of the MTL label regarding health and on expectations towards the different food product categories with respect to healthfulness and nutrient levels. Finally, questions were asked on intention to take the MTL label into account in food choices when it would be implemented in the Netherlands, as well as on potential determinants of this intention. **[Results]** The results show that, in general, the participants had the intention to take the MTL label into account when it would be introduced in the Netherlands, but agreed somewhat less with the statement that they expect that the MTL label would also make their food choices healthier. Besides that, determinants of having an intention to take the MTL label into account when it would be implemented in the Netherlands, were found to be, considering it important to eat healthy, via considering it important to receive nutrition information, and perceived usefulness and ease of use of the MTL label. The results of the conjoint experiment show that, from the three colours of the MTL label, the determinance of the red colour was highest, followed by the green and amber colour. Besides that, the results show that saturated fat and sugar were the most determinant nutrients However, the results also show that, how the respondents judged the healthfulness of food products using the MTL label, differed between food product categories. A qualitative analysis indicated that it may be that, for food product categories that are perceived relatively healthy, the amber colour became slightly more determinant and the green colour slightly less determinant and for food product categories that are considered relatively unhealthy the other way around. Besides that, a qualitative analysis indicated that it may be that, nutrients of which the participants expected them to be present in a food product category, became more determinant and nutrients of which the participants did not expect them to be present in a food product category, less determinant. **[Conclusion]** It can be concluded that, when the MTL would be implemented in the Netherlands, it would be used by Dutch adult consumers, although this is influenced by how important consumers consider it to receive nutrition information (which is higher for people who find it important to eat healthy) and by the perceived usefulness and the perceived ease of use of the MTL label. When it would then be used, the results of this study indicate that especially the red colour of the MTL label would be determinant and especially saturated fat and sugar. However, this study has also shown that, how Dutch adult consumers would use the MTL label, would differ between individuals who have different ideas about how important the various nutrients are regarding health and between different food product categories. Regarding the latter, this study indicates that it may be that, especially colours become more determinant for which consumers do not expect them and that especially nutrients of which consumers do expect them to be present in (high levels in) a food product, become more determinant compared to nutrients that are not expected. Future research could involve more realistic MTL labels and preferably more real-life experiments should be conducted.

Keywords: traffic light, nutrition labelling, label use, food choice, conjoint experiment

Preface

I have always had an interest in human behaviour. Later on, I also developed an interest in health. This interest mainly came from the fact that this is of great importance to people's happiness. When you ask people what they consider most important in life, the answer is most often health, for themselves, friends and family. Because of this interest, in 2013, I decided to start with the bachelor "Health and Society" at the university of Wageningen. Within this study, I came to the conclusion that I was especially interested in the relationship between health and nutrition. However, not on cellular level, but from a consumer perspective. Because of this, I decided to follow free-chosen courses on nutrition and consumer behaviour. As I really enjoyed these courses and wanted to learn more about consumer behaviour, I decided to start with the master "Management, Economics and Consumer Studies", with the specialisation Consumer Studies and the profile Marketing and Consumer Behaviour.

Already in my bachelor, I got very much interested in nutrition labelling, with the main reason being that I noticed room for improvement on the packaging of food products in supermarkets in the Netherlands. Moreover, while talking with other people around me, I found out that this is a topic that everyone can relate to. Within this topic, I got especially enthusiastic about the multiple traffic light label. Because of this, I decided to write by bachelor thesis on whether there is an effect of the traffic light label on the healthfulness of people's food choices.

Although I found out, that it is not very straightforward that nutrition labelling also changes consumers' diets, I still find nutrition labelling interesting. For me, it is not primarily about changing the healthfulness of consumers' diets, but about making it easier for consumers to eat healthy when they want to. This mainly as I highly value freedom of choice. Besides that, I believe it is also an ethical matter to communicate clearly about the healthfulness of a product, just like the price of food products is clearly indicated, as well as that I believe it should also be the case with animal welfare and sustainability. I also think that nutrition labelling is a motivator for the food industry to produce more healthful food products, which will increase competition on the healthfulness of food products. I believe that it is too idealistic to assume that we will slow down the increase in or even decrease the prevalence of nutrition-related diseases by only providing consumers with information about the healthfulness of food products. However, I think that we can achieve this goal by using a combination of strategies of which a clear FOP label on the packaging of food products in supermarkets, according to me, should be part of.

Of course, I did not have to think long about what was going to be the subject of my master thesis. Accordingly, what you are looking at is my master thesis on nutrition labelling. Again, the nutrition label I have been looking at is the traffic light label and I have been researching whether Dutch adult consumers would use it and how they would use it when it would be implemented in the Netherlands. I think it led to a number of relevant insights. During the following years to come, I would like to dive further into this topic, starting with my internship on nutrition labelling at Unilever. My ultimate goal is to contribute to making it easier to make healthful, but also more animal friendly and sustainable, food choices, with the first step being the introduction of the traffic light in the Netherlands.

I would like to end with a word of thanks. First of all, I would like to thank my supervisor Hans van Trijp for his supervision. I have enjoyed his enthusiasm from the beginning onwards. Besides that, he has been an involved supervisor and has, with his knowledge and experience, really helped me to bring this thesis to a higher level. I would also like to thank my second reader, Ellen van Kleef. Not only did she make time to read and give feedback on my proposal, but also to read and give feedback on the concept version of my master thesis. Also, she has been very enthusiastic from the beginning and I really have enjoyed our lively conversations. Finally, I would like to thank my boyfriend, family and friends, who have much supported me throughout this project.

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1. Introduction

Non-communicable diseases, such as obesitas, cancer and cardiovascular diseases, are considered as one of the major health challenges of the 21st century (World Health Organization (WHO), 2014). This is because they are known for having a high burden on death and disease and, over the last decades, have been subject to a fast increase (Muller-Riemenschneider et al., 2008). One of the main reasons for the fast increases in non-communicable diseases is that more and more of people's diets largely consists of ultra-processed food products (Moubarac, Parra, Cannon & Monteiro, 2014; Monteiro, Moubarac, Cannon, Ng & Popkin, 2013). Ultra-processed food products are food products that are known for containing high levels of fat, salt and sugar and are therefore considered to be relatively unhealthy food products. Accordingly, there is an urgent need to increase the healthfulness of people's diets.

One of the strategies that is now widely discussed on both legislative, regulatory and public level is nutrition labelling. Within this discussion, especially front-of-pack (FOP) labels have received much attention (Van Kleef & Dagevos, 2015). FOP labels are placed on the front of food product packages, in contrast to nutrition tables on the back of the packaging of food products. They are designed to, at the point of purchase, provide simplified information about the nutritional content of a food product to consumers at a glance (Cowburn & Stockley, 2005; Feunekes et al., 2008). The idea is that this enables consumers to make more informed food choices, for which it is envisaged to lead to more healthful food choices (Borgmeier & Westenhoefer, 2009; Grunert & Wills, 2007; Cowburn & Stockley, 2003; Cowburn & Stockley, 2005; Baltas, 2001). Furthermore, besides affecting consumers' food choices, FOP labels are expected to motivate the food industry to develop and produce more healthful food products (Vyth et al., 2010a; Vyth et al., 2010b).

The FOP label that is central in the political and scientific debate is the Multiple Traffic Light label (MTL label) (Machín, Aschemann-Witzel, Curutchet, Giménez & Ares, 2018). The MTL label has been developed by the Food Standards Organization (FSA) and provides information on the levels of fat, saturated fat, sugar and salt that a product contains, by giving each of the nutrients either a red, amber or green colour, indicating a high, medium or low level of that nutrient per 100 grams respectively (FSA, 2007). The cut-off values are based on recommended intake levels for the various nutrients which have been defined by the EU legislation on Nutrition and Health Claims. Besides providing information on the levels of fat, saturated fat, sugar and salt, by the use of colours, a requirement of the FSA (2007) is that designs of MTL labels should also always contain numerical information on the grams of a nutrient per serving. Furthermore, designs of the MTL labels sometimes also include information on the Guideline Daily Amounts (GDA) and/or information on the number of calories. In the figure below, an example is shown of such a design of the MTL label (figure 1).

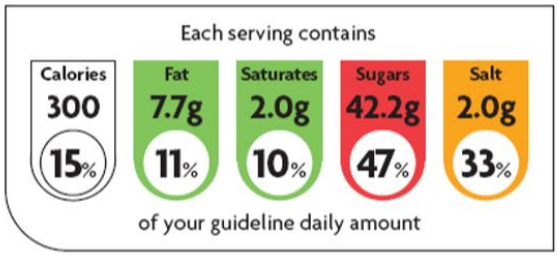

Figure 1. An example of the Multiple Traffic Light front-of-pack (FOP) label (MTL label). Food Standards Agency (2007).

Also in the Netherlands, the MTL label is more and more discussed as a promising FOP label. Especially as the Dutch government has decided to remove the Choices Logo from the packaging of food products in supermarkets in the Netherlands, which is another FOP label which indicates a favourable choice within a product group, based on criteria on saturated fat, trans fat, added sugar, salt, fiber and total energy (Dötsch-Klerk & Jansen, 2008). From October 2018 onwards, it is not allowed anymore to produce product packaging that includes the Choices Logo (Het Vinkje, 2017). Although the Netherlands Nutrition Centre (Stichting Voedingscentrum Nederland), commissioned by the Dutch government, has built and launched a mobile application that provides consumers with personalised nutrition-information (Voedingscentrum, 2018), some consumer organisations, such as the Dutch

consumer organization ‘de Consumentenbond’ or Foodwatch believe that this application will not have its foreseen effects, as it is too much of an effort to use it. They advocate for another FOP label, at least to complement the mobile application, and prefer the MTL label (Levensmiddelenkrant, 2018; Trouw, 2016). Furthermore, recently, five big multinationals (Coca Cola, Mondelez, Nestlé, Pepsico and Unilever), have proposed a specific format of the MTL label, called the Evolved Nutrition Label (ENL) to the European Commission (Evolved Nutrition Label Initiative, 2017). The ENL provides the same information as the MTL label, only the colours are assigned to the different nutrients based on portion sizes instead of per 100 grams.

Although there are efforts going on in order to get (a form of) the MTL label implemented in the Netherlands, it is unclear whether the MTL label would be used by Dutch consumers. Mainly this is because the majority of studies have been focussed on studying the effect of MTL labels on the healthfulness of food choices or the ability to make healthier food choices directly. Moreover, most studies have been conducted in countries other than the Netherlands. Another finding is that research on the determinants of nutrition label use is rare and most studies have been restricted to demographic determinants, so that it remains unclear what processes are underlying the relationships between these demographics and label use (Grunert, Wills & Fernandez-Celemin, 2010).

Besides that, it is not clear yet, how the MTL label would be used, when it would be introduced in the Netherlands. However, since the MTL label is a semi-directive label, there is room left for interpretation (Hodgkins, 2012). The MTL label is a semi-directive label since it is in between only providing factual nutrition information (which does not give any interpretation on healthfulness by itself and therefore leaves a lot of room for interpretation) and only providing one overall evaluation of the healthfulness of a food product (which gives an overall interpretation of the healthfulness of the products, without providing information on which this overall interpretation is based and therefore leaves almost no room for interpretation). For example, the MTL label leaves room for interpretation of the three different colours and based on the Prospect Theory, which states that people value losses more than gains (Kahneman & Tyersky, 2013), it could be expected that consumers attach more value to the red colour of the MTL label. Besides that, the MTL label leaves room for interpretation of the four nutrients and it can be expected that, the importance of the nutrients in how consumers judge the healthfulness of food products, differs between individuals who have different ideas about the relevance of the various nutrients of the MTL label regarding health.

During the last couple of years, three studies have researched whether the importance of the three different colours and the various nutrients of the MTL label are different in how consumers judge the healthfulness of food products based on the MTL label (Balcombe, Fraser & Falco, 2009; Hieke & Wilczynski, 2011; Scarborough et al., 2015) (In appendix I a table overview of the three studies can be found). How important an attribute is in judgement and choice is often referred to as determinance (Ittersum, Pennings, Wansink & van Trijp, 2007) and therefore, this concept will also be used in this report. All studies used a choice-based conjoint experiment and found that the determinance of the three colours of the MTL label in judging the healthfulness of food products differs; it was consistently found that consumers mainly base their decision on the red colour of the MTL label and that a shift from amber to red leads to a higher loss of utility (which is a numerical score which measures how much a level of an attribute influences decisions) compared to a shift from green to amber (Hieke & Wilczynski, 2011). Besides that, all studies showed that the determinance of the various nutrients in judging the healthfulness of food products, differs. Yet, the studies showed mixed results regarding which nutrients are most determinant. Whereas in the studies of Balcombe, Fraser and Falco (2009) and Scarborough et al. (2015), it was found that mainly saturated fat is determinant, Hieke and Wilczynski (2011) found that simply fat, and not specifically saturated fat, is determinant. Besides that, whereas in both the study of Balcombe, Fraser and Falco (2009), as well as in the study of Scarborough et al. (2015), it was found that salt is the second most determinant nutrient, in the study of Hieke and Wilczynski (2011), this was sugar.

Different possible explanations can be given for the ambiguous results. First, it could be that differences exist in the samples used in the studies regarding how important the participants considered the various nutrients of the MTL label to be regarding health. This could for example be caused by the studies being conducted in different countries. Whereas the studies of Balcombe, Fraser and Falco (2009) and Scarborough et al. (2015) were conducted in the United Kingdom, the study of Hieke and Wilczynski (2011) was conducted in Germany. Differences between countries in ideas

about how important nutrients are regarding health, can for example be caused by differences in emphasis on nutrients in public health campaigns (Scarborough, et al., 2015). Indeed, the FSA has employed different campaigns in the United Kingdom to draw attention to the negative health effects of high intakes of salt (Balcombe, Fraser & Falco, 2009). Another reason could be differences in demographic characteristics, such as age. Whereas in the study of Hieke and Wilczynski (2011), 70% of the participants were between the age of 18 and 25 years old and 25% between the age of 25 and 34 years old, in the two other studies, age was more skewed to older ages, with the average age of the sample of Balcombe, Fraser and Falco (2009) being 48 and more than 80% of the sample of Scarborough et al. (2015) being over the age of 45. It could for example be that older age groups consider salt to be important regarding health, as they have the feeling that they are more vulnerable for diseases that are related to high intakes of salt, as these diseases often manifest on older ages.

Besides that, it could be that the determinance of the various nutrients of the MTL label differs per food product category. Indeed, within the studies described above, different food product categories were used. Whereas in the study of Hieke and Wilczynski (2011), yoghurt was used, in the study of Balcombe, Fraser and Falco (2009) this was a basket of food products containing ready meals, chicken burgers/pizzas, pasta ready meals/curry ready meals, cake/crisps and cereal bars/breakfast cereals and in the study of Scarborough et al. (2015) this were ready meals. It is possible that people expect less salt, less saturated fat and/or more sugar and fat to be present in yoghurt, which is reflected in the determinance of the various nutrients of the MTL label when the healthfulness of a or multiple yoghurts is judged. This explanation may be supported by the fact that it was found that the participants in the study of Balcombe, Fraser and Falco (2009) considered saturated fat to be most important regarding health, followed by salt, fat and sugar, which differed from the found determinance of the various nutrients of the MTL label when the participants judged the healthfulness of the basket of food products, in which salt turned out to be most determinant followed by saturated fat, fat and sugar.

Based on the research gaps described above, the objective of this research is twofold. The first objective is to find out whether Dutch adult consumers would use the MTL label when it would be implemented in the Netherlands. The second objective is to find out how Dutch adult consumers would use the MTL label when it would be implemented in the Netherlands. In the textbox below (textbox 1), an overview of the research questions is shown.

Main research question
What is the expected use and the expected way of use of the MTL label by Dutch adult consumers when it would be implemented in the Netherlands?

Sub research question 1
What is the expected use of the MTL label when it would be implemented in the Netherlands?

Sub research question 2
What is the expected way of use of the MTL label by Dutch adult consumers when it would be implemented in the Netherlands?

- What is the determinance of the *colours* of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label?
- What is the determinance of the *nutrients* of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label?
- What is the effect of *the perceived importance of the various nutrients regarding health* on the determinance of the various nutrients of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label?
- What is the effect of *food product category* on the determinance of the various colours and nutrients of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label?

Textbox 1. An overview of the research questions

This study is designed to offer a unique contribution to the scientific literature on this subject. Mainly this is because it is the first time that a study, on the way the MTL label is used, is performed in the Netherlands. Besides that, this study will be the first study that looks at moderators for the relationship between MTL labels and perceived healthfulness of food products as it examines the influence of how important consumers perceive the various nutrients of the MTL label to be regarding health and the influence of food product category.

Besides contributing to the scientific literature, the results of this study can contribute to the debate on whether implementing MTL labels in Dutch supermarkets in the Netherlands would increase the healthfulness of food choices of Dutch adult consumers. Besides that, the result of this study can help understand how use of the MTL label, and maybe also other FOP labels, could potentially be increased as well as the effect of the MTL label, and maybe also other FOP labels, on the healthfulness of food choices, since a deeper understanding on how Dutch adult consumers would use the MTL label will be created. Finally, the food industry can use the acquired information in order to develop new products or adjust already existing products in such a way that Dutch adult consumers perceive the products to be healthier, which would especially be of relevance when the MTL label would be implemented in the Netherlands.

2. Theoretical framework

This theoretical framework consists of two parts, based on the two sub research questions of this study. First, theory is discussed which can explain whether Dutch adult consumers would use the MTL label when it would be implemented in the Netherlands. From the theory, hypotheses have been created, which are integrated into a conceptual model (figure 4). The first part will end with this conceptual model. Hereafter, theory is discussed that can be used to explain how Dutch adult consumers would use the MTL label when it would be implemented in the Netherlands. Again, hypotheses have been created based on this theory and these hypotheses have been integrated into another the conceptual model, which is the conceptual model with which this theoretical framework will end (figure 7).

2.1. Use of the MTL label when it would be implemented in the Netherlands

2.1.1. Use of FOP labels

Use of a FOP label can be defined as taking a FOP into account in food choices. In other words, it is defined as consumers using the information of a FOP label to interpret the healthfulness of a food products, which is then used as a choice criterion for food choices. A model that explains which factors determine whether people use an available FOP label is the FLABEL model (FLABEL, 2012) (figure 2). It has been designed by the FLABEL project, which is a collaborative project which was set up to explore the relationship between label availability and dietary intake among consumers in Europe.

The model shows the different factors that lead from label availability to label use. The model states that, besides the availability of a FOP Label, there are five other factors that play a role in the use of a FOP label. These are formulated as motivation, label format, attention, liking and understanding. Motivation can be described as a motivation to eat healthy. Label format is the type of FOP label. With attention, attention to the FOP label is meant. With liking, it is meant whether consumers like a certain FOP label, and with understanding, whether they understand a certain FOP label. Specifically, according to the model, two factors that determine use of a FOP label are the extent to which people like and understand a FOP label. However, before consumers can like or understand a FOP label, they must pay attention to the label. The three factors, liking, understanding and attention, are in turn effected by a persons' motivation to eat healthy and the format of the label that is available.

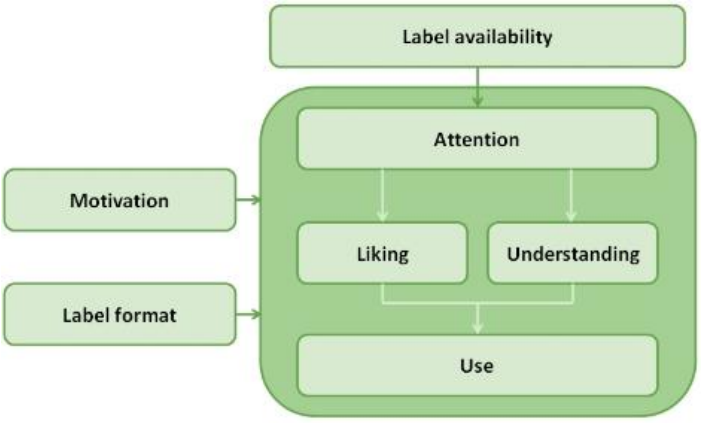

Figure 2. The FLABEL model: a model that shows the factors that lead from label availability to label use (FLABEL, 2012).

2.1.2. Perceived importance of healthy eating and receiving nutrition information

The FLABEL model explains that having a motivation to eat healthy is an important determinant for the use of a FOP label. The same was found in a study of van Herpen and Van Trijp (2011). This study showed that health goals of consumers increase attention to and use of nutrition labels, especially when these health goals concern specific nutrients. Besides that, in a study of Grunert, Wills and Fernandez-Celemin (2010), it was found that use of nutrition information, a more general concept, is mainly related to interest in healthy eating. Therefore, it can be expected that, the effect of perceived

importance of healthy eating on the use of a FOP label, is mediated by the perceived importance to receive nutrition information. Based on this, the following two hypotheses have been formulated.

H1. A higher perceived importance of healthy eating increases the perceived importance to receive nutrition information

H2. A higher perceived importance of receiving nutrition information increases the intention to take the MTL label into account in food choices

2.1.3. Perceived usefulness and ease of use of the MTL label

The FLABEL model explains that label format is an important determinant of label use. It is expected to influence whether people pay attention to a label, whether they like a label, whether they understand a label and therefore also whether they would use a label. Whether consumers like a label may depend on whether consumers like the information that the label provides and believe that this information is relevant to the healthfulness of the food product: the perceived usefulness of the label. Whether consumers understand a label may depend on whether the information is easy to use: the perceived ease of use of the label.

The concepts perceived usefulness and perceived ease of use come from the Technology Acceptance Model (Davis, 1989) (figure 3). This is a theory that explains that the most important determinants for the use of technologies are the perceived usefulness and the perceived ease of use of technologies. The FOP label can be considered as an information technology since its main function is to provide information.

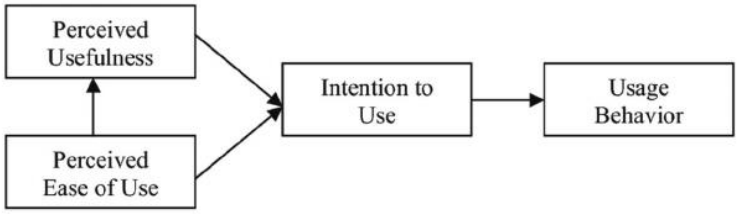

Figure 3. Technology Acceptance Model (TAM): a model that explains what are important determinants of the use of a technology (Davis, 1989).

The model states that the perceived usefulness and ease of use of a technology positively affect people's intentions to use that technology and this positively influences actual use of the technology. The relationship between an intention to perform a behaviour and actually performing that behaviour is also an important part of the well-known Theory of Planned Behaviour (TPB) (Ajzen, 1991). However, in the TPB, an intention is preceded by an attitude towards a certain behaviour. Yet, the perceived usefulness and perceived ease of use of a technology can be seen as important aspects of the attitude towards a technology. In later versions of the TAM, indeed, attitude was often included in the model as a mediator in between perceived usefulness and ease of use of a technology and intention to use a technology. Finally, the TAM states that perceived ease of use also influences perceived usefulness. Based on this, the following three hypotheses have been formulated.

H3. A higher perceived usefulness of the MTL label increases the intention to take the MTL label into account in food choices

H4. A higher perceived ease of use of the MTL label increases the intention to take the MTL label into account in food choices

H5. A higher perceived ease of use of the MTL label increases the perceived usefulness of the MTL label.

2.1.4. Expected effect of the MTL label on the healthfulness of food choices

Not only use of a FOP label is often researched in studies on FOP labels. In a lot of studies, the extent to which a FOP label leads to more healthful food choices, is taken as the dependent variable. Indeed, stimulating consumers to make healthier food choices, is one of the two main functions of the MTL label, besides stimulating the food industry to produce more healthful food products However, important to acknowledge is that these are two different variables and it can be expected that a difference exists between taking a FOP label into account in food choices and making healthier food choices. This since people can take a MTL label into account in food choices, without necessarily basing their food choice on that criteria, just like someone can take into account the price of a product, but in the end not choose the cheapest one, because for example, the expected taste of the other product is higher. This is because healthfulness is only one among other choice-criteria such as price, convenience and taste. Moreover, it can be expected that some consumers will use the label, but because they already eat healthy, do not expect the FOP label to have a big effect on the healthfulness of their food choices. However, in general, it can be expected that, consumers who have the intention to take the MTL label into account in their food choices when it would be implemented in the Netherland also expect the MTL label to have a bigger effect on their food choices. Because of this, the last hypothesis is formulated below.

H6. A higher intention to take the MTL label into account in food choices increases the expected effect of the MTL label on the healthfulness food choices

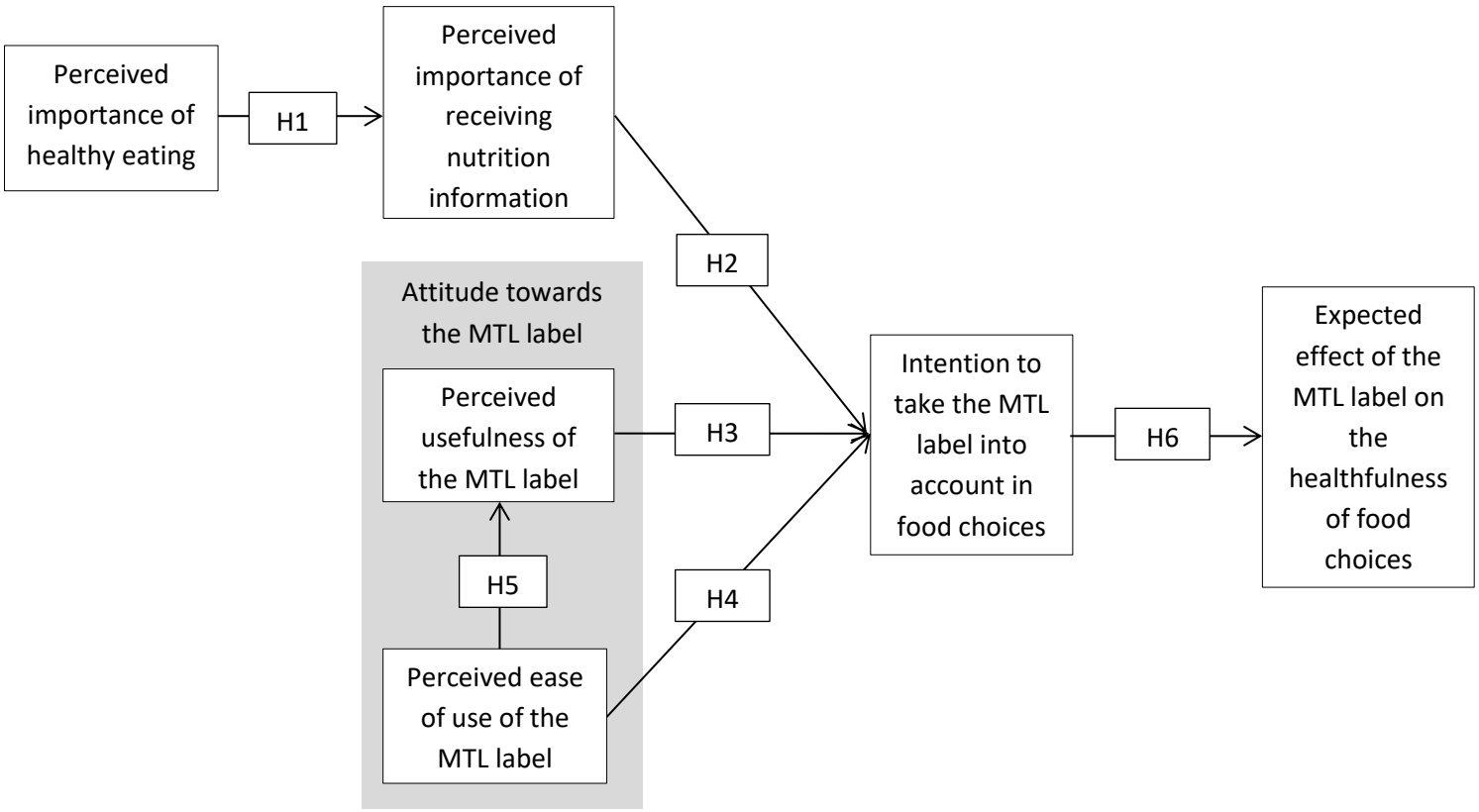

Figure 4. Conceptual model of the expected use of the MTL label when it would be implemented in the Netherlands

H1. A higher perceived importance of healthy eating increases the perceived importance to receive nutrition information

H2. A higher perceived importance of receiving nutrition information increases the intention to take the MTL label into account in food choices

H3. A higher perceived usefulness of the MTL label increases the intention to take the MTL label into account in food choices

H4. A higher perceived ease of use of the MTL label increases the intention to take the MTL label into account in food choices
H5. A higher perceived ease of use of the MTL label increases the perceived usefulness of the MTL label.
H6. A higher intention to take the MTL label into account in food choices increases the expected effect of the MTL label on the healthfulness of food choices

2.2. Way of use of the MTL label when it would be implemented in the Netherlands

2.2.1. Importance of attributes in judgement and choice

When looking at the way the MTL label is used, both importance of the various nutrients of the MTL label and importance of the various colours of the MTL label can be distinguished in how consumers judge the healthfulness of food products. However, importance is a rather vague and broad concept. Because of this, Ittersum, Pennings, Wansink and van Trijp (2007) have specified the concept of importance and state that the importance of attributes is a multi-dimensional concept, which consists of salience, relevance and determinance. Accordingly, they state that, different methods that are used to measure attribute importance, measure different dimensions.

The first dimension, *salience*, refers to how easy certain attributes come to a person's mind or how easy they are recognized when thinking about or seeing a certain object (Krech & Crutchfield, 1948). According to Alba et al. (1991), the salience of an attribute is largely determined by the accessibility of information about this attribute in a person's memory, which is increased by the quantity and quality of the processing of that information. It can be measured by just asking someone what attributes according to that person matter and it is expected that the order in which attributes are mentioned reflects the importance of these (Kaplan & Fishbein, 1969).

The second dimension, *relevance*, is commonly explained as how important a certain attribute is according to someone (Myers & Alpert, 1977), based on that person's values and desires (Batra et al., 2001). It can be measured by just letting people judge the importance of different attributes, such as the direct-rating method (Ittersum, Pennings, Wansink & van Trijp, 2007). With this method, people are for example asked to rate nutrients on a scale from not important for their health until very important for their health.

According to Myers and Alpert (1977), the final dimension, *determinance*, can be explained as the importance of a certain attribute in judgement and choice and is therefore the dimension that is of main interest in this study. According to Fisher (1995), the determinance of an attribute is mainly determined by differences in attribute levels in the object space examined. More specifically, according to Fisher (1995), when there are larger differences in attribute levels, these attribute levels become more determinant. When for example, someone wants to buy a car (a choice situation), attributes that are very rare, like having a specific feature in the car, are considered to be more important in the decision compared to attributes that almost all cars have, like having a steering wheel. An example of how the determinance of attributes can be measured, is by using conjoint methods (Ittersum, Pennings, Wansink & van Trijp, 2007), in which consumers are for example asked to evaluate the healthfulness of two different food products, that differ in one or multiple attribute(s).

Salient attributes are considered as being more important compared to non-salient attributes (Steenkamp & Van Trijp, 1997; Wansink et al., 2005), just like relevant attributes are considered as being more important compared to non-relevant attributes (Schwer & Daneshvary, 2002) and determinant attributes are considered as being more important compared to non-determinant attributes (Ittersum, Pennings, Wansink & van Trijp, 2007). Following this line of reasoning, an important attribute is thus an attribute that is salient (it is easily recognized), relevant (it is in line with someone's values and desires) and/or determinant (it is important in a judgement or choice).

Important to notice is that, although according to Ittersum, Pennings, Wansink and van Trijp (2007), it is possible that an attribute is only salient, relevant or determinant, the three dimensions of attribute importance are not totally independent dimensions (figure 5). For example, they state that determinant and relevant attributes are more salient compared to non-relevant and non-determinant attributes (relationship 1 and 2). Furthermore, people sometimes use salience as a heuristic for inferring attribute relevance (relationship 3) (Fishbein & Ajzen, 1975). Besides that, Alpert (1971)

found that the determinance of attributes is positively affected by the relevance of the attribute to the individual (relationship 4).

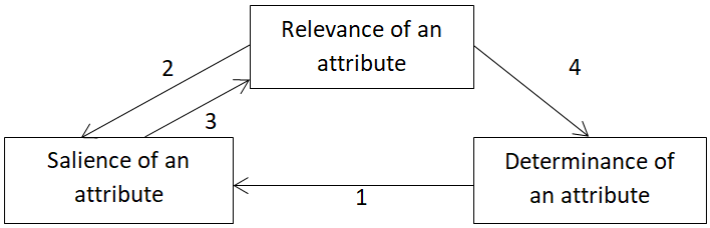

Figure 5. The relationship between the three dimensions of attribute importance: salience, relevance and determinance (Ittersum, Pennings, Wansink & Van Trijp, 2007)

In the theory described above, salience is described as how easy certain attributes come to a person's mind or how easy they are recognized when thinking about or seeing a certain object (Krech & Crutchfield, 1948). Besides that, it was explained that salience is largely determined by the accessibility of information about an attribute in a person's memory, which is increased by the quantity and quality of the processing of that information.

Yet, according to the Dichotic Model of Salience, developed by Guido (1998), salience is not a unidimensional concept and is a broader concept than what is described in the theory above. More specifically, the model states that two types of salience exist, based on the different processes underlying salience, which are re-salience and in-salience. It is a model that combines two streams of research, which are research on salience and information in(congruity). The latter is based on schema theory and information processing.

Re-salience is described as a type of salience that is the consequence of a top-down process, as it starts with internal motivation. Accordingly, a stimulus is re-salient in a certain context when it is congruent with a perceiver's goal. More specifically, the processing of a re-salient attribute is more the consequence of an active search for patterns in the stimulus input, which is based on memories of past experiences, expectations based on schematic knowledge and personal goals. Moreover, the type of attention that is involved is voluntary attention, also called endogenous attention, which means that the consumer explicitly pays attention to a stimulus. It is the type of salience that is referred to in the theory described earlier.

Besides re-salience, the Dichotic Model of Salience distinguishes *in-salience*. In-salience is explained as a type of salience that is the consequence of a bottom-up process. A stimulus is in-salient when, in a certain context, it is incongruent with a perceiver's scheme, or differently stated, incongruent with someone's prior knowledge and expectations. More specifically, the processing of an in-salient stimulus starts with arrival of sensory information to the receptors and works via a fixed set of rules and procedures. Also, sensory dominance (when a stimuli stands out in the immediate context), negativity (when evaluation of a stimuli falls below the psychological midpoint) and extremity (when a stimuli deviates from a central tendency) fall under this category and all three of them have been found to increase the level of in-salience of an attribute. The type of attention that is involved in this type of salience is involuntary attention, which is also called exogenous attention.

Combing the information provided above, a new figure can be developed, which can be found in figure 6. The concepts in bold are the same concepts as the concepts that can be found in the figure 5, and the relationships indicated with the numbers 1 until 4 are the same relationships that can be found in figure 5. Yet, compared to figure 5, what is new is that now two types of salience are distinguished. Furthermore, the attribute that was called 'salience of an attribute' in the previous figure has now become 're-salience of an attribute'.

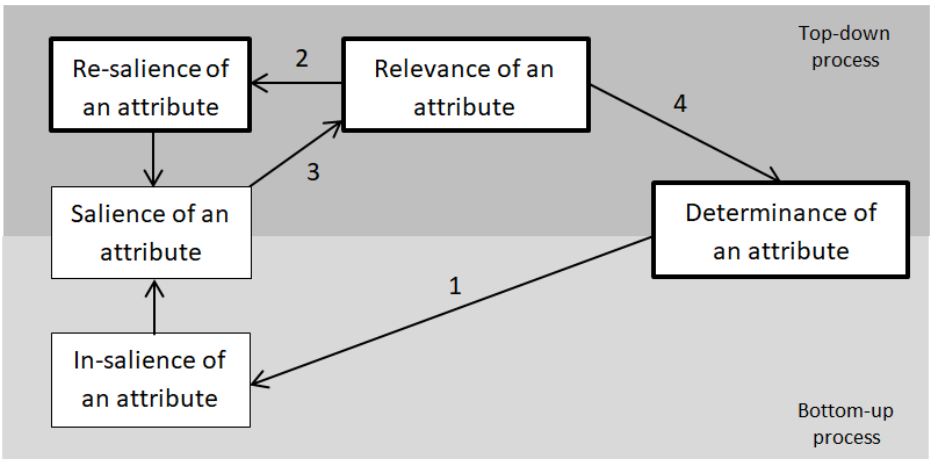

Figure 6. The relationships between the three dimensions of attribute importance (salience, relevance and determinance) and two types of salience (Ittersum, Pennings, Wansink & Van Trijp, 2007; Guido, 1998).

Guido (1998) states that salient attributes, are attributes to which attention is paid and that attention is always built up from exogenous attention (the bottom-up process, which is related to the in-salience of an attribute) and endogenous attention (the top-down process, which is related to the re-salience of an attribute); they are complementary processes. Therefore, it can be concluded that both types of salience can play a role in judgement and choice at the same time. However, where exogenous attention is very fast, endogenous attention is slower as it is consciously controlled. Besides that, although exogenous attention is very fast, it also fades quickly unless the stimulus turns out to be important, whilst endogenous attention is often maintained longer. Because of this difference, first attention will be paid to attributes that are in-salient, such as attributes that are extreme. When those attributes are found to be important, these attributes will be further processed. Somewhat later, a top-down process can start, in which attention will be paid to attributes that are re-salient, such as attributes of which you expect to be present. This could imply that for stimuli that can easily be processed (the colours of the MTL label), the role of exogenous attention will be bigger, whereas for stimuli that are more difficult to process (the nutrients of the MTL label), the role of endogenous attention will be bigger.

2.1.2. Determinance of the colours red, amber and green

When looking at the possible salience of the three different colours, based on the evolutionary meaning of red, which means danger, it could be expected that this colour is most sensory dominant. This would mean that when being confronted with different colours, a red colour drags the attention first and is therefore more in-salient. Besides that, as has been earlier described, negativity, which is explained as 'when evaluation of a stimuli falls below the psychological midpoint', of which a red colour can be an example, increases the level of in-salience of an attribute (Ittersum, Pennings, Wansink & van Trijp, 2007). Third, following the prospect theory, it can be expected that for consumers, a red colour is also of most relevance when judging the healthfulness of a food product that contains a MTL label. The prospect theory states that people attach more value to losses compared to gains (Kahneman & Tversky, 2013). Following this theory, it could be expected that people have more interest in avoiding potential losses and therefore mainly focus on the red colours of the MTL label when judging the healthfulness food products, which would increase the re-salience of a red colour. As, according to Ittersum, Pennings, Wansink and van Trijp (2007), salience influences determinance indirectly via relevance and relevance influences determinance directly, it can also be expected that the determinance for the red colour of the MTL label is higher. Indeed, three studies that have been done on the determinance of the various nutrients of the MTL label found that consumers mainly base their decisions on the red colour of the MTL label and that a shift from amber to red leads to a higher loss of utility (which is a numerical score which measures how much a level of an attribute influences decisions) compared to a shift from green to amber (Balcombe, Fraser & Falco, 2009; Hieke & Wilczynski, 2011; Scarborough et al., 2015). Based on this, hypothesis 7 is formulated below.

H7. The red colour of the MTL label is more determinant in how Dutch adult consumers judge the healthfulness of food products using the MTL label compared to the green and amber colour of the MTL label

2.2.3. Determinance of the nutrients fat, saturated fat, sugar and salt

The salience of different nutrients for European consumers has been investigated in the review of Grunert and Wills (2007). In this research, it was namely asked "What aspects do you consider to be important regarding healthy food products?" In this review it was found that, from the various nutrients of the MTL label, for European consumers, especially fat is salient. Sugar and salt are also salient, but to a lesser extent.

An attribute is more re-salient when it is considered more relevant. In two large comparative studies of ACNielsen (2005) and Bureau Européen des Unions des Consommateurs (2005), also conducted in Europe, it was indeed found that people selectively read nutrition information for some nutrients while they do read nutrition information on other nutrients. More specifically, it was found that information on fat content and calories are reported most often as being read by European consumers. Moreover, in a study of Hoefkens, Verbeke and Camp (2011) it was found that that European consumers consider saturated fat to be most important regarding health, followed by sugar, fat and salt. In a study of Balcombe, Fraser and Falco (2009), it was also found that saturated fat is considered most important regarding health according to German consumers. However, this nutrient was followed by salt and only then fat and sugar. Although it seems that (saturated) fat is consider most salient and relevant by European consumers regarding health, it seems that the perceived relevance of the various nutrients of the MTL label differs either between countries and/or between individuals. The perceived relevance of nutrients differing between countries can for example be the consequence of different public health campaigns having been active that were focussed on making people aware of the negative health effects of different nutrients. The perceived relevance of nutrients could differ between individuals, for example because of differences in demographics.

As salience, according to Ittersum, Pennings, Wansink and van Trijp (2007), influences determinance indirectly via relevance and relevance influences determinance directly, it can also be expected that the determinance of (saturated) fat of the MTL label is higher. Three studies on the determinance of fat, saturated fat, sugar and salt of the MTL label in how consumers judge the healthfulness of food products showed ambiguous results, although all three studies found that either fat or saturated fat are part of two most determinant nutrients. In the study of Balcombe, Fraser and Falco (2009) it was found that salt and saturated fat are most determinant. In the study of Hieke and Wilczynski (2011) it was found that sugar and fat are most determinant. In the study of Scarborough et al. (2015), it was found that saturated fat and salt are most determinant. Based on the ideas of Ittersum, Pennings, Wansink and van Trijp (2007) and the results of the previous studies described above, hypotheses 8, 8.1 and 8.2 have been formulated below.

H8. When Dutch adult consumers perceive a nutrient to be very important regarding health, that nutrient will become more determinant in how Dutch adult consumers judge the healthfulness of food products using the MTL label compared to when consumers perceive a nutrient to be less important regarding health

H8.1. Dutch adult consumers consider the nutrients of the MTL label to have a different importance regarding health and consider '(saturated) fat' of the MTL label to be more important regarding health, compared to the nutrients 'salt' and 'sugar' of the MTL label

H8.2. When Dutch adult consumers judge the healthfulness of food products using the MTL label, the various nutrients of the MTL label differ in how determinant they are and '(saturated) fat' of the MTL label is more determinant compared to the nutrients 'salt' and 'sugar' of the MTL label

2.2.4. Food product category as moderator

The fact that we distinguish "food product categories", is the consequence of a categorisation process. In their daily lives, people use categorisation processes to simplify and structure the complex environment they live in (Cohen, 2005; Sujan & Tybout, 1989). These categorisation processes can best be explained as people trying to perceptually group stimuli, such as food products, into a certain category in their mind. These categories are called perceptual schemes and they consist of networks of previously acquired knowledge. Perceptual schemes change over time and differ between individuals.

Different bases for categorization exist. Food products can for example be categorized on similar (physical) attributes (e.g. the texture is the same), but they can also be categorized based on similar goals (e.g. both food products are healthy products) or similar scripts (e.g. both food products are eaten in the same way, such as that different soups are eaten from a bowl with a spoon). This means that, like the way food products are divided into different categories within supermarkets, such as the meat, dairy, bread and vegetables departments, people also categorize food products like this, in their minds.

When a consumer has categorised a certain stimulus into a specific perceptual scheme, knowledge about that perceptual scheme is activated and hence, the consumer automatically has expectations about the stimuli. For example, expectations regarding taste or healthfulness, but also expectations regarding which ingredients the product consist of and hence which nutrients are low or high in the food product.

Food product categories have been found to influence the perception of the healthfulness of food products directly as some food products or food product categories are associated with healthy or unhealthy in people's minds. Besides food product categories influencing the perception of the healthfulness directly, when a MTL label is available, it can be expected that they also influence the way the information of the MTL label is interpreted and in that way influence the perceived healthfulness of a food product indirectly. First of all, it is possible that a food product category changes the expectations of the health of a food product, which in turn influences the determinance of the three different colours of the MTL label. For example, when someone considers a food product to be healthy, it is possible that, when a MTL label is presented on the packaging with a lot of red and amber colours, those red and amber colours will have a higher salience compared to when that person already expects the food product to be unhealthy. This as, following the prospect theory again of Kahneman and Tversky (2013), the red and amber colours are then even more perceived as a loss, since they are not only a loss in itself, but also a loss regarding to what was expected. Moreover, it can be that the other way around is also true and that for unhealthful food products, the green colour becomes more determinant. As colours are a rather easy to process stimuli, it can be expected that the in-salience of the colours will be influenced by food product category and therefore the nutrients will be salient which are in contrast to what people expect, as it will be a more bottom-up process.

Second, it can be expected that food product category influences the determinance of the nutrients of the MTL label. When for example someone is looking for a bread, it can be that, in the person's mind bread is associated with containing a lot of salt, as in the media a lot of attention has been paid to this negative relationship. In other words, in the mind of the consumer, salt seems to be most relevant with respect to the food product category "bread". According to Ittersum, Pennings, Wansink and van Trijp (2007), both the nutrient being relevant in itself as well as it therefore also being more salient, positively influence the determinance of "salt" in the judgement of the perceived healthfulness of the food product. As nutrients are rather difficult to process stimuli, it can be expected that the re-salience of the nutrients will be influenced by food product category and therefore the nutrients will be salient which are in in line with what people expect, as it will be a more top-down process. Indeed, this line of researching could explain the differences in the conclusions of the studies of Balcombe, Fraser and Falco (2009), Hieke and Wilczynski (2011) and Scarborough et al. (2015), as it was found that in the study of Hieke and Wilczynski (2011), in which yoghurt was used as a food product category, that sugar and fat were the most determinant nutrients of the MTL label and it can be expected that consumers expect yoghurts to contain more fat than saturated fat and less salt. In the study of Balcombe, Fraser and Falco (2009) and Scarborough et al. (2015), studies in which among others ready meals was the food product category of interest, this were saturated fat and salt and indeed it can be expected that nutrients expect saturated fat and salt to be present in high levels in ready meals. Based on this, hypotheses 9, 9.1 and 9.2 have been formulated below.

H9. The food product category that a food product belongs to influences how Dutch adult consumers judge the healthfulness of this food product using the MTL label

H9.1. The food product category that a food product belongs to influences the determinance of the different colours of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label: when the food product category that the food products belong to is perceived as relatively healthy, the red and amber colours are more determinant relative to the green colour compared to when the food product category that the food products belong to is perceived as relatively unhealthy

H9.2. The food product category that a food product belongs to influences the determinance of the various nutrients of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label: the nutrients that are expected to be present in relatively high levels in the food product category are more determinant , compared to the nutrients that are expected to be present in relatively low levels in the food product category.

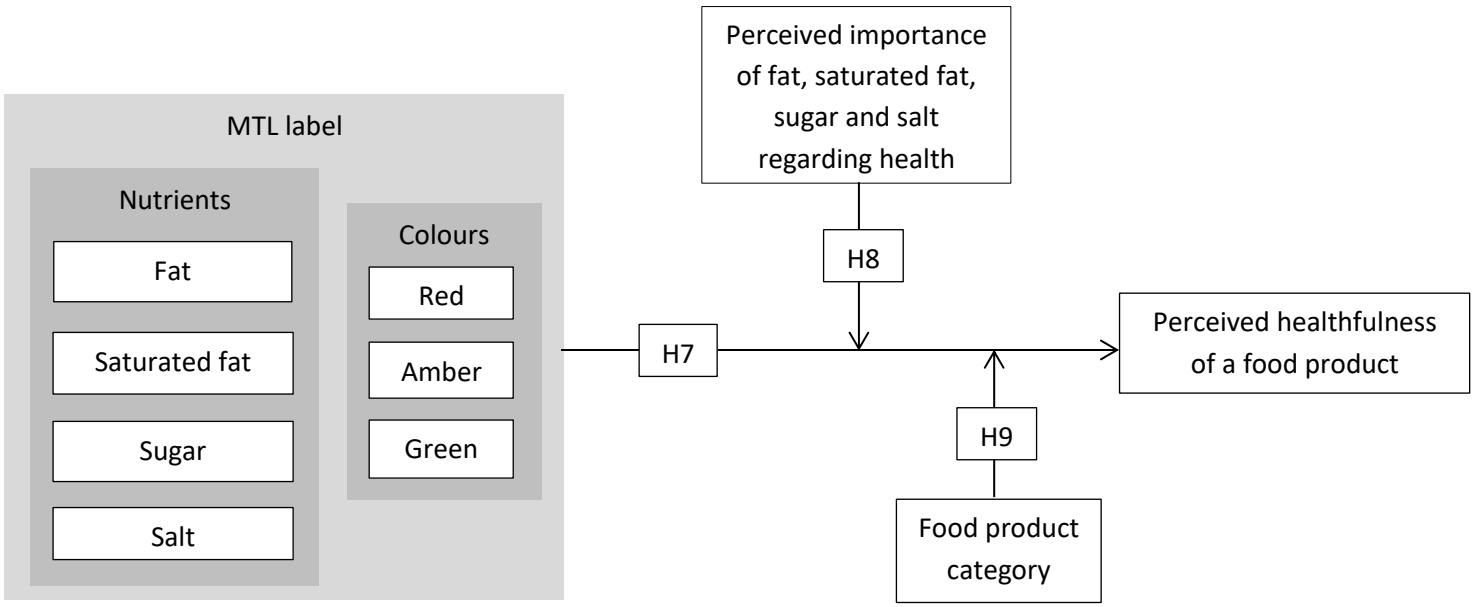

Figure 7. Conceptual model of the expected way of use of the MTL label when it would be implemented in the Netherlands

H7. The red colour of the MTL label is more determinant in how Dutch adult consumers judge the healthfulness of food products using the MTL label compared to the green and amber colour of the MTL label.

H8. When Dutch adult consumers perceive a nutrient to be very important regarding health, that nutrient will become more determinant in how Dutch adult consumers judge the healthfulness of food products using the MTL label compared to when consumers perceive a nutrient to be less important regarding health

H8.1. Dutch adult consumers consider the nutrients of the MTL label to have a different importance regarding health and consider '(saturated) fat' of the MTL label to be more important regarding health, compared to the nutrients 'salt' and 'sugar' of the MTL label

H8.2. When Dutch adult consumers judge the healthfulness of food products using the MTL label, the various nutrients of the MTL label differ in how determinant they are and '(saturated) fat' of the MTL label is more determinant compared to the nutrients 'salt' and 'sugar' of the ` MTL label

H9. The food product category that a food product belongs to influences how Dutch adult consumers judge the healthfulness of this food product using the MTL label

H9.1. The food product category that a food product belongs to influences the determinance of the different colours of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label: when the food product category that the food products belong to is perceived as relatively healthy, the red and amber colours are more determinant relative to the green colour compared to when the food product category that the food products belong to is perceived as relatively unhealthy

H9.2. The food product category that a food product belongs to influences the determinance of the various nutrients of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label: the nutrients that are expected to be present in relatively high levels in the food product category are more determinant, compared to the nutrients that are expected to be present in relatively low levels in the food product category.

3. Methodology

3.1. Design

To answer the research questions, a choice-based conjoint experiment was used, incorporated into an online questionnaire. The questionnaire can be found in appendix III and was designed in Qualtrics. The conjoint experiment was used to answer research question 2 on how Dutch adult consumers would use the MTL label. The questions in the questionnaire were used, partly also to answer research question 2 on how Dutch adult consumers would use the MTL label, but mainly to ask for demographics and to answer research question 1 on whether Dutch adult consumers would use the MTL label.

Conjoint analysis is a survey based statistical technique that helps determine how people value different attributes that make up an individual product or service. For example, a car may have attributes such as size, brand and price. These attributes can be broken down into different levels. For example, the brand may be Audi, Volvo or BMW. Although the MTL label is not a product or a service, the nutrients can be seen as attributes and the colours as different levels and hence, conjoint analysis can also be used to help determine how people value the different attributes of the MTL label.

More specifically, the objective of conjoint analysis is to determine which combination of a limited number of attributes is most influential in the decision making of participants. It works via showing participants a set of products consisting of different combinations of levels of attributes of the product. Hereafter, the participants are asked to choose from, rank or rate the products that are shown. Conjoint designs in which participants are asked to choose between products or services, are called choice-based conjoint analysis. In this study, this type of a conjoint design was chosen over the classical rating-based approach, as this type of a conjoint design is more similar to real-life buying situations and thus using such a design will lead to a higher external validity (Moore, 2004).

In the choice-based conjoint experiment, participants were asked to make a series of 18 choices, each time between two different MTL labels regarding which MTL label according to them represented the most healthful food product. The MTL labels differed regarding the three different colours red, amber and green (levels) that were assigned to the four different nutrients fat, saturated fat, sugar and salt (attributes) (table 1). In this experiment, the dependent variable was thus the perceived healthfulness of the two food products that were represented by the two MTL labels and the independent variable, the different MTL labels.

Table 1. The attributes and levels of the choice-based conjoint experiment of this study.

Attributes	Fat	Saturated fat	Sugar	Salt
Levels	Red Amber Green	Red Amber Green	Red Amber Green	Red Amber Green

The design that was used for the choice-based conjoint design was a full-profile design. Full-profile designs are designs that display a level from every attribute in in every choice. The reason to use a full-profile design was that, with the number of attributes and levels being rather limited, it was possible to use full-profile designs as well as that it increases the external validity of the study.

As this study includes four attributes with three levels each, 81 single full-profiles could be made as well as a very large number of choice sets. However, this an impossible number of choice sets to present to participants. Therefore, a design was made that limits this number of choice sets. The design of this study was arrived at by using computer optimization and specifically the 'D-efficiency' measure of Kuhfeld et al. (1995). In such as design, computer algorithms are used to assess a lot of different potential designs and then pick the most efficient one. Efficiency is a measure of the information content that a design can capture. Efficiencies are most often stated in relative terms comparing multiple designs (e.g. design A is 80% as efficient as design B). A design that is more efficient needs fewer observations (including participants and/or choice sets per respondent) to get the same standard errors and significances.

A factor that influences design efficiency is utility balance, which can be described as the degree to which alternatives in a choice set are similar in preference. Severe imbalance leads to

obvious choices that are less valuable for estimating utilities (the main outcome of interest in choice-based conjoint studies, which is a numerical score which measures how much a level of an attribute influences decisions) and therefore decrease the efficiency of a design. Since it was expected that the participants would have clear preferences towards green colours of the MTL label and disfavour amber and mainly red, choice sets that differed too much in colour pattern were excluded. More specifically, giving a red colour a score of 1, an amber colour a score of 2 and a green colour a score of 3, the two choice sets could not differ more than 3 scores. Thus, it could not be that the left MTL label contained 3 red colours and 1 green colour (which is 6 in total) and the right MTL label 3 green colours and 1 amber colour (which is 10 in total) as this leads to a difference of 4. The final choice set that has been use for this study can be found in appendix V and had an efficiency of almost 70%.

Food product category was added to the study as a between-subjects design factor. Because of this, the study consisted of four experimental conditions, each with a specific food product category, and one control condition, in which no specific food product category was mentioned. In the control condition, the instruction for example was "choose the food product that you consider the most healthy" . It has been decided to include food product categories as a between-subjects design factor in order to keep the number of choices participants had to make limited and to keep the task a rather simple task for the participants. Another reason that food product categories were included as a between-subjects design, was because in a pilot study of Scarborough et al. (2015), food product category was taken as a within-subjects design factor, but that did not lead to the participants using different strategies. Probably this could be explained by either the number of choices the participants had to make being too large, so the participants did not pay attention after the first couple of questions anymore or because in the first couple of questions, the participants developed a strategy that they maintained during the entire questionnaire. Yet, this could be different when food product categories would be added as a between-subjects design factor.

Originally, the study contained an extra experimental condition, in which also no specific food product category was used, but with a colour code for calories. However, the design used turned out not to give the results needed to answer the research question. It was therefore decided that the experimental condition was not taken into account in this report, but the rationale behind the inclusion of a colour-code for calories, the methodology used and the results related to this part of the study are included in appendix VIII. The answers of the participants of the calories condition to the questions of the questionnaire apart from the conjoint-experiment itself, were taken into account after there was checked that these answers did not differ between the participants from the calories condition and the other conditions

3.2. Participants

The participants were recruited via the network of the researcher. For this, Facebook, LinkedIn and e-mail were used (see appendix IV). In the message in which participants were asked to join the experiment and at the end of the survey, people were asked to invite other people to fill in the survey as well. Moreover, three VVV-vouchers of 10 euros each were raffled.

To calculate the minimum sample size needed, the rule-of-thumb of Orme (2010) was used. This rule of thumb takes into account the number of choice sets, the number of alternatives per choice set and the largest number of levels for any one attribute. Using this rule-of-thumb, it can be calculated that the minimum required sample size was 41 participants per condition so that in total the minimum required sample size was 246 (with the calories condition included). In that case, 500 representations per main effect level are used. However, Orme (2010) states that using 1000 representations per main effect level is even better. In that case, 84 participants need to be required per condition which meant 504 participants in total (with the calories condition included). The goal of the researcher was thus to reach a sample size of at least 246 participants, but preferably more than 504.

In order to participate, participants had to be above the age of 18 years. This was checked as participants were asked to fill in their age within the questionnaire. Furthermore, the goal was to achieve a fair amount of diversity within the sample regarding age, gender, educational background, whether participants had a background in nutrition, having pre-teenage children living at home and BMI.

3.3. Procedure

The online questionnaire (appendix III), which was in Dutch in order to make sure it was fully understood by the Dutch study population, started with an introduction text. Hereafter, a simple explanation of the MTL label was shown to the participants. Also, on this page, the inclusion of the-page number started (i.e. Page 1/10), which was done in order to motivate the participants to fill in the entire questionnaire. The MTL label was explained with a short text together with examples of two MTL labels. The decision has been made to give two examples, in order to simulate as much the task that the participants had to do in the conjoint study. Moreover, the MTL labels that were used as an example looked the same as the MTL labels that were used in the experiment and were two MTL labels that had the possibility of ending up in the final choice set as a pair, but that were not included in the final choice set, so that they met the requirements of ending up in the experiment as a pair. The decision has been made to explain the MTL label since it increases the likelihood of participants understanding the MTL label, which increases the internal validity of the study. Furthermore, it was expected that when introduced in real life, the MTL label will also be explained in for example television commercials, so that it was also expected to increase the external validity of the study.

After the participants were introduced to the MTL label, instructions were given on how to answer the questions of the experiment and a practice question was shown. Again, the two MTL labels that were used in the practice question were two examples that had the possibility of ending up in the final choice set as a pair, but that were not included in the final choice set. However, they differed from the MTL labels that were used to explain the MTL label.

The instruction that was given to the participants was "choose the bread/pizza/cookie/yoghurt/food product that you consider the healthiest". In order to make a choice between the two different MTL labels, consumers could just simply click on one of the two MTL labels. The selected MTL label then was highlighted with a green colour (figure 8). When more than one label was selected or no label was selected and the respondent wanted to go to the next question, an error message became visible that stated that at least one and only one of the two labels should be selected.

Furthermore, the decision has been made not to include a 'no-difference' option as this will offer a statistical limitation. Yet, in order to prevent confusion, participants were explained, when they were introduced to the practice question, that, when no difference was perceived between the two MTL labels, they should randomly choose one of the two MTL labels.

Figure 8. Example question from the bread condition as part of the choice-based conjoint experiment.

After the participants were finished with the experiment, the online questionnaire continued. This part of the questionnaire consisted of descriptive questions (such as gender, age, education level and BMI), a question to determine the participants' perceived importance of the various nutrients of the MTL label regarding health, questions on participants' expectations regarding the healthfulness of and nutrient levels within the different food product categories and questions to determine the participants potential use of the MTL label, as well as that questions were asked on potential determinants of this intention. Also, some questions were asked that were eventually found to be not necessary to answer the research questions. Although these questions are not mentioned here, they can be found in the questionnaire in appendix III, are mentioned in the measures section of the methodology and the results are included in appendix VII. Questions about the same subject were grouped together on a single page, in order to make the questionnaire organized and to not overwhelm the participants with too many questions at once (in the questionnaire in appendix III, new pages are marked with a dotted line). The questionnaire ended with a closing text in which the participants were thanked for their participation and where there was a text entry in which they could leave their mailing address if they wanted to join the raffle.

Participants could only continue to the next page, when all questions were answered, except for the two questions on weight and length. Before the questions in order to determine the participant's length and weight (in order to calculate their BMI) were asked, the following was written: "To calculate your BMI, I would like to know your length and weight. When you prefer not to answer these questions, you can skip these questions". When the participants did not want to answer these two questions or one of them, when they wanted to go to the next page a window popped up which stated that "You did not answer one/two (depending on whether they skipped only weight or length or both) of the questions on this page. Do you want to continue?", but they could just click on "Yes" and continue to the next page. In this way, they were encouraged to answer the questions on length and weight, but were not obliged, which could be a reason for participants to quit the entire questionnaire.

3.4. Stimuli

3.4.1. Design of the MTL label

The MTL label that has been designed for this study, only provided three different colours (red, amber and green) for four nutrients (fat, saturated fat, sugar and salt). Although giving additional information on the levels of the nutrients per serving is a requirement of the FSA (2007), the choice has been made to use this simplistic version of the MTL label as it increases the internal validity of the study because the interest of this study was to calculate the importance of the various colours and nutrients of the MTL label and the other elements of the MTL were not included in this objective.

Within the MTL labels that were designed, the colours for the various nutrients of the MTL label varied randomly. This was done in order to keep the labels across the different food product categories the same, which increases the internal validity. Furthermore, a horizontal MTL label was used and although it is not explicitly recommended, the nutrients were presented in the same order as is suggested by the FSA, which is fat, saturated fat, sugars and salt. Finally, also the nutrients of the MTL labels were in Dutch, as this was expected to increase the internal as well as the external validity of the study.

3.4.2. Manipulation of food product category

In the study, four different food product categories were used. These were bread, pizza, yoghurt and cookies. These four different food product categories were chosen because of their expected association with the various nutrients of the MTL label. Accordingly, bread was chosen as it was expected to be associated with salt and not with (saturated) fat and sugar, pizza with (saturated) fat and not with sugar, yoghurt with (saturated) fat and sugar and not with salt and cookies with sugar, while it was not expected that cookies are perceived as containing a low level of any of the other nutrients. Furthermore, it was expected that these categories would differ in health perception. It was expected that bread and yoghurt would be considered relatively healthy, whereas pizza and cookies would be considered relatively unhealthy. Third, all food product categories are regularly consumed in the Netherlands, so that it could be expected that people are familiar with and can imagine to buy such a product. Finally, it is interesting to include yoghurt since this was the food product category for which

really different results were found when comparing the findings of the study of Hieke and Wilczynski (2011) to the findings of the study of Balcombe, Fraser and Falco (2009) and Scarborough et al (2015).

The food product category was manipulated by mentioning the name of the food product category in the instructions-text, in the practice question and in the actual 18 questions that were part of the experiment. Moreover, the two MTL labels of the experimental questions were presented on different backgrounds. More specifically on a picture of a supermarket at the background in the control condition, a bread shelf within a supermarket in the bread condition, a freezer with pizzas within a supermarket in the pizza condition, the cookies shelf within a supermarket in the cookies condition and the yoghurt shelf within a supermarket in the yoghurt condition (figure 9). Besides this being necessary in order to make the manipulation strong enough, it increases the external validity of the study and it partly covers the issue that verbal descriptions are more likely to be interpreted differently which increases the heterogeneity in responses.

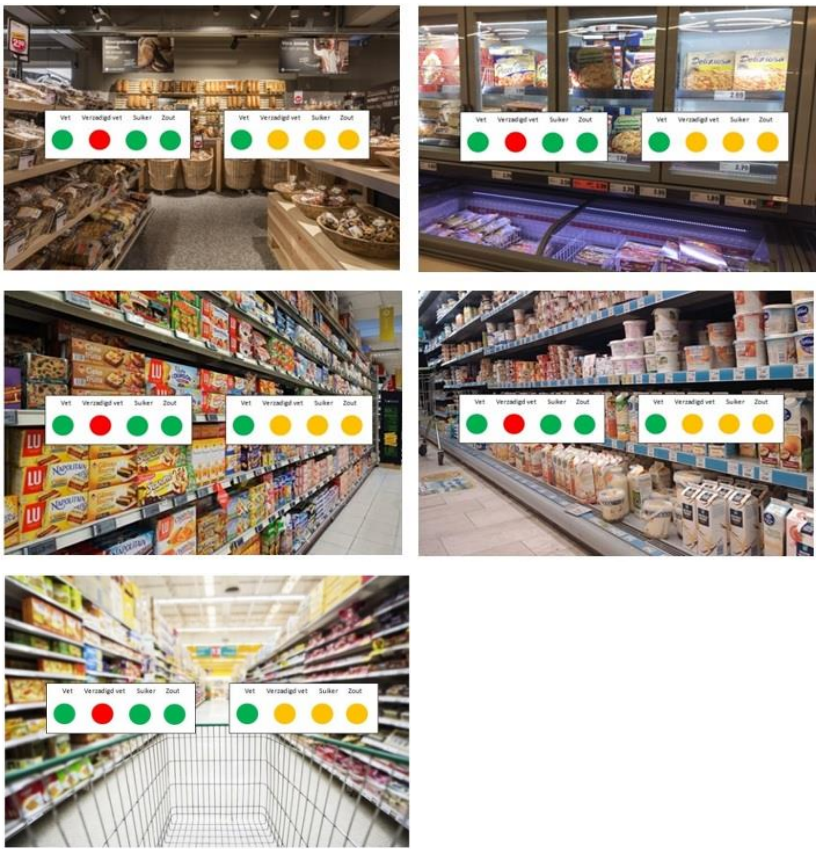

Figure 9. Pictures of the practice questions of the different experimental conditions (the bread, pizza, cookies and yoghurt condition) and the control condition of the choice-based conjoint experiment.

Although for the external validity, it would be even more favourable to present MTL labels on the packaging of food products, it has been decided not to do this in order to protect the internal validity of the study. The main problem would be that different food products should be designed, in order to allow for the differences in nutrient levels of the MTL labels. Yet, doing this would complicate the design too much as not only the different food product categories would be manipulated, but also different food products within these food product categories.

3.5. Measures

3.5.1. Demographics

Gender was measured using a multiple-choice question. The question that was used was "What is our gender?" and participants could select one out of three options. The options that were used were "Male", "Female" and "Other".

Age was measured using an open-ended question formulated as "What is your age?" and with a text entry below. A validation to the question was added, so that participants could only fill in a number between the 1 and 100. Otherwise, an error occurred.

Education level was measured using a multiple-choice question that was formulated as "What is your highest education? (When you are still studying at this moment, fill in that type of education)". The options used were "Geen onderwijs", "Basisschool/lager onderwijs", "Lager beroepsonderwijs (lts, leao, vbo, huishoudschool)", "Middelbaar algemeen onderwijs (vmbo, mavo, mulo, mms)", "Middelbaar beroepsonderwijs (mbo, mts, meao)", "Voorbereidend hoger onderwijs (havo, vwo, hbs)", "Hoger beroepsonderwijs (hbo, hts)", "Wetenschappelijk onderwijs (wo bachelor, wo master en PHD)" and "Other, namely…" to which a text entry was included. Examples were given of each type of education in order to be sure that participants understood the answering options. Participants could only select one option. In the data-analysis, "lager beroepsonderwijs" and "middelbaar algemeen onderwijs" were taken together as it turned out that these two are often explained to be the same, as "middelbaar algemeen onderwijs" is a newly introduced education level and "lager beroepsonderwijs" no longer exists.

Culture was measured using a multiple-choice question formulated as "With which culture do you identify yourself? It is possible to select multiple options". The available options were "The Dutch culture", "The Turkish culture", "The Indonesian culture", "The German culture", "The Surinamese culture", "The Polish culture", "The Moroccan culture", "The Belgian culture" and "Other, namely" to which a text entry was included.

In order to measure whether participants had pre-teenage children living at home, the question "Do you have a child or multiple children living at home that is or are younger than 12 years of age?", was asked. This variable was measured as a categorical variable as only two answering options were available, namely "Yes" and "No".

In order to calculate BMI, the participant's length and weight had to be determined. Length was measured using the open question "What is your length in centimetres?" Below this question a text entry was added. Weight was also measured using an open question. This time the question was "What is your weight in kilogram?" and also below this question a text entry was added. To both text entries no restrictions were added, in order to prevent participants not answering the questionnaire because some forms of answering the questionnaire were not allowed.

To find out whether participants had a background in nutrition (either because of a study being related to nutrition or a job), the question "Do you have a background in nutrition (for example a nutrition-related study or a nutrition-related job)?" was asked for which the participants were asked to select on out of two options: "Yes" or "No".

3.5.2. Measures related to use of the MTL

Each concept from the conceptual framework on the potential use of the MTL label when it would be implemented in the Netherlands was measured with one question, except for the concept 'importance of healthy eating'. How important the participants considered healthy eating was measured using three items based on the health consciousness scale by Schifferstein and Oude Ophuis (1998). The three items were "health is important to me in my food choices", "I always choose food products that I consider to be healthy" and "I don't mind not eating food products that I consider unhealthy". The items were rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7). The items were converted into a mean score for further analysis. The Cronbach's alpha turned out to be 0.708 and did not become higher when any of the items were deleted.

The extent to which the participants consider it important to receive nutrition information was measured with the item "I find it important to receive information about the health of food products". The item was rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7).

The perceived usefulness of the MTL label was measured with the item "The traffic light label gives the information you need for making healthy food choices". The item was based on the scale which measures perceived usefulness of a technology of Davis (1989) and was rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7).

The perceived ease of use of the MTL label was measured with the item "The traffic light label is easy to use for making healthy food choices". The item was based on the scale which measures perceived ease of use of a technology of Davis (1989) and was rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7).

Expectations regarding the potential use of the MTL label when it would be introduced in the Netherlands was measured with the item "When the traffic light label would be introduced in the Netherlands, I would take it into account when making food choices". The item was rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7).

Expectations regarding the potential effect of the MTL label on the healthfulness of food choices when it would be introduced in the Netherlands was measured with the item "When the traffic light label would be introduced in the Netherlands, it would make my food choices healthier". The item was rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7).

3.5.3. Measures related to way of use of the MTL label

Perceived healthfulness of a food product

The dependent variable "perceived healthfulness" was measured as a categorical variable, as participants were asked to make choices between two MTL labels regarding which of the two MTL labels represented the most healthful food product (left or right) and were obliged to choose either the left MTL label or the right MTL label. The instruction was "choose the bread/pizza/cookie/yoghurt/food product that you consider the healthiest".

Perceived importance of the various nutrients of the MTL label and calories regarding health

To measure participants' perceptions about the importance of the various nutrients of the MTL label and calories regarding health, a ranking-method was used, in which participants were asked to assign the terms "fat", "saturated fat", "sugar", "salt" and "calories" to one out of five different boxes, which represented the following answers: "totally important", "important", "neutral", "unimportant" and "totally unimportant". The question used was: "How important do you consider avoiding saturated fat, fat, sugar, salt and calories for health? Drag all words below to the box that you think that these words fit best. You can put multiple words in one box."

Measures on food product category expectations

To find out what expectations the participants had regarding the healthfulness of the different food product categories used in the experiment, the participants were asked to rate 10 items on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7). For every food product category (pizza, bread, cookies and yoghurt) and for food products in supermarkets in general, two items were presented to the participants. The first item for pizza for example was "Pizzas in supermarkets are in general healthy". The second item for pizza for example was "The health differences between pizzas in supermarkets are big". The latter was included as it was expected to be able to say something about the strength of the beliefs on healthfulness. For example, when pizzas in supermarkets are considered to be relatively unhealthy, but the health differences are considered to be big, the belief that pizzas in supermarkets are relatively unhealthy is less strong compared to when pizzas in supermarkets are considered to be relatively unhealthy ánd when the health differences are small.

To find out what expectations the participants had regarding the levels of nutrients and calories in the different specific food product categories, two questions were used for each of the different food product categories and for food products in supermarkets in general. In the first question, which was asked in order to determine which nutrients the participants consider to be relatively high or low in food products in the different food product categories, the participants were asked to rate 5 items on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7) for every food product category. The question for bread for example was "Finish the sentence

below. In general, breads in supermarkets contain in my opinion a lot of…" and the five items "Fat", "Saturated fat", "Sugar", "Salt" and "Calories". In the second question, which was asked in order to determine which nutrient(s) the participants consider to differ the most between food products within the different food product categories, the participants were asked to answer four multiple-choice questions of which the question for bread for example was "Only fill in the question below if you have a clear opinion about it. A relatively healthful bread in a supermarket, often contains less … compared to other breads in supermarkets. It is possible to select multiple options" and the available options were "Fat", "Saturated fat", "Sugar", "Salt" and "Calories".[1]

3.5.4. Additional measures

Device used to fill in the questionnaire
The device that the participants used to answer the questionnaire was measured with a multiple-choice question that was formulated as "Which device are you using to fill in this questionnaire?" in which the participants could choose one option out of three options, which were "Computer/laptop", "Tablet" or "Mobile phone".

Time to answer each of the different questions from the conjoint analysis [2]
The time that the participants needed for each of the 18 choices, was registered. Four variables were automatically measured by Qualtrics. These are the time passed until the first click, the time passed until the last click, the time passed until the page submit button was clicked and the total number of clicks. Only the time passed until the page was submitted was used for the analysis, as this is the most relevant variable, as it includes the total time that the participants used to think about their choice (because also after the last click there is still time to think about the choice, as it can still be changed).

Strategy used in the choice-based conjoint experiment [3]
The strategy that the participants used for answering the 18 choice-sets was measured with a multiple-choice question that was formulated as "In which way did you answer the 18 questions? Select all options that apply". The available options were "I based my decision on the number of green/amber/red colours", "In my decisions, I took into account how important I perceive the various nutrients of the MTL label regarding health", "In my decisions, I took into account the expectations I have regarding breads/pizzas/cookies/yoghurts/food products in Dutch supermarkets" and "Other, namely…" to which a text entry was included.

When the third option, "In my decisions, I took into account the expectations I have regarding breads/pizzas/cookies/yoghurts/ food products in Dutch supermarkets", was selected, a second question popped up in which it was asked how the participants took into account their expectations regarding food products in Dutch supermarkets or a specific food product category. The question that was used was "How did you, in your choices, take into account the expectations you have regarding breads/pizzas/cookies/yoghurts/food products in Dutch supermarkets? Select all options that apply". The available options were "I mainly took into account the nutrients that I expect to be high in breads/pizzas/cookies/yoghurts/ food products in Dutch supermarkets ", "I mainly take into account the nutrients that I did NOT expect to be high in breads/pizzas/cookies/yoghurts/food products in Dutch supermarkets", "I based my decisions on the nutrients that I expect to differ the most between breads/pizzas/cookies/yoghurts/food products in Dutch supermarkets" and "Other, namely…" to which a text entry was included.

[1] Which nutrient(s) the participants considered to differ the most between food products within the different food product categories is not discussed in the results, but the results are included in appendix VII.
[2] Time is not discussed in the results, but the results are included in appendix VII.
[3] Strategy used in the choice-based conjoint experiment is not discussed in the results, but the results are included in appendix VII.

Current daily dietary pattern.[4]
To find out what nutrients the participants try to avoid in their daily life, the following question was asked: "Finish the sentence below. In my daily life, I try to eat not too much of…" and the different items which were rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7) were fat, saturated fat, sugar, salt and calories.

Subjective nutrition knowledge[5]
Subjective nutrition knowledge was measured using three items based on a scale from Flynn and Goldsmith (1999). The items of the originals scale were "I know pretty much about healthy eating", "I do not feel very knowledgeable about healthy eating" (reverse scored), "Among my circle of friends, I'm one of the "experts" on healthy eating", "Compared to most other people, I know less about health eating" (reverse scored) and "When it comes to healthy eating, I really don't know a lot" (reverse scored). To keep the questionnaire short, the second and the final item were left out of the questionnaire. The items were rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7). The items were converted into a mean score for further analysis. The Cronbach's alfa of the scale turned out to be 0.851 and did not become higher when any of the items were deleted.

Understanding of the relationships between the various nutrients of the MTL label and calories regarding health[6]
To find out to what extent the participants thought they understand the effect of the various nutrients of the MTL label and calories on health, the following question was asked: "Finish the sentence below. To me, it is clear what the effect is of…on health". The different items which were rated on a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7) were fat, saturated fat, sugar, salt and calories.

Understanding of the difference between fat and saturated fat [7]
To find out whether participants understood the difference between fat and saturated fat, three items were used that the participants had to rate a 7-point Likert scale ranging from "Totally disagree" (1) to "Totally agree" (7). The items were "I understand the difference between fat and saturated fat", "There is a difference between fat and saturated fat regarding health" and "Unsaturated fat is healthier compared to saturated fat" (reverse scored).

3.6. Pilot study
An early version of the questionnaire was piloted with an opportunistic sample of 5 participants and there was strived for diversity regarding demographic characteristics of the participants who participated. Some participants filled in the questionnaire with the researcher looking at how it went and with the researcher asking questions about the understandability of the questionnaire. To one participant, an email with a link to the questionnaire was sent and feedback was given by the respondent itself. With the pilot study, mainly the understandability of the questionnaire and questions was checked, on the basis of which some text descriptions and questions were adapted. Moreover, the pilot study was used to check whether the participants had different expectations regarding the different food product categories, which was found to be the case.

[4] Current daily dietary pattern is not discussed in the results, but the results are included in appendix VII.
[5] Subjective nutrition knowledge is not discussed in the results, but the results are included in appendix VII.
[6] Understanding of the relationships between the different nutrients and calories regarding health is not discussed in the results, but the results are included in appendix VII.
[7] Understanding of the difference between fat and saturated fat is not discussed in the results, but the results are included in appendix VII.

3.7. Data analysis

The questionnaire has been active from the 27th of December until the 9th of January. After the data collection in Qualtrics was stopped, the data was downloaded into SPSS. For the data analysis, SPSS IBM 25 was used. First, the data was cleaned. Unnecessary information was removed and participants that had not finished the 18 choice sets were excluded from the analysis. Besides this, the data-file was prepared for the different analyses.

A first analysis consisted of calculations of the Cronbach's alfa's of the different scales used. Hereafter, randomisation checks were performed. Chi-square tests were used for gender and having pre-teenage children living at home, having a background in nutrition, device used and education. Yet, as regarding education, one assumption of the chi-square test was violated, as 25 cells (52,1%) had an expected count less than 5, the likelihood ratio was interpreted instead of the chi-square. Two one-way ANOVA's were used for age and BMI.

After the randomisation checks had been performed, a binary logistic regression was performed. In this binary logistic regression, the dependent variable was whether consumer choose the left MTL label (1) or not (0). The independent variables were eight dummy variables with two for every nutrient. First, 16 dummy variables were created for the left MTL label and the right MTL label separately. In these dummy variables, green was the reference group. For example, the first dummy variable for the nutrient fat on the left MTL label got a 1 when it had a red colour and a 0 when it had an amber or green colour and the second dummy variable for the nutrient fat on the left MTL label got a 1 when it had an amber colour and a 0 when it had a red or green colour. The same was done for the right MTL label and for the other nutrients. Hereafter, all the dummy variable of the right MTL label were subtracted from the dummy variable of the left MTL label. The possible values were now 0, 1 and -1. The first dummy variable for fat now contained a value of 1 when the left MTL label contained a red colour for fat whereas the right MTL label contained an amber or a green colour for fat. It contained a value of 0 when both the left and the right MTL label contained a red colour for fat or when the left MTL label contained an amber or green colour for fat and the right MTL label an amber or green colour and a value of -1 when the left MTL label contained an amber or green colour and the right MTL label a red colour for fat.

Although conjoint analysis provides various outputs for analysis (Orme, 2010) the two most important and often used outputs are utilities, also called part-worths and attribute importances. Utilities are implicit valuations of the levels of the different attributes. They are calculated based on dummy variables that are created for each of the different levels of the attributes and are therefore scaled to an arbitrary additive constant within each attribute. In other words, together they sum up to zero within each attribute. A negative utility value therefore does not mean that that specific level was unattractive. Only the order of the different utilities (-0.20 is better than -0.40 and 0.40 is better than -0.20) and the distances between the different utilities have a meaning. From these utilities or part-worths, also the relative importance of the different attributes can be determined, which is the same as the determinance of the different attributes. They are calculated based on the difference in the range of the utilities of an attribute and therefore specify how much difference each attribute could make in the total utility of a product or service. Importances add to a 100% and are relative to other attributes. From the beta-coefficients of the binary logistic regression, therefore, part-worth utilities were calculated and from these part-worth utilities, the importance (determinance) of the various nutrients of the MTL label. The importance (determinance) of the different colours were determined by using the average utilities of each colour across the various nutrients of the MTL label.

In order to determine the effect of food product category, five different binary logistic regressions, one for each condition that contained a specific food product category and one in which these four conditions were all taken into account, were performed. The -2 Log Likelihood ratios of the four binary logistic regressions of the food product category conditions were compared with the -2 Log Likelihood of the binary regression in which they were all included. As the difference between these -2 Log Likelihoods, using the chi-square distribution, turned out to be significant, the part-worth utilities and importances of these binary logistic regressions were calculated and qualitatively compared. Moreover, the importance (determinance) of the various colours of the MTL label were qualitatively compared to the expectations of the respondents towards the healthfulness of the different food product categories. The importance (determinance) of the various nutrients of the MTL label

were qualitatively compared to the expectations of the respondents towards the nutrient levels within the different food product categories.

In order to determine the effect of how important the participants consider the various nutrients of the MTL label to be regarding health on how the participants judged the healthfulness of food products, dummy variables were created for the perceived importance of the various nutrients of the MTL label (where 'very important' was compared with 'important, neutral, not important and very unimportant) and were put into a binary logistic regression together with the dummy variables for the various nutrients of the MTL label as well as that the interaction variables were put into the binary logistic regression. As all interaction variables were significant for at least one of the dummy variables of the various nutrients of the MTL label, the part-worth utilities and importance of the binary logistic regressions, each time comparing people who rated a nutrient as 'very important' to people who rated a nutrient as 'important', 'neutral', 'unimportant' and 'very unimportant', were also calculated and qualitatively compared.

To find out what determines whether people would take the MTL label into account in their food choices, when the MTL label would be implemented in the Netherlands, correlations between the different possible determinants were acquired. Hereafter, different simple and multiple linear regressions were performed, of which the R squares and the beta coefficients were interpreted.

Finally, to determine whether differences exist between the different variables of potential use of the MTL label with respect to demographic characteristic, as well as to determine whether differences exist regarding how important consumers consider various nutrients of the MTL label to be regarding health with respect to demographic characteristics, dummy variables were created and independent-samples t-test were performed. For each demographic characteristic, one dummy variable was created. Regarding gender this was a dummy variable comparing women (=1) to men (=0). For age, this was a dummy variable comparing people aged 40-78 (=1) to people aged 18-39 (=0). For pre-teenage children living at home and having a background in nutrition, this were two dummy variables comparing people with pre-teenage children living at home (=1) to people without pre-teenage children living at home (=0) and comparing people with a background in nutrition (=1) to people without a background in nutrition (=0). For education level, this was a dummy variable comparing people who have followed or are following higher professional education (i.e. HBO) or research oriented programmes (i.e. WO) (=1) to people who have followed or are following no education, no education higher than primary education, no education higher than Preparation Vocational Secondary Education (i.e. VMBO), no education higher than Senior Secondary Vocational Education (MBO) or no education higher than Senior General Secondary Education (i.e. HAVO) and University preparation education (i.e. VWO). Finally, regarding BMI, this was a dummy variable comparing people being underweight and having a normal weight (a BMI below 25) (=1) to people being overweight or having obesitas (a BMI above 25) (=0).

4.Results

4.1. Randomization checks

Gender was equally balanced across the different conditions (X^2 (4) = 2.519, p = .641), as were age (F (4, 486) = .323, p = .862), education (G (28) = 29.754, p = .375), BMI (F (4, 437) = .749, p = .559), whether having pre-teenage children living at home (X^2 (4) = 5.132, p = .274) and whether having a background in nutrition (X^2 (4) = 2.751, p = .600). Since different devices were used to fill in the questionnaire (most often participants used a mobile phone to fill in the questionnaire (61.2%), but some participants also used a computer or laptop (32.1%) and a tablet (6.4%)), it was also checked whether the device that the participants used was balanced across the different conditions. It was found that this was the case (X^2 (8) = 10.789, p = .214).

4.2. Sample characteristics

In total, 618 participants finished the 18 choice-sets. Of these 618 participants, 8 participants were below the age of 18 and were therefore excluded from the analysis, so that in total 610 participants were included in the analysis. From these 610 participants, 549 participants finished the entire questionnaire. The total number of participants between the different conditions, varied between 83 and 115 participants.

In table 2, the demographic characteristics of the sample are described. From the participants, 164 (26.9%) were men and 440 (72.1%) women. The mean age of the participants was 29.79 (SD=13.46), with ages ranging from 18 till 78 years of age. Since the distribution of age was a rather skewed distribution, it is meaningful to mention the median as well, which was 23.00. The majority of the participants were relatively highly educated. A total of 334 (55.3%) participants studied or are studying at a university of sciences and 156 (25.8%) participants studied or are studying at a university of applied sciences. Together they account for 81.1%. In total, 66 participants (10.9%) indicated that they have pre-teenage children (12 years of age or younger) living at home and 125 participants (21.7%) indicated that they had a background in nutrition (either because of following or having followed nutrition-related education or because having/having had a job that is related to nutrition). The BMI of the participants was on average 22.9 (SD = 3.42) and ranged from 16.4 to 38.9. Using the categorizations of the WHO (2018), in total 23 (3.8%) of the participants were underweight (BMI < 18.5), 403 (66.1%) had a normal weight (BMI between 18.5 and 25), 103 (16.9%) were overweight (BMI between 25 and 30) and 18 (3%) had obesitas. None of the participants was classified as having morbid obesitas. Most participants associate themselves mainly with the Dutch culture (n = 592 (98.0%)), although there are a couple of participants that filled in that they (also) associate themselves with the Belgian culture (n = 9), the German culture (n = 6), the Indonesian culture (n=6) and other cultures (n = 12) such as the Turkish, Polish and Spanish culture.

Table 2. Demographic characteristics of the sample.

		Number (%)
Gender	Male	164 (26.9%)
	Female	440 (72.1%)
Age	18-19	118(19.5%)
	20-39	360 (59.6%)
	40-59	105 (17.4%)
	60-78	21 (3.5%)
Education	No education	1 (0.2%)
	Primary education	2 (0.3%)
	Preparation Vocational Secondary Education (i.e. VMBO)	16 (2.6%)
	Senior secondary vocational education and training (i.e. MBO)	60(9.9%)
	Senior general secondary education (i.e. HAVO) and University preparation education (i.e. VWO)	35 (5.8%)
	Higher professional education (i.e. HBO)	156(25.8%)
	Research oriented programmes (i.e. WO)	334 (55.3%)
Pre-teenage children	Yes	66 (10.9%)
	No	538 (89.1%)

Background in nutrition	Yes No	125 (21.7%) 452 (78.3%)
BMI	Underweight (< 18.5) Normal weight (18.5 – 25) Overweight (25 – 30) Obesitas (30 – 40) Morbid obesitas (> 40)	23 (3.8%) 403 (66.1%) 103 (16.9%) 18 (3%) 0 (0%)

4.3. Use of the MTL label when it would be implemented in the Netherlands

4.3.1. Possible determinants of use of the MTL label

The participants indicated that, when the MTL label would be introduced in the Netherlands, they would in general take the MTL label into account in their food choice decisions (M = 5.37, SD = 1.33). Moreover, the participants indicated that, when the MTL label would be introduced in the Netherlands, the would in general expect the MTL label to make their food choices healthier (M = 4.69, SD = 1.49). When then looking at the potential determinants of use of the MTL label, it was found that the participants indicated that they consider healthy eating to be important with an average mean across the three items of the 7-points Likert scale regarding the importance of healthy eating of 4.78 (SD = 1.07). Furthermore, the participants indicated that they consider it to be important to receive information about the healthfulness of food products (M = 5.89, SD = 1.05). Finally, regarding the MTL label specifically, the study shows that the participants are positive about the perceived usefulness of the MTL label (M = 4.93, SD = 1.37), as well as about the perceived ease of use of the MTL label (M = 4.99, SD = 1.43).

4.3.2. Relationships between the possible determinants of use of the MTL label

It was found that all the five different factors are significantly correlated ($p < .01$), except for the correlations between perceived importance of healthy eating and perceived usefulness of the MTL label ($p > .05$), perceived importance of healthy eating and perceived ease of use of the MTL label ($p > .05$) and perceived importance of healthy eating and the expected effect of the MTL label on the healthfulness of food choices ($p > .05$) (table 3). The strongest correlations exist between perceived usefulness of the MTL label and perceived ease of use ($r = .77$, $p < .01$) and between potential use of the MTL label in food choices and potential effect of the MTL label on food choices ($r = .73$, $p < .01$).

Table 3. Correlations between the possible determinants of expected use of the MTL label.

	1. Perceived importance of healthy eating	2. Perceived importance of receiving nutrition information	3. Perceived usefulness of the MTL label	4. Perceived ease of use of the MTL label	5. Intention to use of the MTL label in food choices	6. Expected effect of the MTL label on the healthfulness of food choices
1	-	.359**	.079	.072	.174**	.073
2		-	.301**	.224**	.473**	.324**
3			-	.769**	.635**	604**
4				-	.544**	.533**
5					-	.734**
6						-

* p<.05
** p <.01

To test hypotheses 1 till 6, different linear regressions were performed. The results are presented in figure 10. First, a simple linear regression was performed to test if perceived importance of healthy eating significantly predicts perceived importance of receiving nutrition information (H1). The results of the regression indicated that perceived importance of healthy eating explains 12.9% of the variance ($R^2 = .129$, $F(1, 548) = 81.058$, $p < .01$). More specifically, it was found that perceived importance of healthy eating predicts perceived importance of receiving nutrition information ($\beta = .360$, $p < .01$), so that hypothesis 1 was supported by the data.

Hereafter, a multiple linear regression was performed to test if importance of receiving nutrition information perceived usefulness of the MTL label and perceived ease of use of the MTL label significantly predict the participants' intention to use of the MTL label when it would be implemented in the Netherlands (H2, H3 and H4). The results of the regression indicated that the three predictors explain 49.8% of the variance (R^2 = .498, F (3, 546) = 180.824, p <.01). More specifically, it was found that perceived important to receive nutrition information significantly predicts the participants' intention to use the MTL label when it would be implemented in the Netherlands (β = .39, p <.01) as well as perceived usefulness of the MTL label (β = .42, p <.01) and perceived ease of use (β = .13, p <.01). Therefore, it can be concluded that hypotheses 2, 3 and 4 are supported by the data.

As an extra analysis, there was tested whether perceived importance of receiving nutrition information is really a mediator in between the relationship between an perceived importance of healthy eating (H1 and H2). First, there was looked at whether perceived importance of healthy eating, perceived importance of receiving nutrition information and behavorial intention to take the MTL label into account in food choices correlate. It was found that this is the case (p<.01). Hereafter, two simple linear regressions were performed with first perceived importance of healthy eating as the independent variable and then perceived importance of receiving nutrition information. In both regressions, the independent variable turned out to significantly predict the dependent variable. Perceived importance to eat healthy explained 3% of the variance in intention (R^2 = .030, F (1, 549) = 17.067, p < .01) and was found to be a significant predictor (β = .22, p <.01). Perceived importance of receiving nutrition information explained 22.3% in the variance of intention (R^2 = .223, F (1,549) = 157.579), p <.01) and was also found to be a significant predictor (β = .219, p <.01). However, when both independent variables were included, the perceived importance of healthy eating was no longer significant (>.05), whereas this was still the case for perceived importance of receiving nutrition information (β = .593). This shows that perceived importance of receiving nutrition information mediates the relationship between the perceived importance of healthy eating and behavorial intention to take the MTL label into account in food choices and therewith confirms hypotheses 2 and 3 together.

Then, a simple linear regression was performed to test if perceived ease of use of the MTL label significantly predicts perceived usefulness of the label (H5). The results of the regression indicated that perceived ease of use explains 59.1% of the variance (R^2 = .59, F (1,548) = 792.24, p <.01). More specifically, it was found that perceived ease of use of the MTL label significantly predicts perceived usefulness of the label (β =.74, p <.01) and thus hypothesis 5 is supported by the data.

Finally, a simple linear regression was performed to test if the participants behavorial intention to use the MTL label when it would be implemented in the Netherlands significantly predicts the expected effect of label on the healthfulness of their food choices (H6). The results of the regression indicated that the behavorial intention predicts 53.9% of the variance (R^2 = .539, F (1,548) = 653.302), p <.01) with a β of .82 (p<.01) and thus also hypothesis 6 is supported by the data.

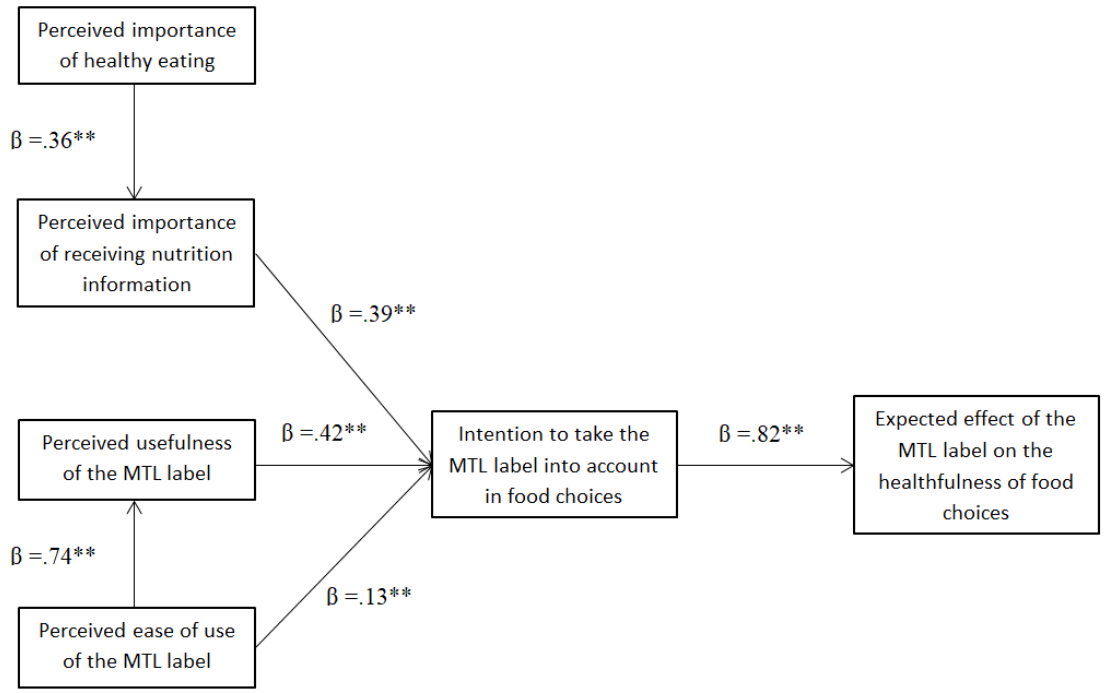

Figure 10. Results on how intention to take the MTL label into account in food choices is predicted by the perceived importance of healthy eating, the perceived importance of receiving nutrition information and the perceived usefulness of the MTL label and perceived ease of use of the MTL label and how intention to take the MTL label into account predicts the expected effect of the MTL label on the healthfulness of food choices.
* p<.05
** p <.01

4.4. Way of use of the MTL label when it would be implemented in the Netherlands [8]

4.4.1. Determinance of the colours red, amber and green

It was expected that the red colour of the MTL label is more determinant in how Dutch adult consumers judge the healthfulness of food products using the MTL label compared to the green and amber colour (H7). Looking at the average (independent of the different nutrients) utilities of the different nutrients, it was found that the average utility of red is -1.37, the average utility of green 1.11 and the average utility of amber 0.26 (figure 11). This means that a shift from amber to red leads to a higher loss of utility (-1.63) compared to a shift from green to amber (-0.85). Calculating importances based on these utilities, leads to red having a relative importance of 50.0%, followed by green with a relative importance of 40.5% and amber, with a relative importance of 9.5%. Thus, hypothesis 7 is supported by the data.

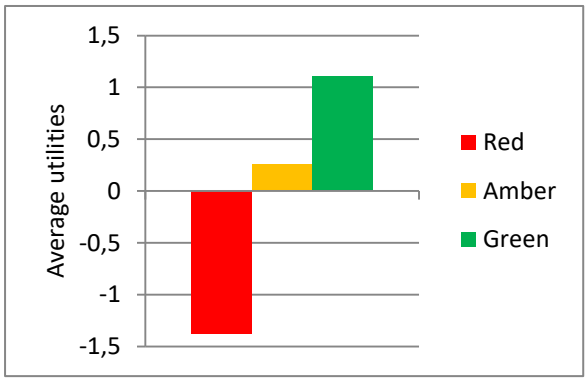

Figure 11. Average utilities of the colours of the MTL label

4.4.2. Determinance of the nutrients fat, saturated fat, sugar and salt

It was expected that either saturated and/or fat would be the most determinant nutrient when Dutch adult consumers judge the healthfulness of food products using the MTL label (H 8.2). Looking at the utilities of the various nutrients of the MTL label (table 4; figure 12), it can be found that the utility of red with respect to saturated fat is -1.65, whereas this is -1.42 for sugar, -1.29 for fat and -1.09 for salt. The same pattern can be found for green, where the utility of green with respect to saturated fat is 1.33, whereas this is 1.21 for sugar, 1.09 for fat and 0.81 for salt. Accordingly, calculating importances based on the ranges of these utilities for each nutrient, leads to saturated fat having a relative importance of 30.1% followed by sugar with 26.6%, fat with 24.1% and salt with 19.2%, which supports hypothesis 8.2.

Table 4. The part-worth utilities and relative importances of the various nutrients of the MTL label.

Nutrients	Colours	Utilities	Relative importances (%)
Fat	Red Amber Green	-1.29 .29 1.09	24.1
Saturated fat	Red Amber Green	-1.65 .33 1.33	30.1
Sugar	Red Amber Green	-1.42 .21 1.21	26.6
Salt	Red Amber Green	-1.09 .29 0.81	19.2

[8] In appendix VI an overview can be found of the percentage of participants choosing either the left or the right MTL label in the 18 choice sets.

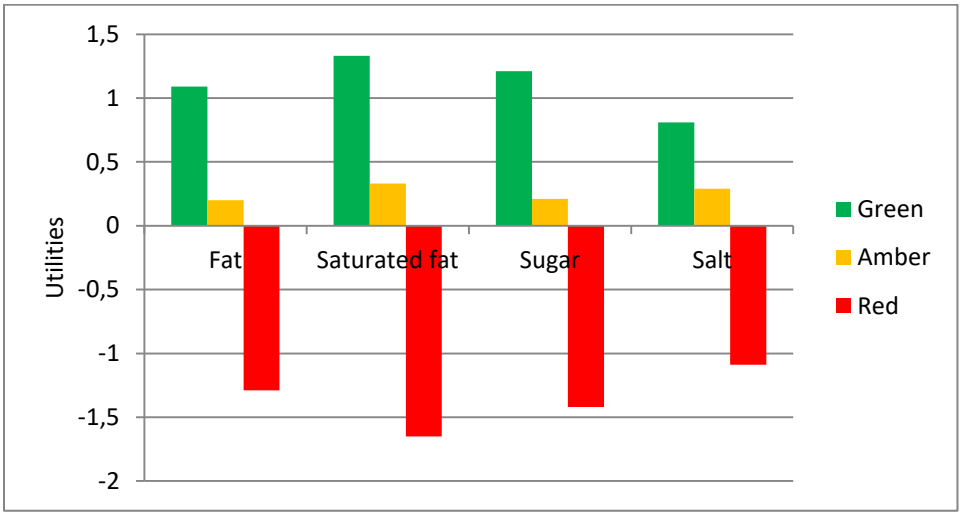

Figure 12. Utilities of the nutrients of the MTL label.

4.4.3. Perceived importance of the nutrients regarding health as a moderator

It was expected that, the determinance of the various nutrients of the MTL label in how consumers judge the healthfulness of food products using the MTL label, depends on how important consumers consider the various nutrients to be regarding health (H8). In order to test this hypothesis, first, there was tested whether the respondents considered the various nutrients of the MTL label to have a different perceived importance regarding health. This is actually the first part of hypothesis 8.1 and to test this hypothesis, a one-way repeated measure analysis of variance (ANOVA) was conducted. This analysis showed that the respondents considered the different nutrients of the MTL label to have a different importance regarding health ($F(1,549) = 13168.320$, $p < .01$). Thus, it can be concluded that the first part of hypothesis 8.1. is supported by the data.

Hereafter, post hoc comparisons using the Bonferroni correction were done in order to test whether Dutch adult consumers consider (saturated) fat to be more important regarding health compared to sugar and salt, which is the second part of hypothesis 8.1. The post hoc comparisons showed that all the means differ significantly from each other ($p<.01$) and that the participants considered saturated fat to be most important regarding health ($M = 4.42$, $SD = .80$) and hereafter sugar ($M = 4.12$, $SD = .85$), salt ($M = 3.94$, $SD = .93$), fat ($M= 3.56$, $SD = .91$) and calories ($M = 3.30$, $SD = .99$) (which are means that have been measured on a 5-points Likert scale). Thus, also the second part of hypothesis 8.1. is supported by the data.

Finally, a binary logistic regression was performed in order to find out whether there is an interaction effect between the various nutrients of the MTL label being considered very important regarding health compared to nutrients being considered important, neutral, unimportant or very unimportant regarding health and the determinance of these nutrients in how the participants judged the healthfulness of food products using the MTL label. It was found that this is the case for at least one of the two interaction variables for each of the nutrients (table 5). More specifically, when fat was rated as being ‘very important with respect to health’, it was more determinant in the food choices of the participants (26.2%) compared to fat being rated as important, neutral, unimportant or very unimportant with respect to health (23.9%). The same holds for saturated fat (32.1% vs. 26.8%), sugar (29.6% vs. 24.6%) and salt (23.1% vs. 15.6%). Because of this, it can be concluded that H8 is supported by the data.

Table 5. Effect of perceived importance of the various nutrients of the MTL label regarding health on the importance (determinance) of the nutrients in judging the healthfulness of food products using the MTL label.

Nutrients		Beta coefficients	Importance (determinance) of nutrient when rated as "important", "neutral", "unimportant" or "very unimportant" (%)	Importance (determinance) of nutrient when rated as "very important" (%)
Fat	D1 fat x D relevance fat	-.569**	23.9	26.2
	D2 fat x D relevance fat	-.038		
Saturated fat	D1 saturated fat x D relevance saturated fat	-.964**	26.8	32.1
	D2 saturated fat x D relevance saturated fat	-.229		
Sugar	D1 sugar x D relevance sugar	-.422**	24.6	29.6
	D2 sugar x D relevance sugar	-.153		
Salt	D1 salt x D relevance salt	-.959**	15.6	23.1
	D2 salt x D relevance salt	-.503**		

D1 = Red compared to green, D2 = Amber compared to green
* p<.05
** p <.01

4.4.4. Food product category as a moderator

It was expected that the food product category that a food product belongs to, influences how Dutch adult consumers judge the healthfulness of this food product using the MTL label (H9). To test this hypothesis, four binary logistic regressions were conducted for each of the four experimental conditions and the -2 log likelihoods of these four different experimental conditions were summed (-2 Log likelihood = 3447.5) and compared with the actual -2 log likelihood of the four experimental conditions together (-2 Log Likelihood = 3519.2) (table 6). It turned out that the summed -2 Log likelihoods together were 71.7 -2 log likelihood smaller than the actual total -2 log likelihood. As the -2 log likelihood follows a chi-square distribution, a chi-square table was used in order to determine whether this was a significant difference. It was found that at a degrees of freedom of 32 (as 8 parameters were estimated in the experimental conditions and the control conditions and therewith 32 parameters in the total model, which is a difference of 24) and for a p smaller than .001, the chi-square should at least be 51.179, which is the case. Thus, it can be said that there are differences between the different food product categories with respect to the parameters of the model (p<.001), which are the beta-coefficients of the various nutrients of the MTL label from which the part-worth utilities and importances of the nutrients and colours are calculated. Moreover, it can thus be concluded that hypothesis 9 is supported by the data.

Table 6. Utilities of the nutrients in the different experimental conditions as well as the -2 Log Likelihoods of the different experimental conditions.

			Bread	Pizza	Cookies	Yoghurt	Total
Utilities	Fat	Red	-1.17	-1.79	-1.20	-1.19	-1.28
		Amber	.25	.09	.20	.11	.19
		Green	.92	1.71	.90	1.19	1.08
	Saturated fat	Red	-1.35	-2.36	-1.80	-1.67	-1.68
		Amber	.30	.26	.24	.32	.31
		Green	1.05	2.08	1.56	1.36	1.37
	Sugar	Red	-1.40	-1.65	-1.36	-1.47	-1.07
		Amber	.39	.12	.14	.14	-.46
		Green	1.00	1.53	1.23	1.22	1.52
	Salt	Red	-1.07	-1.94	-1.18	-1.00	-1.13
		Amber	.24	.61	.17	.28	.26
		Green	.82	1.31	1.00	.71	.87
-2 Log likelihood	Real		830.1	697.5	988.7	931.2	3519.2
	Expected						3447.5
	Difference						71.7

Food product category influencing the determinance of the different colours

The first part of hypothesis 9.1. is about whether, the food product category that a food product belongs to, influences the determinance of the different colours of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label. When qualitatively comparing the importance of the different colours of the MTL label, it was found that in all the different experimental conditions and in the control condition, the relative importance of red was the same (50%). However, the relative importance of the colours amber and green differed between the different conditions (table 7; figure 13). In the cookies and pizza condition, the relative importance of amber was 7.0% and the relative importance of green 43.0%. In the bread condition however, the relative importance of amber was 12% and the relative importance of green 38%, in the yoghurt 7.8% and 43% and in the control condition 11.0% and 39.0%. Thus, based on the found difference in importance, it could be said that the first part of hypothesis 9.1 is supported by the data.

Table 7. The differences between food product categories regarding the relative importances of the different colours of the MTL label

	Relative importances (%)	Bread	Pizza	Cookies	Yoghurt	Control
Colours	Red	50.0	50.0	50.0	50.0	50.0
	Amber	12.0	7.0	7.0	7.8	11.0
	Green	38.0	43.0	43.0	42.1	39.0

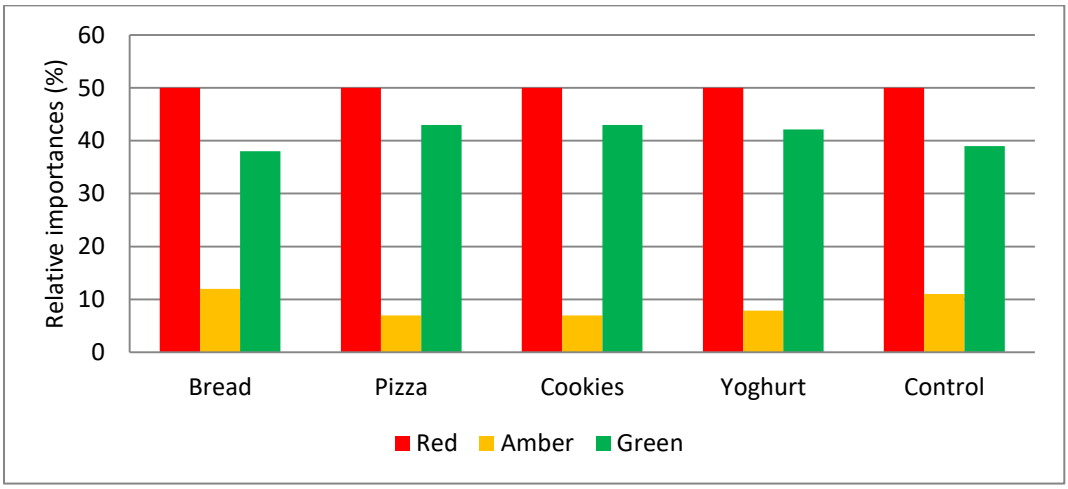

Figure 13. The relative importances (%) of the colours in the different experimental conditions and the control condition.

The second part of hypothesis 9.1. is about in wat way, the food product category that a food product belongs to, influences the determinance of the different colours of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label. It was expected that, when the food product category that the food products belong to is perceived as relatively healthy, the red and amber colours are more determinant relative to the green colour, compared to when the food product category that the food products belong to is perceived as relatively unhealthy.

In order to test whether this hypothesis is supported by the data, there was first tested whether the participants considered the four food product categories that were used in this study to differ in healthfulness. To test this part of the hypothesis, a one-way repeated measure analysis of variance (ANOVA) was conducted. It was found that there is a significant difference with respect to respondents' expectations regarding the healthfulness of the different food product categories and food products in supermarkets in general ($F(1,569) = 10786.799$, $p < .01$) (figure 14).

Hereafter, there was tested how healthy the participants perceived the different food product categories to be. Follow up comparisons using the Bonferroni correction indicated that all pairwise differences were significant ($p<.01$) except for the means of pizza ($M=2.16$, $SD =.98$) and cookies ($M=2.09$, $SD=1.02$) ($p>.05$). Thus, it can be said that yoghurt is considered to be most healthful,

followed by bread, food product categories in supermarkets in general and then pizza and cookies (which do not differ significantly).

To be able to give a full picture of the perceived healthfulness of a food product category, it is also important to find out to what extent the participants considered the food products within one category to differ regarding healthfulness. To answer this question, a one-way repeated measure analysis of variance (ANOVA) was conducted. It was found that there is a significant difference the respondents' expectations regarding the difference in healthfulness of the different food product categories and food products in supermarkets in general ($F(1,569) = 11040.403$, $p < .01$) (figure 14). Follow up comparisons using the Bonferroni correction indicated that all each pairwise differences were significant ($p < .01$) except for the means of bread ($M = 2.16$, $SD = .98$) and yoghurt ($M = 2.09$, $SD = 1.02$) ($p > .05$). Thus, it can be said that the largest differences in healthfulness are considered to be between the food products in supermarkets, followed by bread and yoghurt (which do not significantly differ) and then cookies and pizzas.

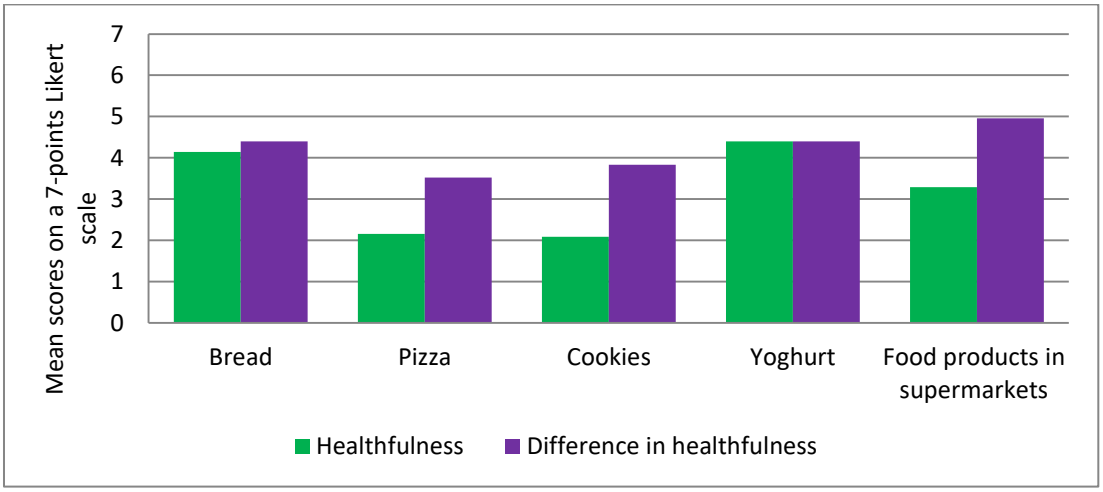

Figure 14. Mean scores (rated on a 7-points Likert scale) of perceived healthfulness and perceived difference in healthfulness of food products in supermarkets, breads, pizzas, cookies and yoghurts.

Hereafter, the differences in the importance of the colours between the different food product categories were qualitatively compared with the expectations of the healthfulness of the different food product categories. In short, it was found that the importance of the red colour was the same, but that the importance of green was somewhat lower, and the importance of amber somewhat higher, in the bread condition, the yoghurt condition and the control condition (which were perceived to be relatively healthy) compared to the pizza and cookies condition (which were perceived to be relatively unhealthy). Because of this, the findings of this study indicate that for food products that are perceived to be relatively unhealthy (pizza and cookies), the green colour becomes slightly more determinant relative to the amber colour and that for food products that are perceived relatively healthy (bread and yoghurt) the amber colour becomes slightly more determinant relative to the green colour. Moreover, comparing it with the control conditions, it seems that especially the first one is true (the green colour becomes more determinant for food products that are perceived as relatively unhealthy relative to the amber colour), as the bread and yoghurt condition were more similar to the control condition and the expectation towards the healthfulness in food products in supermarkets in general was in between the perceived healthfulness of bread and yoghurt and pizza and cookies. Thus, the second part of hypothesis 9.1. is also supported by the data, although it should be mentioned that it are not both the importances of the red and amber colour that changed relative to the green colour, but it was only the importance of the amber colour that changed relative to the green colour.

Food product category influencing the determinance of the different nutrients

The first part of hypothesis 9.2. is about whether, the food product category that a food product belongs to, influences the determinance of the different nutrients of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label. When qualitatively comparing the importance of the different nutrients of the MTL label, it was found that in the bread

condition, saturated fat (27.3%) and sugar (27.3%) were equally determinant, followed by fat (23.8%) and salt (21.5%), in the pizza condition saturated fat was most determinant (30.9%), followed by fat (24.4%), salt (22.6%) and sugar (22.1%), in the cookies condition saturated fat (32.8%) and sugar (25.3%) were most determinant, followed by salt (21.3%) and fat (20.5%) and in the yoghurt condition, saturated fat (30.9%), sugar (26.4%) and fat (25.4%) were most determinant, followed by salt (17.4%). Finally, in the control condition saturated fat (28.9%) and sugar (28.9%) were evenly determinant, followed by fat (25.5%) and salt (16.7%) (table 8; figure 15). Thus, based on this difference in percentages, it could be said that the first part of hypothesis 9.2. is supported by the data.

Table 8. The differences between food product categories regarding the relative importances of the various nutrients of the MTL label

	Relative importances (%)	Bread	Pizza	Cookies	Yoghurt	Control
Nutrients	Fat	23.8	24.4	20.5	25.4	25.5
	Saturated fat	27.3	30.9	32.8	30.9	28.9
	Sugar	27.3	22.1	25.3	26.4	28.9
	Salt	21.5	22.6	21.3	17.4	16.7

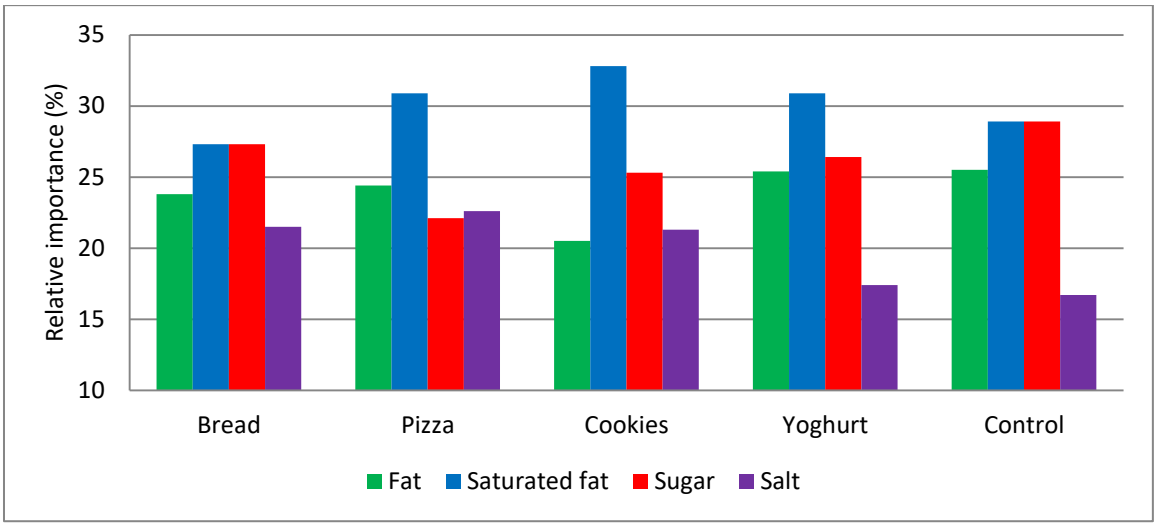

Figure 15. The relative importances of the nutrients in the different experimental conditions and the control condition.

The second part of hypothesis 9.2. is about in wat way, the food product category that a food product belongs to, influences the determinance of the different nutrients of the MTL label in how Dutch adult consumers judge the healthfulness of food products using the MTL label. It was expected that whenthe nutrients that are expected to be present in relatively high levels in the food product category are more determinant, compared to the nutrients that are expected to be present in relatively low levels in the food product category.

To test the second part of hypothesis 9.2, there was first tested whether the respondents expected the nutrient levels to differ within the four food product categories. This was done by means of a one-way repeated measure analysis of variances (ANOVA). The tests showed that this is the case for food products in supermarkets ($F(1,551) = 27651.65$, $p < .01$), breads ($F(1,551) = 14276.915$, $p < .01$), pizzas ($F(1,551) = 30215.759$, $p < .01$), cookies ($F(1,551) = 24944.008$, $p < .01$) and yoghurts ($F(1,551) = 30215.759$, $p < .01$) (table 9; figure 16).

Hereafter, there was tested which nutrients are then expected to be present in the different food product categories. Post hoc comparisons using the Bonferroni correction indicated that all mean scores for the various nutrients of the MTL label in food products in supermarkets differed significantly ($p<.01$). It was found that the respondents mostly expect sugar, followed by salt, saturated fat and fat. This was also the case for bread, except for saturated fat ($M = 3.32$, $SD = 1.4$) and fat ($M = 3.24$, $SD = 1.23$). The respondents expected breads to especially contain high levels of

salt, followed by sugar and saturated fat and fat (which did not significantly differ). For pizzas, also all mean scores for the five various nutrients of the MTL label differed significantly ($p<.05$), except for saturated fat ($M = 5.52$, $SD = 1.15$) and fat ($M = 5.47$, $SD = 1.06$). The respondents mainly expected salt, followed by saturated fat and fat (which did not differ signifcantly) and sugar. For cookies, it was found that only the mean scores of saturated fat ($M = 5.22$, $SD = 1.33$), fat ($M = 5.08$, $SD = 1.27$) and salt ($M = 5.04$, $SD = 1.19$) were not statistically different. It was thus found that the respondents mainly expect sugar, followed by saturated fat, fat and salt (which did not significantly differ). For yoghurt, all mean scores for the five various nutrients of the MTL label differed significantly ($p<.01$). It was found that the respondents mainly expect sugar, followed by fat, saturated fat and salt. To give a more general expectation of the nutrient levels that are expected within the different food product categories, the nutrient levels were divided into three different categories. Based on the means scores found, it was determined that a high expected level was a mean score higher than 5, a neutral level a mean score between 3.5 and 5 and a low level a mean score lower than 3.5 (table 9). Interpreting this information, it can be found that none of the nutrients is really expected to be high in yoghurt, whereas in all the other food product categories, there are nutrients of which the respondents expect them to be present in relatively high levels. On the contrary, whereas salt is only expected to be present in low levels in yoghurt and saturated fat and fat are only expected to be present in low levels in bread, in the pizza and cookies condition none of the nutrients were expected to be present in low levels. Finally, only in the cookies condition, all the four different nutrients were expected to be present in relatively high levels.

Table 9. Expectations about the levels of nutrients in the different food product categories*.

Product category	Bread	Pizza	Cookies	Yoghurt	Food products in supermarkets
High level (>5 on a 7-points Likert scale)	Salt[1]	Salt[1] Saturated fat[2] Fat[2]	Sugar[1] Saturated fat[2] Fat[2] Salt[2]		Sugar[1] Salt[2]
Neutral level (between 3.5 and 5 on a 7-points Likert scale)	Sugar[2]	Sugar[3]		Sugar[1] Fat[2] Saturated fat[3]	Saturated fat[3] Fat[4]
Low level (<3.5 on a 7-points Likert scale)	Saturated fat[3] Fat[3]			Salt[4]	

* Within every food product category, the statistical differences between the nutrient levels are (also) indicated using numbers in superscript. For example, with respect to pizza, the expected level of salt differed significantly from the expected level of saturated fat, but the expected level of saturated fat did not differ significantly from the expected level of fat.

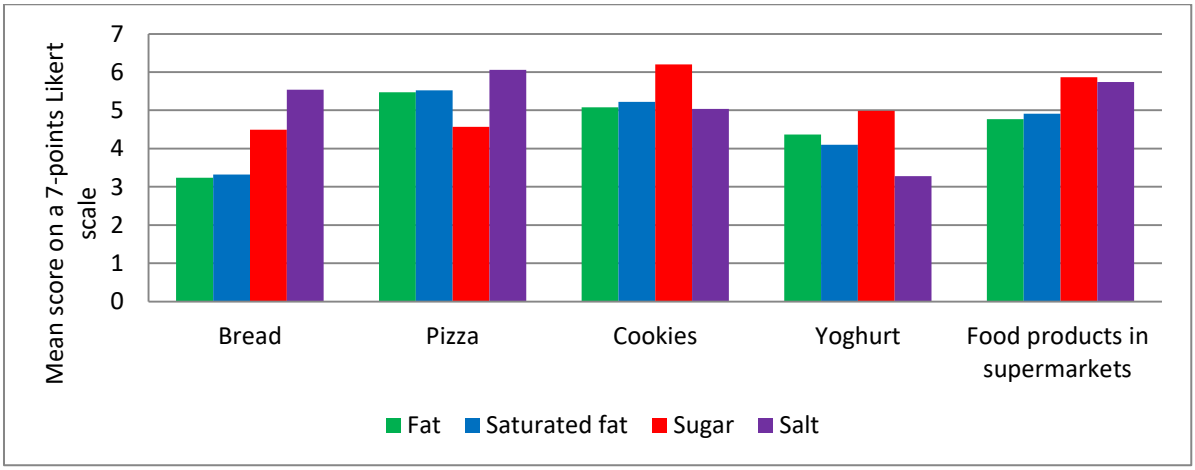

Figure 16. Expectations about the levels of nutrients in the different food product categories.

Finally, the differences in the importance of the nutrients between the different food product categories, were qualitatively compared with the expectations of the nutrient levels of the different food product categories. When looking at the differences in the importance of the nutrients between the different food product categories, what stands out is that in the bread condition and in the control condition, saturated fat and sugar were equally determinant, whereas in the pizza, cookies and yoghurt condition, there were clear differences in percentages, with saturated fat being more determinant than sugar. Thus, saturated fat was less determinant in the bread condition and in the control condition compared to the other conditions. When looking at the expectations of the nutrient levels in bread and in the control condition, it can be found that the participants expected fat and saturated fat not to be present in bread and that they had a neutral stance towards the levels of fat and saturated fat in food products in supermarkets. Besides that, saturated fat was the least determinant nutrient in the bread condition and the participants also expected the lowest level of saturated fat in bread. Second, what stands out is that salt is the least determinant in the yoghurt condition compared to the other food product categories, which is also the nutrient that participants do not expect in yoghurts. However, the determinance of salt was even lower in the control condition. Third, sugar is considered to be the least determinant in the pizza condition and indeed, this is the only nutrient for which the participants do not expect it to be present in high levels. Finally, it was found that salt is most determinant in the pizza condition, compared to the other conditions and participants indicated that they also consider salt to be present in the highest levels in pizzas. Taking a closer look at these findings, it seems that especially the nutrients became less determinant for which consumers also expect it not to be present (in high levels) in a food product and more determinant for nutrients for which consumers expect them to be present (in high levels in food products). This indicates that also hypothesis 9.2. is supported by the data.

4.5. Relationships regarding demographic characteristics

4.5.1. Use of the MTL label

Different independent samples t-test were conducted to test whether the expected use of the MTL label differs with respect to demographic characteristics, as well as the expected determinants of the expected use of the MTL label and the expected effect on the MTL label on the healthfulness of food choices (table 10). First of all, an independent samples-t-test showed that women find it more important to receive nutrition information about the healthfulness of food products compared to men ($t(548) = -2.1$, $p < .05$).

Second, independent-samples t-test were conducted in which the responses of people from older age groups were compared with the responses of people from younger age groups. It was found that people who are older than 40 years of age consider it more important to eat healthy compared to people who are younger than 40 years of age ($t(208.543) = -4.469$, $p < .01$), that they consider the perceived usefulness of the MTL label to be higher (($t(202.022) = -3.483$, $p < .01$), that they are more likely to take the MTL label into account in their food choices when it would be implemented in the Netherlands ($t(196.790) = -3.131$, $p < .01$) and that they would consider it more likely that the MTL label would in that case influence their food choices ($t(548) = -3.057$, $p < .01$). For a couple of tests mentioned above, levene's test for equality of variances was significant, so that the t statistic not assuming homogeneity of variances was interpreted.

Multiple independent samples t-test comparing people from lower education levels to people from higher education levels showed that people with a lower education (excluding HBO and WO) rate the perceived usefulness of the MTL label higher compared to people with a higher education (HBO and WO) ($t(548) = 2.856$, $p < .01$). The same holds for the perceived ease of use of the MTL label, with also people with a lower education rating the perceived ease of use of the MTL label higher compared to people with a higher education ($t(548) = 2.383$, $p < .05$).

Multiple independent-samples t-tests comparing the responses of people who have a background in nutrition with the responses of people who do not have a background in nutrition, showed that people who have a background in nutrition, consider it more important to eat healthy compared to people who do not have a background in nutrition ($t(575) = 2.441$, $p < .05$) and find it more important to receive information about the healthfulness of food products ($t(233.154) = 3.102$, $p < .01$). However, it was also found that people who have a background in nutrition would consider it

less likely that the introduction of the MTL label would make their food choices healthier, compared to people without a background in nutrition (t (548) = -2.390, p <.05). Again, for one of the tests mentioned above, levene's test for equality of variances was significant, so that the t statistic not assuming homogeneity of variances was interpreted.

Table 10. Relationships between the possible determinants of expected use and demographics (M, SD).

	Gender Men (n=155) Women (n=385)	Age <40 (n=436) >40 (n=114)	Education level <HBO (n=98) >HBO (n=452)	Background in nutrition Yes (n=120) No (n=430)	Pre-teenage children Yes (n=54) No (n=496)	BMI <25 (n=395) >25 (n=100)
Perceived importance of healthy eating	4.66 (1.12) 4.82 (1.05)	4.69 (1.08) 5.13 (.95)**	4.74 (.95) 4.79 (1.09)	4.98 (.96) 4.72 (1.10)*	4.89 (.91) 4.77 (1.09)	4.81 (1.08) 4.67 (1.02)
Perceived importance of receiving nutrition information	5.74 (.91) 5.94 (1.10)*	5.86 (1.08) 5.96 (.95)	5.80 (.93) 5.90 (1.08)	6.12 (.87) 5.82 (1.09)**	5.63 (1.22) 5.91 (1.03)	5.90 (1.09) 5.78 (.98)
Perceived usefulness of the MTL label	4.96 (1.29) 4.92 (1.40)	4.83 (1.40) 5.29 (1.20)**	5.29 (1.17) 4.85 (1.40)**	4.78 (1.45) 4.97 (1.35)	4.83 (1.26) 4.94 (1.39)	4.91 (1.40) 5.13 (1.15)
Perceived ease of use of the MTL label	5.08 (1.36) 4.96 (1.46)	4.94 (1.45) 5.20 (1.35)	5.31 (1.21) 4.93 (1.47)*	4.78 (1.57) 5.05 (1.39)	4.76 (1.33) 5.02 (1.44)	4.97 (1.43) 5.22 (1.32)
Behavorial intention to take the MLT label into account in food choices	5.38 (1.25) 5.36 (1.36)	5.28 (1.35) 5.68 (1.19)**	5.49 (1.25) 5.34 (1.34)	5.37 (1.30) 5.37 (1.33)	5.41 (1.16) 5.36 (1.34)	5.33 (1.36) 5.46 (1.22)
Expected effect of the MTL label on the healthfulness of food choices	4.79 (1.35) 4.65 (1.54)	4.59 (1.47) 5.06 (1.48)**	4.91 (1.39) 4.64 (1.50)	4.40 (1.47) 4.77 (1.48)*	4.57 (1.62) 4.70 (1.47)	4.66 (1.49) 4.74 (1.44)

The variables were measured on a 7-points Likert scale.
Regarding the variable perceived importance of healthy eating, the sample sizes were somewhat bigger as that question was asked earlier on in the questionnaire (for example <40 (n=465) and >40 (n=121)).
* p<.05
** p <.01

4.5.2. Perceived importance of the nutrients regarding health

Multiple independent samples t-test were conducted to test whether, how important nutrients are considered regarding health, differs with respect to demographic characteristics (table 11). It was found that women consider sugar to be more important than men (t (589) = -2.306, p <.05). Furthermore, it was found that people from older age groups consider all nutrients, as well as calories, to be more important regarding health compared to people from younger age groups (p<.01). Besides that, it was found that people with lower education levels consider fat to be more important compared to people with higher education levels (t (589) = 4.566, p <.01), as well as calories (t (589) = 2.695, p <.01). Moreover, it was found that people with a higher BMI consider calories to be more important compared to people with a lower BMI (t (528) = -3.859, p <.01). Also, it was found that people with a background in nutrition consider fat to be less important compared to people without a background in nutrition (t (589) = 4.566, p <.01) and salt to be more important (t (589) = 2.695, p <.01). Finally, it was found that people with pre-teenage children living at home consider sugar to be more important compared to people without pre-teenage children living at home (t (589) = 1.977, p <.05).

Table 11. Relationships between the perceived importances of the various nutrients of the MTL label and demographics (M, SD).

	Gender Men (n=161) Women (n=430)	Age <40 (n=464) >40 (n=127)	Education level <HBO (n=106) >HBO (n=485)	Background in nutrition Yes (n=125) No (n=452)	Pre-teenage children Yes (n=63) No (n=528)	BMI <25 (n=420) >25 (n=110)
Fat	3.55 (.91) 3.56 (.91)	3.49 (.90) 3.80 (.90)**	3.92 (1.00) 3.48 (.87)**	3.34 (.91) 3.60 (.91)**	3.52 (.93) 3.56 (.91)	3.53 (.94) 3.67 (.83)
Saturated fat	4.43 (.80) 4.42 (.80)	4.36 (.81) 4.67 (.71)**	4.32 (.96) 4.45 (.76)	4.51 (.79) 4.40 (.81)	4.38 (.97) 4.43 (.78)	4.40 (.83) 4.54 (.76)
Sugar	3.99 (.91) 4.17 (.82)*	4.06 (.85) 4.34 (.81)**	4.16 (.92) 4.11 (.83)	4.06 (.75) 4.13 (.87)	4.32 (.82) 4.09 (.85)*	4.07 (.84) 4.23 (.88)
Salt	3.90 (.96) 3.95 (.92)	3.86 (.95) 4.21 (.78)**	4.04 (.96) 3.92 (.92)	4.10 (.87) 3.90 (.94)*	4.10 (.86) 3.92 (.93)	3.95 (.94) 3.97 (.87)
Calories	3.30 (1.08) 3.30 (.96)	3.22 (.99) 3.62 (.94)**	3.54 (.95) 3.25 (1.00)**	3.21 (.96) 3.32 (1.00)	3.40 (.91) 3.29 (1.01)	3.20 (1.01) 3.60 (.85)**

The variables were measured on a 5-points Likert scale.

* p<.05

** p <.01

5. Discussion

5.1. Conclusion

5.1.1. Use of the MTL label when it would be implemented in the Netherlands

The first objective of this study was to find out whether Dutch adult consumers would use the MTL label when it would be implemented in the Netherlands. From the results of this study, it can be concluded that, in general, Dutch adult consumers would use the MTL label when it would be implemented in the Netherlands. However, it was found that this does not automatically mean that they will also make more healthful food choices: a difference existed between the intention of the respondents to take the MTL label into account in food choices and the expected effect of the respondents regarding the MTL label on the healthfulness of their food choices. Besides that, it was found that, the intention to use the MTL label when it would be implemented in the Netherlands, is higher for people that consider it more important to receive nutrition information, which is higher for people who find it more important to eat healthy, and for people who rate the perceived usefulness and perceived ease of use of the MTL label higher. Finally, it was found that a higher perceived ease of use of the MTL label increases the perceived usefulness of the MTL label.

Previous research has already found that, whereas people may have intentions to use FOP labels to make healthier food choices, this may not be reflected in their actual shopping behaviour (Sacks, Rayner & Swinburn, 2009). This can probably be explained by healthfulness only being one of the choice criteria for food products. Two other (complementary) possible explanations are time pressure and that food choices are known for being habitual behaviour (Grunert and Wills, 2007; Grunert, Wills & Fernandez-Celemin, 2010). A new insight of this study is that, although in different studies it was already found that an interest in healthy eating (Grunert, Wills & Fernandez-Celemin, 2010) and an interest in receiving nutrition information positively effects label use, this study has shown that perceived importance of healthy eating positively effects use of the MTL label, and therefore probably also other FOP labels, via a higher perceived importance of receiving nutrition information. However, it was found that how important a consumer considers it to receive nutrition information cannot fully be predicted by how important a consumer considers it to eat healthy and that other predictors should exist. Another new insight is that, although the technology acceptance model (TAM), which states that the perceived ease of use and perceived usefulness of (information) technologies are two important determinants of intention to use these technologies, has been validated in a lot of different studies, this is the first time that is also shown to be applicable to the use of the MTL label and therefore potentially also other FOP labels.

Besides that, this study has led to some relevant insights on the relationships between demographic characteristics and (the determinants of) (MTL) label use. First, the results of this study show that people from older age groups are more likely to use the MTL label compared to people from younger age groups. Although this is in line with a study of Grunert and Wills (2007), in which it was concluded that older consumers generally have a higher self-reported label use, a new insight of this study is that this can possibly be explained by the fact that people from older age groups consider it more important to eat healthy as well as that they rate the perceived usefulness of the MTL label, and possibly also of other FOP labels, higher. In line with this, it was also found that older consumers expect the MTL label to have a bigger effect on the healthfulness of their food choices compared to people from younger age groups.

Second, although previous research has shown that also women and higher educated consumers have a higher self-reported label use, these findings were not replicated in this study. However, it was found that women consider it more important to receive nutrition information, which could explain that sometimes a relationship is found. More surprisingly is that it was found that people with a lower education level rate the perceived usefulness and the perceived ease of use of the MTL label higher than people with a higher education level, which have both been found to be important determinants of the intention to take the MTL into account in food choices when it would be implemented in the Netherlands and could therefore imply a higher potential use of the MTL label when it would be implemented in the Netherlands by lower educated consumers. An explanation for this difference regarding the perceived usefulness and perceived ease of use of the MTL label, might be that people with lower education levels use the MTL label differently, for example by relying more

on solely the colours of the MTL label instead of also looking at the various nutrients of the MTL label the colours apply to. This would mean that they have a way of using the MTL label that is easier, as well that it could explain why they are less critical on the perceived usefulness of the MTL label. Furthermore, it could be that they are less critical because they have a lower (subjective) nutrition knowledge. The fact that lower education consumers in general perceive the MTL label easy to understand, was already found in a study of Tesco (2006a). Moreover, in a study of Unilever (2006), no effect of education on perceived understanding of nutrition labels could be found. However, important to notice is that a difference exist between subjective and objective understanding of FOP labels and that research has shown that consumers with a higher education level objectively have a better understanding of nutrition labels, compared to people with a lower education level (Drichoutis, Lazaridis & Nayga, 2006).

Third, an interesting finding was that, although it was found that people with a background in nutrition consider it more important to eat healthy and consider it more important to receive nutrition information, this did not lead to people with a background in nutrition being more likely to use the MTL label when it would be implemented in the Netherlands. Moreover, it was found that people with a background in nutrition consider it less likely that the MTL label would make their food choices healthier compared to people without a background in nutrition. Possibly, this can be explained by people with a background in nutrition not expecting much benefit of using the MTL label because they already consider their diet to be healthy and/or already have the idea that they already know the different levels of nutrients within different food product categories and therefore already know the healthfulness of different food products.

5.1.2. Way of use of the MTL label when it would be implemented in the Netherlands

The second objective of this research was to find out how Dutch adult consumers would use the MTL label when it would be implemented in the Netherlands. The results of this study show that, when Dutch adult consumers use the MTL label to judge the healthfulness of food products, the red colour of the MTL label is more determinant compared to the green and amber colour. Moreover, it was found that a shift from amber to red leads to a higher loss of utility compared to a shift from green to amber. Both findings are in line with the three studies that have been conducted earlier (Balcombe, Fraser & Falco, 2009; Hieke & Wilczynski, 2011; Scarborough et al., 2015) (appendix II) and are in line with the prospect theory, which states that people value losses more than gains (Kahneman & Tversky, 2013). Besides that, it is line with a research of Grunert, Wills and Fernandez-Celemin (2010) of which the results indicated that consumers may over-interpret the severity of red colours.

What is new is that this study shows that food product category influences the way Dutch adult consumers use the MTL label in judging the healthfulness of food products. This means that it may be that the importances of the different colours in how consumers judge the healthfulness of food products using the MTL label is influenced by the food product category. A qualitative analysis indicated that it may be that for unhealthy products, the green colour becomes more determinant relative to the amber colour as well as that it may be that for healthy products, the amber colour becomes more determinant relative to the green colour. Looking back at the ideas Guido (1998) who has defined two types of salience, of which one is the result of a bottom-up process and the other of a top-down, this is possibly explained by these colours being in contrast to what people expect, which according to Guido (1998) means these colours are more in-salient, which is salience that is the result of a bottom-up process. Following then the ideas of Ittersum, Pennings, Wansink and van Trijp (2007), who state that importance is a multi-attribute concept which consists of salience, relevance and determinance, this works via these colours therefore being considered more relevant regarding health and therefore also more determinant.

Besides that, this study showed that saturated fat and sugar are the most determinant nutrients of the MTL label when Dutch adult consumers judge the healthfulness of food products by using the MTL label, followed by fat and salt. The fact that saturated fat has been found to be one of the two most determinant nutrients of the MTL label is in line with previous research (Balcombe, Fraser & Falco, 2009; Hieke & Wilcynski, 2011; Scarborough et al., 2015). In all three studies either fat or saturated fat was found to be one of the two most determinant nutrients. However, in none of the three studies and in the present study, the same two nutrients were found to be most determinant. In the study of Balcombe, Fraser and Falco (2009), it was found that salt and saturated fat are most

determinant, in the study of Hieke and Wilcynski (2011) this were sugar and fat and in the study of Scarborough et al. (2015) this were saturated fat and salt. Yet, this study may give an explanation for these ambiguous results, as this study has also shown that the determinance of the various nutrients of the MTL label depends on how important consumers consider the various nutrients of the MTL label regarding health, which differs between individuals. Besides that, this study has shown that food product category influences the way Dutch adult consumers use the MTL label in judging the healthfulness of food products and it may be that the determinance of the different nutrients in how consumers judge the healthfulness of food products using the MTL label is influenced by the food product category.

Regarding the importance of the various nutrients with respect to health, it was found that Dutch adult consumers in general consider saturated fat to be most important regarding health, followed by sugar, salt and fat. In general, this is in line with the determinance of the different nutrients in how Dutch adult consumers judged the healthfulness of food products, in which saturated fat and sugar were most determinant, however, followed by fat and finally salt. Moreover, it is in contrast to what was found in the study of Balcombe, Fraser and Falco (2009). In this study, it was namely found that consumers from the United Kingdom consider saturated fat and salt to be most important regarding health, followed by fat and sugar. This may (partly) explain the difference in results found in this study compared to the study of Balcombe, in which salt and saturated fat are the two most determinant nutrients when consumers from the United Kingdom judged the healthfulness of a basket of food products and may therefore also explain the differences found in the three studies.

A possible explanation of, how important the respondents considered the various nutrients of the MTL label to be regarding health, differing between the different studies, is the difference in demographic characteristics. It was expected that for example, the difference in the ages of the samples used in the three studies could explain the ambiguous results. However, although differences were found in perceived importance of the various nutrients of the MTL label regarding health with respect to demographic characteristics, these findings do not explain the ambiguous results of the three studies. It was for example not found that people from older age groups consider salt to be more important respectively to the other nutrients, compared to people from lower age groups. However, what was found is that women consider sugar to be more important regarding health, compared to men. Furthermore, it was found that older age groups consider all the nutrients to be more important regarding health. Besides that, it was found that people with a lower education and without a background in nutrition consider fat to be more important regarding health compared to people with a higher education and without a background in nutrition. This can possibly be explained by people with a higher education level and people with a background in nutrition better understanding the difference between fat and saturated fat and therefore consider saturated fat to be more important compared to fat. Moreover, it was found that people who have a background in nutrition consider salt to be more important regarding health compared to people who do not have a background in nutrition. Finally, it was found that people who have pre-teenage children living at home consider sugar to be more important regarding health compared to people who do not have pre-teenage children living at home. Possibly, the differences in importances of the different nutrients between the present study and the study of Balcombe, Fraser and Falco (2009), is thus the difference in countries, which can for example be caused by public health campaigns having addressed different nutrients. Indeed, in the United Kingdom, different public health campaigns have addressed the negative health effects of high intake of salt.

Regarding the effect of food product category on the determinance of the various nutrients of the MTL label, this study indicates that possible nutrients become less determinant for which consumers do not expect it to be present (in high levels) in a food product and therefore more determinant for which consumers do expect it to be present (in high levels) in a food product. Looking back at the ideas of Guido (1998) this is possibly explained by specific nutrients being considered more relevant for a specific food product category compared to other nutrients. Because of this, the nutrients are more re-salient. Following then the ideas of Ittersum, Pennings, Wansink and van Trijp (2007), this would mean that these nutrients would also be considered more relevant and therefore more determinant. The way the three studies differed in their conclusion, can indeed be logically explained by the different food product categories that were used in the studies. It was found that in the study of Hieke and Wilcynski (2011), sugar and fat were most determinant in how consumers

judged the healthfulness of yoghurts, whereas in the studies of Balcombe, Fraser and Falco (2009) and Scarborough et al. (2015), saturated fat and salt were most determinant in how consumers judged the healthfulness of ready meals and a basket of food products including also ready meals and chicken burgers/pizzas, cake/crisps and cereal bars/breakfast cereals. When then looking at the results of this study, it can be found that Dutch adult consumers expect yoghurts to contain higher levels of fat than saturated fat and low levels of salt and expect pizzas to especially contain a lot of salt and hereafter a lot of saturated fat. Thus, it may indeed be that sugar and fat were found to be most determinant in how consumers judge the healthfulness of yoghurts, as this are the nutrients that consumers expect to be present in yoghurts, and salt and saturated fat in how consumers judge the healthfulness of food product categories of which consumers expect these nutrients to be present, for example pizza. Moreover, the perceived importances of the different nutrients of the MTL label regarding health were only exactly the same as the determinance of the various nutrients of the MTL label when the participants judged the healthfulness of cookies. As this was the only food product category for which the participants expected all the nutrients to be present in high levels, this also provides support for this explanation.

5.2. Limitations

A first limitation of this study is that the sample that was used was not a completely representative sample. The sample consisted of a relatively large number of women, rather young people and rather highly educated people. Besides that, people with pre-teenage children were under-represented in the sample, while people with a background in nutrition were probably overrepresented. However, since the relationships between these demographics and the variables of interest in this study were investigated, something can be said about it has probably influenced the results. When more men would have been included in the study for example, sugar probably would have been less determinant. When more people with a lower education would have been included in the study, fat would probably have been more determinant, relative to saturated fat. When less people with a background in nutrition would have been included in the study, fat would have been more determinant relative to saturated fat as well as that salt would have been even less determinant. When more people with children would have been included in the study, probably sugar would have been even more determinant. Another example is that when elderly people would have been included in the study, the intention to use the MTL label when it would be implemented in the Netherlands would probably have been higher.

Second, clear differences exist between the study and real life. For example, rather simplistic labels were used in this study, as information on the levels of nutrients per serving was left out, while this is a requirement of the FSA (2007), as well as information on the GDA and calories, while this is often done in designs of MTL labels. However, this could influence how Dutch adult consumers use the MTL label. For example, the FSA (2007) recommends to look at the numerical information on the levels of nutrients per serving, with an equal number of red, amber and green colours. Moreover, it could have influenced, and probably increased, the perceived usefulness of the MTL label and could therefore have influenced, and probably increased, the intention of the respondents to take the MTL label into account in food choices. Another difference of this study compared to real life is that the MTL labels were randomly varied whereas nutrient levels are not independent of each other and not all MTL labels can exist for the different food product categories. For example, the levels of fat and saturated fat are related and as yoghurts do not contain high levels of salt, a yoghurt with a red colour for salt on the MTL label will in real life not exist. Probably, in real life therefore, the effect of food product categories will even be bigger. Another difference includes that in this study, the participants judged the healthfulness of food products in a food product category, whereas in real life, Dutch adult consumers would judge the healthfulness of actual food products, with which maybe additional expectations would come, for example due to packaging, brand, price and/or health claims. Finally, in real life Dutch adult consumers would probably judge the healthfulness of food products from different food product categories within a single time span and not only from one food product category, as what was done in the experiment. It could for example be that when judging the healthfulness of food products from different food product categories, consumers develop one strategy (for example they always focus on limiting the number of red colours for fat and saturated fat),.

Third, a couple of limitations threat the measurement validity of this study. A first limitation is that in this study, salt was the only nutrient for which the right MTL label was overall healthier. For

fat, saturated fat and sugar, the left MTL label was overall healthier and accordingly, in total, the left MTL label was chosen in 64% of the cases. It could therefore be that salt was more often sacrificed and therefore its determinance decreased, whereas this would not be the case with different choice sets. Indeed, it was found that consumers consider saturated fat to be most important regarding health, followed by sugar and salt, with fat being the considered the least important, so that would have been also the order in determinance when different choice sets were presented to the participants. Moreover, this could explain why salt for example in the bread condition did not became one of the most determinant nutrients. Another limitation is that, although it was quantitatively tested whether food product category influences the way that Dutch adult consumers use the MTL label in judging the healthfulness of food products and it was found that this is the case, this finding was followed by only a qualitative analysis. Because of this, it could not be said with certainty whether this was because food product category influences the determinance of the different colours and/or of the different nutrients in how consumers judge the healthfulness of food products using the MTL label. Besides that, it could also not be said with certainty how food product category would potentially influence the determinance of the different colours and the different nutrients, as this was also only done by qualitatively comparing the expectations towards the food product categories and the found difference in importances of the colours and nutrients between the different food product categories. A third limitation is that some consumer groups were underrepresented, so that possibly a lot of effects were not found only because of this underrepresentation. For example, only 66 people who have pre-teenage children living at home were included in the study. A fourth limitation is that the questions on the determinants of label use were all self-reported questions, which threatens the internal validity of the study, as with self-reported questions social desirable answers are a problem. Therefore, the perceived importance of healthy eating, the perceived importance of receiving nutrition information, perceived ease of use and perceived usefulness of the MTL label, intention to take the MTL label into account in food choices and the expected effect of the MTL label on the healthfulness of food choices possibly have been rated slightly higher due to social bias. Besides that, intention to perform a certain behaviour is not necessarily reflected in actually performing that behaviour. Most often, intention is higher than actual behaviour, as actual behaviour is more complicated. Indeed, in a study of Rayner, Boaz and Higginson (2001), it was found that actual use of nutrition labels is less than self-reported use.

Finally, a couple of elements have not been included in this study. First, although importance of healthy eating was measured, it was not measured how important the participants consider healthfulness relative to other possible choice criteria for choosing food products, such as price, taste and convenience. However, it may be that this is where an important difference lies: it may be that everyone considers health and healthy eating important, but that there are differences when they are asked how important they consider it relative to other choice criteria. It could be expected that this influences even more the intention to use the MTL label compared to only the perceived importance of healthy eating and the perceived importance to receive nutrition information. Moreover, it could be expected that it influences the expected effect on the MTL on the healthfulness of food choices and may be an important mediator between the relationship of using a MTL label and also making more healthful food choices. Second, regarding attitude towards the MTL label, only perceived ease of use of the label and perceived usefulness of the MTL label were taken into account. However, another important element of people's attitudes towards FOP labels may be credibility. A previous research found that in general consumers consider doctors, dieticians, friends and relatives to be more credible than FOP labels, so that they are also more interested in getting nutrition information from them (van Dillen et al., 2003). Moreover, one of the reasons that the choices logo has been removed was because the trust of the public was lacking as companies should pay money in order to be able to put the label on the packaging of their food products. Third, attention was not taken into account in this study, whereas it is an important determinant of label use. For example, in a study of Steenhuis, van Assema, van Breukelen and Glanz (2004), a new FOP label was introduced in Dutch supermarkets supported by an educational campaign. However, only 50% of the consumers had noticed the intervention and only 25% had noticed the labels. Fourth, this study did not take into account the influence of food product category on the intention to take the MTL label into account in food choices. However, previous research has shown that this differs between food product categories. It was for example found that consumers generally consider nutrition information to be less relevant for fresh food

products like fruits, vegetables and meat and for products that are regarded as a treat, also called 'indulgence products', like chocolate (Grunert & Wills, 2007). In the same review, it was concluded that most interest in nutrition information is regarding processed products that have a low degree of transparency such as ready meals. Besides that, it was found that consumers consider nutrition information to be important for food products with a healthy image such as yoghurt (Grunert, Wills & Fernandez-Celemin, 2010). Yet, this study may provide an explanation for this, as it was found that consumers expect larger difference to exist between healthy food products compared to unhealthy food products, which would make use of the MTL labels for healthy food products more useful.

5.3. Suggestions for practice

The results of this study contribute to the debate on whether implementing MTL labels in Dutch supermarkets in the Netherlands would increase the healthfulness of food choices of Dutch adult consumers. Although the measurements used are self-reported measures, this study indicates that when the MTL label would be implemented in the Netherlands, Dutch adult consumers would take it into account and also expect it to influence their food choices. Although the results of this study indicate that younger age groups are less likely to use the MTL label when it would be implemented in the Netherlands compared to older age groups, this may not threat the effect of the MTL label on the healthfulness of Dutch consumers since the older age groups display a higher prevalence of non-communicable diseases and on average have a higher BMI.

Besides that, this study provides insights into how the use of the MTL label, and therefore also other FOP labels, can be increased. It was found that usage of a FOP label is a question of importance of receiving nutrition information together with the perceived usefulness and perceived ease of use of a FOP label. Therefore, when wanting to increase the use of a FOP label, the focus should be on increasing people's interests in receiving nutrition information, together with increasing the perceived usefulness and perceived ease of use of the label. Increasing people's interests in receiving nutrition information can be done by increasing people's perceived importances of healthy eating. However, increasing people's perceived importances of healthy eating is a difficult one. A lack of perceived importance of healthy eating may mainly be because of consumers preferring the immediate benefits of a tasteful food product over the long-term benefits of a nutritious product (Verbeke, 2006), so that the challenge is to combine both. What may help is to decrease the perceived trade-off between taste and health, which could for example be done via product reformulations. Increasing the perceived usefulness of the label can be done by increasing the perceived ease of use of the label and this can be done, when implementing the MTL label, providing educational campaigns with it that increase the ease of use of the MTL label. Furthermore, the perceived usefulness of the MTL label may be higher when the MTL label is implemented together with information on GDA, and probably also when implemented together with numerical information on the levels of nutrients per serving and calorie content. This as in the study of Tesco (2006a), the participants agreed more with the statement "gives me all the information I need" regarding a label that only contains GDA information, compared to the MTL label without this information.

The results of this study can also help increase the effect of the MTL label, or of other FOP labels, on the healthfulness of food choices. As it was found that Dutch adult consumers put most emphasis on the nutrients saturated fat and sugar, increasing the effect of the MTL label on the healthfulness of food choices should especially be focussed on increasing the perceived importance of the nutrients fat and salt regarding health. This could for example be done by educational campaigns or by highlighting these nutrients more on the MTL label. To increase the effect of other FOP labels, a suggestion would be to at least include information on saturated fat and sugar, as participants consider these nutrients to be most important in judging the healthfulness of food products. Besides that, a more general suggestion would be to leave room for interpretation with respect to FOP labels, as people have different ideas about the importance of nutrients regarding health.

Finally, from this study, conclusions can be drawn, which can be used by the food industry. When the MTL label would be implemented in the Netherlands, a suggestion for the food industry would be to especially try to reduce the number of red colours of the MTL label on their food products or on new food products that they are developing and especially try to do this for saturated fat and sugar. However, the results of this study also indicate that it may that food product category influences how important Dutch adult consumers consider the different colours and the various nutrients of the

MTL label in judging the healthfulness of food products by using the MTL label. It may be that for food products that are perceived to be relatively unhealthy, the green colour is more determinant relative to the amber colour and that for food products that are perceived to be relatively healthy, the amber colour is more determinant relative to the green colour. Therefore, it would especially be important to reduce the number of amber colours for healthy products and increase the number of green colours for unhealthy products. Besides that, it may be that, especially nutrients are determinant of which consumers expect them to be present (in high levels) in a food product. Therefore, a final suggestion would be to especially try to reduce the red and amber colours for nutrients for which consumers expect them to be present in a food product.

5.4. Suggestions for future research

A first suggestion for future research regarding use of FOP labels would be to be keep a distinction between consumers taking a FOP label into account in food choices and consumers making healthier food choices because of a FOP label. Besides that, a suggestion would be to be aware of the food product category that is used. More concrete, this would mean that it is important to think about what kind of food product category you are using, as it can influence how consumers judge the healthfulness of food products. Based on this research, the suggestion would be to choose a food product category for which consumers expect all the different nutrients to be present in high levels, such as cookies. Not using a particular food product category may not be desirable as it was found that consumers do have expectations towards food products in supermarkets and this may translate in the determinance of the different nutrients in how consumers judge the healthfulness of food products using the MTL label. Moreover, although using a food product category instead of particular food products already threatens the external validity of the study, this would be even more when no food product category would be used.

Second, the same research could be repeated but then with a different design of the choice-based conjoint analysis, in which salt would not be the only nutrient which is more healthful in one of the two MTL labels while the percentage of people choosing for the left and the right MTL label not being the same. This should be done in order to test the low determinance of salt for Dutch adult consumers using the MTL label. Second, the same research could be done, but then it should be followed by quantitative analysis on the effect of food product category on the determinance of the different colours and the different nutrients in how consumers judge the healthfulness of food products using the MTL label. Third, the same research could be done but then trying to reach an even larger diversity in the sample regarding demographic characteristics, so that even more analysis can be done and more valuable insights can be gained.

Third, research could elaborate on this research by researching how Dutch adult consumers would use the numerical information on nutrient levels per serving and possibly also information on GDA and information on the number of calories on the MTL label. Moreover, it could be researched whether the valuation of healthfulness among other choice criteria, indeed moderates the relationship between having the intention to take the MTL label into account in food choices and the expected effect on the healthfulness of food choices. Third, it could be researched more in depth what the attitude is towards the MTL of Dutch adult consumers, since in this research only perceived ease of use and perceived usefulness of the MTL label were taken into account. For example, it could be that credibility is also an important factor regarding attitude of the MTL label. Fourth, only one question was asked to determine perceived ease of use and only one question was asked to determine perceived usefulness of the MTL label and the participants were not further asked for any explanation. However, it could be that the participants missed information and therefore the perceived usefulness of the MTL label could be increased. It could for example be that the participants missed information on qualifying nutrients (such as vitamins and minerals), as the MTL label only provides information on disqualifying nutrients (such as fat, saturated fat, sugar and salt). Therefore, more research could be conducted to find out what determines the perceived usefulness of the MTL label. Fifth, attention could be included in another research. Sixth, research could include the influence of food product category on whether consumers use a MTL label. Finally, research could elaborate more on this research by finding out what determines how important people consider it to receive nutrition information. This as it was found that perceived importance of healthy eating only explains 12.9% of the variance in the perceived importance of receiving nutrition information.

A final, but also most important suggestion, is to conduct a research on whether consumers would use and how they would use the MTL label when this would be implemented in the Netherlands, in a real-life setting, for example by introducing the MTL label in a supermarket in the Netherlands. In the review of Grunert and Wills (2007) it was already mentioned that there is an urgent need for more research that studies consumer use of nutritional information on food labels in real world settings.

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Appendices

I. Table including previous studies on way of use of the MTL label

Table 12. Studies that have researched the effect of the MTL label on difference in perceived healthfulness of food products previously

Study	Country	Food product	Sample characteristics	Sample size	Method	Dependent variable	Selection of MTL labels	Design	Explanation of MTL	Descriptive questions	Conclusion
Balcombe, Fraser and Falco (2009)	United Kingdom	Basket of food products containing ready meals, chicken burgers/pizza, pasta ready meals/curry ready meals, cake/crisps and cereal bars/breakfast cereal	Households; average of 48 years; 81% females; differences in education level	477	Online survey including choice experiment (6 choice tasks with 3 options and a 'don't know' option)	Consumer's WTP for reductions in the nutrients in the TLS	Developed the set of attributes by presenting a number of draft choice cards to a small group of participants	Full factorial design yielding 24 choice sets which were blocked into four groups of six	The MTL was explained using a textual explanation	Age, income, gender, marital status, number of children in household, educational achievement, employment status, health consciousness, food label use, raking of nutrients their importance in terms of wellbeing	UK consumers have a strong preference to reduce the quantity of any nutrients associated with a red light and are mostly concerned with salt and saturated fats.
Hieke and Wilczynski (2011)	Germany	Yoghurt	Students; 70% between 18 and 24 years old; 69% females; mainly high level of education	2002	Online survey including a choice experiment (nine choice tasks with 3 options and a no-choice option)	Consumer's preferences of products when being interested in selecting the healthiest alternative based only on the information of the MTL label	Random variation of stimuli	Reduced orthogonal design	The MTL was explained using pictorial examples	Nutrition knowledge, awareness of a healthy diet's importance, self-reported use of nutrition labels, perceived usefulness of MTL label before and after the experiment, intention to take the MTL label into consideration in actual buying situations, gender, age, education level and number of persons and children living in the household	Consumers mainly focus on avoiding sugar and fats and a shift from amber to red leads to a higher loss of utility compared to a shift from green to amber.
Scarborough et al. (2015)	United Kingdom	Ready meals	Supermarket shoppers; more than 80% over the age of 45; 62% female; 54% were educated to degree level or higher	187	Online survey including a choice experiment (20 choice tasks with 2 options)	Consumers choice of which MTL label represents the healthier food	The MTL labels were designed to cover the full range of nutritional quality of ready meals as identified in an audit of 373 ready meals in a large supermarket in the UK	Ecological design yielding 25 labels and 300 pairwise comparisons	The MTL was not explained	Age, sex, ethnicity, socio-economic status, nutrition literacy (general health interest and subjective nutrition knowledge)	UK supermarket shoppers put most emphasis on saturated fat and salt and consider avoidance of red lights being more important than the selection of green lights.

II. Table including previous studies on way of use of the MTL label and the present study

Table 13. Studies that have researched the effect of the MTL label on difference in perceived healthfulness of food products previously and the present study

Study	Country	Food product	Sample characteristics	Sample size	Method	Dependent variable	Selection of MTL labels	Design	Explanation of MTL	Descriptive questions	Conclusion
Balcombe, Fraser and Falco (2009)	United Kingdom	Basket of food products containing ready meals, chicken burgers/pizza, pasta ready meals/curry ready meals, cake/crisps and cereal bars/breakfast cereal	Households; average of 48 years; 81% females; differences in education level	477	Online survey including choice experiment (6 choice tasks with 3 options and a 'don't know' option)	Consumer's WTP for reductions in the nutrients in the TLS	Developed the set of attributes by presenting a number of draft choice cards to a small group of participants	Full factorial design yielding 24 choice sets which were blocked into four groups of six	The MTL was explained using a textual explanation	Age, income, gender, marital status, number of children in household, educational achievement, employment status, health consciousness, food label use, raking of nutrients their importance in terms of wellbeing	UK consumers have a strong preference to reduce the quantity of any nutrients associated with a red light and are mostly concerned with salt and saturated fats.
Hieke and Wilczynski (2011)	Germany	Yoghurt	Students; 70% between 18 and 24 years old; 69% females; mainly high level of education	2002	Online survey including a choice experiment (nine choice tasks with 3 options and a no-choice option)	Consumer's preferences of products when being interested in selecting the healthiest alternative based only on the information of the MTL label	Random variation of stimuli	Reduced orthogonal design	The MTL was explained using pictorial examples	Nutrition knowledge, awareness of a healthy diet's importance, self-reported use of nutrition labels, perceived usefulness of MTL label before and after the experiment, intention to take the MTL label into consideration in actual buying situations , gender, age, education level and number of persons and children living in the household	Consumers mainly focus on avoiding sugar and fats and a shift from amber to red leads to a higher loss of utility compared to a shift from green to amber.
Scarborough et al. (2015)	United Kingdom	Ready meals	Supermarket shoppers; more than 80% over the age of 45; 62% female; 54% were educated to degree level or higher	187	Online survey including a choice experiment (20 choice tasks with 2 options)	Consumers choice of which MTL label represents the healthier food	The MTL labels were designed to cover the full range of nutritional quality of ready meals as identified in an audit of 373 ready meals in a large supermarket in the UK	Ecological design yielding 25 labels and 300 pairwise comparisons	The MTL was not explained	Age, sex, ethnicity, socio-economic status, nutrition literacy (general health interest and subjective nutrition knowledge)	UK supermarket shoppers put most emphasis on saturated fat and salt and consider avoidance of red lights being more important than the selection of green lights.
New study	The Netherlands	Bread, pizza, yoghurt, cookies and food products in general	Dutch adult consumers	610	Online survey including a choice experiment (18 choice-tasks with 2 options)	Consumers choice of which MTL label represents the healthier food	Random variation of stimuli	D-efficient design with excluding MTL labels coming into a choice set that were too different	The MTL was explained using pictorial examples and a textual explanation	Gender, age, education, culture, pre-teenage children living at home, BMI, importance of nutrients regarding health, importance of healthy eating, current daily dietary pattern, subjective nutrition	Dutch adult consumers, when using the MTL label, focus most on the red colour of the MTL label and on the nutrients saturated fat and

										knowledge, understanding effect nutrients on health, understanding difference fat and saturated fat, background in nutrition, expectations regarding healthfulness of food product categories, expectations regarding levels of nutrients in food product categories, importance of receiving nutrition information, perceived usefulness of the MTL label, perceived ease of use of the MTL label, intention to take the MTL label into account in food choices, expected effect of the MTL label on the healthfulness of food choices	sugar. However, it was found that this is dependent on food product category and how important the various nutrients of the MTL label are considered regarding health

III. Online survey

INTRODUCTION
Beste meneer/mevrouw,

Super fijn dat u mij wilt helpen met mijn afstudeeronderzoek!

Deze vragenlijst gaat over een nieuw gezondheidslabel voor op voedselverpakkingen genaamd "het stoplichtensysteem". Het doel van deze vragenlijst is om te achterhalen hoe consumenten dit label gebruiken.

De vragenlijst begint met een uitleg van het label en een voorbeeldvraag. Hierna volgen 18 vragen waarin u gevraagd wordt het label te gebruiken bij het maken van gezonde voedselkeuzes. De vragenlijst eindigt met een aantal afsluitende vragen.

Ik zou u willen vragen de vragenlijst helemaal tot het einde in te vullen. Op deze manier weet ik zeker dat ik uw data kan gebruiken. Het invullen van de vragenlijst duurt ongeveer 15 minuten.

Onder de deelnemers verloot ik drie VVV-bonnen ter waarde van €10,-. Wanneer u aan deze loting mee wilt doen, kunt u op het einde uw e-mailadres achterlaten.

De resultaten zullen alleen gebruikt worden voor dit onderzoek en de antwoorden blijven anoniem. Door op 'volgende' te klikken, geeft u aan dat u het bovenstaande hebt gelezen en hiermee instemt.

Alvast heel erg bedankt!
Chantal

EXPLANATION OF MTL LABEL
Pagina 1/10
Hieronder ziet u twee voorbeelden van het stoplichtensysteem. De labels vertegenwoordigen ieder een eigen product (product 1 en product 2). Het label is ontworpen door een onafhankelijke instantie in Engeland en zal mogelijk ook geïntroduceerd worden in supermarkten in Nederland. Het label zal hierbij op de voorkant van verpakkingen van voedselproducten worden geplaatst.
Het label geeft met drie kleuren (rood, oranje en groen) aan hoeveel vet, verzadigd vet, suiker en zout er per 100 gram in een product zit. Rood betekent dat er relatief veel van het nutriënt in het product zit, oranje gemiddeld en groen, weinig. Hierdoor kunt u producten met elkaar vergelijken op de mate van gezondheid.

INSTRUCTIONS EXPERIMENT (PIZZA CONDITION)
Pagina 2/10

Lees onderstaande instructie en beantwoord daarna onderstaande voorbeeldvraag.

Beeld uzelf in dat u in de supermarkt boodschappen aan het doen bent en op zoek bent naar een gezonde pizza. Klik op het label dat volgens u de meest gezonde pizza vertegenwoordigt. Er is hierbij geen goed of fout: ik ben geïnteresseerd in uw keuzes.

Wanneer u op een label klikt, zal het label groen oplichten. U kunt maar één label aanklikken. Wanneer volgens u beide labels een even gezond pizza vertegenwoordigen, klik dan willekeurig op één van de twee labels.

Voorbeeldvraag.

Geef aan welke pizza volgens u het meest gezond is

Terug | Volgende

INSTRUCTIONS EXPERIMENT (BREAD CONDITION)
Pagina 2/10

Lees onderstaande instructie en beantwoord daarna onderstaande voorbeeldvraag.

Beeld uzelf in dat u in de supermarkt boodschappen aan het doen bent en op zoek bent naar een gezond brood. Klik op het label dat volgens u het meest gezonde brood vertegenwoordigt. Er is hierbij geen goed of fout: ik ben geïnteresseerd in uw keuzes.

Wanneer u op een label klikt, zal het label groen oplichten. U kunt maar één label aanklikken. Wanneer volgens u beide labels een even gezond brood vertegenwoordigen, klik dan willekeurig op één van de twee labels.

Voorbeeldvraag.

Geef aan welk brood volgens u het meest gezond is

Terug | Volgende

INSTRUCTIONS EXPERIMENT (YOGHURT CONDITION)
Pagina 2/10

Lees onderstaande instructie en beantwoord daarna onderstaande voorbeeldvraag.

Beeld uzelf in dat u in de supermarkt boodschappen aan het doen bent en op zoek bent naar een gezonde yoghurt. Klik op het label dat volgens u de meest gezonde yoghurt vertegenwoordigt. Er is hierbij geen goed of fout: ik ben geïnteresseerd in uw keuzes.

Wanneer u op een label klikt, zal het label groen oplichten. U kunt maar één label aanklikken. Wanneer volgens u beide labels een even gezonde yoghurt vertegenwoordigen, klik dan willekeurig op één van de twee labels.

Voorbeeldvraag.

Geef aan welke yoghurt volgens u het meest gezond is

Terug | Volgende

INSTRUCTIONS EXPERIMENT (COOKIES CONDITION)
Pagina 2/10

Lees onderstaande instructie en beantwoord daarna onderstaande voorbeeldvraag.

Beeld uzelf in dat u in de supermarkt boodschappen aan het doen bent en op zoek bent naar een gezond koekje. Klik op het label dat volgens u het meest gezonde koekje vertegenwoordigt. Er is hierbij geen goed of fout: ik ben geïnteresseerd in uw keuzes.

Wanneer u op een label klikt, zal het label groen oplichten. U kunt maar één label aanklikken. Wanneer volgens u beide labels een even gezond koekje vertegenwoordigen, klik dan willekeurig op één van de twee labels.

Voorbeeldvraag.

Geef aan welk koekje volgens u het meest gezond is

Terug | Volgende

INSTRUCTIONS EXPERIMENT (CONTROL CONDITION)
Pagina 2/10

Lees onderstaande instructie en beantwoord daarna onderstaande voorbeeldvraag.

Beeld uzelf in dat u in de supermarkt boodschappen aan het doen bent en op zoek bent naar gezonde voedingsproducten. Klik op het label dat volgens u het meest gezonde voedingsproduct vertegenwoordigt. Er is hierbij geen goed of fout: ik ben geïnteresseerd in uw keuzes.

Wanneer u op een label klikt, zal het label groen oplichten. U kunt maar één label aanklikken. Wanneer volgens u beide labels een even gezond voedingsproduct vertegenwoordigen, klik dan willekeurig op één van de twee labels.

Voorbeeldvraag.

Geef aan welk voedingsproduct volgens u het meest gezond is

Terug | Volgende

QUESTIONS OF CHOICE EXPERIMENT

Pagina 3/10

Nu volgen de afsluitende vragen.

DEVICE USED TO FILL IN THE QUESTIONNAIRE
Wat voor een elektronisch apparaat gebruikt u voor het invullen van deze vragenlijst?
- ☐ Computer/laptop
- ☐ Tablet
- ☐ Mobiele telefoon

STRATEGY USED IN THE CHOICE EXPERIMENT (PIZZA CONDITION)
Op welke manier heeft u de 18 vragen beantwoord? Klik ALLE opties aan die van toepassing zijn.
- ☐ Ik heb mijn keuzes gebaseerd op het aantal groene/oranje/rode kleuren
- ☐ Ik heb in mijn keuzes meegenomen hoe belangrijk ik de verschillende nutriënten vind voor gezondheid
- ☐ Ik heb in mijn keuzes, de verwachtingen die ik heb ten aanzien van pizza, meegenomen
- ☐ Anders, namelijk…

When the third option was selected, the question below was presented to the participant.

Hoe heeft u in uw keuzes, de verwachtingen die u heeft ten aanzien van voedingsproducten die in supermarkten verkocht worden, meegenomen? Klik ALLE opties aan die van toepassing zijn.
- ☐ Ik lette vooral op de nutriënten waarvan ik verwacht dat ze hoog zijn in pizza
- ☐ Ik lette vooral op de nutriënten waarvan ik NIET verwacht dat ze hoog zijn in pizza
- ☐ Ik heb mijn keuzes gebaseerd op de nutriënten waarvan ik verwacht dat ze het meest verschillen tussen pizza's.
- ☐ Anders, namelijk…

STRATEGY USED IN THE CHOICE EXPERIMENT (BREAD CONDITION)
Op welke manier heeft u de 18 vragen beantwoord? Klik ALLE opties aan die van toepassing zijn.
- ☐ Ik heb mijn keuzes gebaseerd op het aantal groene/oranje/rode kleuren
- ☐ Ik heb in mijn keuzes meegenomen hoe belangrijk ik de verschillende nutriënten vind voor gezondheid
- ☐ Ik heb in mijn keuzes, de verwachtingen die ik heb ten aanzien van brood, meegenomen
- ☐ Anders, namelijk…

When the third option was selected, the question below was presented to the participant.

Hoe heeft u in uw keuzes, de verwachtingen die u heeft ten aanzien van voedingsproducten die in supermarkten verkocht worden, meegenomen? Klik ALLE opties aan die van toepassing zijn.
- ☐ Ik lette vooral op de nutriënten waarvan ik verwacht dat ze hoog zijn in brood
- ☐ Ik lette vooral op de nutriënten waarvan ik NIET verwacht dat ze hoog zijn in brood
- ☐ Ik heb mijn keuzes gebaseerd op de nutriënten waarvan ik verwacht dat ze het meest verschillen tussen broden
- ☐ Anders, namelijk…

STRATEGY USED IN THE CHOICE EXPERIMENT (COOKIES CONDITION)
Op welke manier heeft u de 18 vragen beantwoord? Klik ALLE opties aan die van toepassing zijn.
- ☐ Ik heb mijn keuzes gebaseerd op het aantal groene/oranje/rode kleuren
- ☐ Ik heb in mijn keuzes meegenomen hoe belangrijk ik de verschillende nutriënten vind voor gezondheid
- ☐ Ik heb in mijn keuzes, de verwachtingen die ik heb ten aanzien van koekjes, meegenomen
- ☐ Anders, namelijk…

When the third option was selected, the question below was presented to the participant.

Hoe heeft u in uw keuzes, de verwachtingen die u heeft ten aanzien van voedingsproducten die in supermarkten verkocht worden, meegenomen? Klik ALLE opties aan die van toepassing zijn.

- ☐ Ik lette vooral op de nutriënten waarvan ik verwacht dat ze hoog zijn in koekjes
- ☐ Ik lette vooral op de nutriënten waarvan ik NIET verwacht dat ze hoog zijn in koekjes
- ☐ Ik heb mijn keuzes gebaseerd op de nutriënten waarvan ik verwacht dat ze het meest verschillen tussen koekjes
- ☐ Anders, namelijk…

STRATEGY USED IN THE CHOICE EXPERIMENT (YOGHURT CONDITION)

Op welke manier heeft u de 18 vragen beantwoord? Klik ALLE opties aan die van toepassing zijn.

- ☐ Ik heb mijn keuzes gebaseerd op het aantal groene/oranje/rode kleuren
- ☐ Ik heb in mijn keuzes meegenomen hoe belangrijk ik de verschillende nutriënten vind voor gezondheid
- ☐ Ik heb in mijn keuzes, de verwachtingen die ik heb ten aanzien van yoghurt, meegenomen
- ☐ Anders, namelijk…

When the third option was selected, the question below was presented to the participant.

Hoe heeft u in uw keuzes, de verwachtingen die u heeft ten aanzien van voedingsproducten die in supermarkten verkocht worden, meegenomen? Klik ALLE opties aan die van toepassing zijn.

- ☐ Ik lette vooral op de nutriënten waarvan ik verwacht dat ze hoog zijn in yoghurt
- ☐ Ik lette vooral op de nutriënten waarvan ik NIET verwacht dat ze hoog zijn in yoghurt
- ☐ Ik heb mijn keuzes gebaseerd op de nutriënten waarvan ik verwacht dat ze het meest verschillen tussen yoghurts
- ☐ Anders, namelijk…

STRATEGY USED IN THE CHOICE EXPERIMENT (CONTROL CONDITION)

Op welke manier heeft u de 18 vragen beantwoord? Klik ALLE opties aan die van toepassing zijn.

- ☐ Ik heb mijn keuzes gebaseerd op het aantal groene/oranje/rode kleuren
- ☐ Ik heb in mijn keuzes meegenomen hoe belangrijk ik de verschillende nutriënten vind voor gezondheid
- ☐ Ik heb in mijn keuzes, de verwachtingen die ik heb ten aanzien van voedingsproducten die in supermarken verkocht worden, meegenomen
- ☐ Anders, namelijk…

When the third option was selected, the question below was presented to the participant.

Hoe heeft u in uw keuzes, de verwachtingen die u heeft ten aanzien van voedingsproducten die in supermarkten verkocht worden, meegenomen? Klik ALLE opties aan die van toepassing zijn.

- ☐ Ik lette vooral op de nutriënten waarvan ik verwacht dat ze hoog zijn in voedingsproducten die in supermarkten verkocht worden
- ☐ Ik lette vooral op de nutriënten waarvan ik NIET verwacht dat ze hoog zijn in voedingsproducten die in supermarkten verkocht worden
- ☐ Ik heb mijn keuzes gebaseerd op de nutriënten waarvan ik verwacht dat ze het meest verschillen tussen voedingsproducten die in supermarkten verkocht worden
- ☐ Anders, namelijk…

GENDER

Pagina 4/10

Wat is uw geslacht?

- ☐ Man
- ☐ Vrouw
- ☐ Anders

AGE
Wat is uw leeftijd?

EDUCATION LEVEL
Wat is uw hoogst genoten opleiding? (Wanneer u op dit moment een opleiding volgt, vul dan die opleiding in)

- ☐ Geen onderwijs
- ☐ Bassischool/lager onderwijs
- ☐ Lager beroepsonderwijs (LTS, LEAO, VBO, huishoudschool)
- ☐ Middelbaar algemeen onderwijs (VMBO, MAVO, MULO, MMS)
- ☐ Middelbaar beroepsonderwijs (MBO, MTS, MEAO)
- ☐ Voorbereidend hoger onderwijs (HAVO, VWO, HBS)
- ☐ Hoger beroepsonderwijs (HBO, HTS)
- ☐ Wetenschappelijk onderwijs (WO, PHD)
- ☐ Anders, namelijk…

CULTURE
Met welke cultuur identificeert u zichzelf? Meerdere antwoorden aankruisen is mogelijk.

- ☐ De Nederlandse cultuur
- ☐ De Turkse cultuur
- ☐ De Indonesische cultuur
- ☐ De Duitse cultuur
- ☐ De Surinaamse cultuur
- ☐ De Poolse cultuur
- ☐ De Marokkaanse cultuur
- ☐ De Belgische cultuur
- ☐ Anders, namelijk…

PRE-TEENAGE CHILDREN LIVING AT HOME
Heeft u thuiswonende kinderen/een thuiswonend kind die 12 jaar is/zijn of jonger?

- ☐ Ja
- ☐ Nee

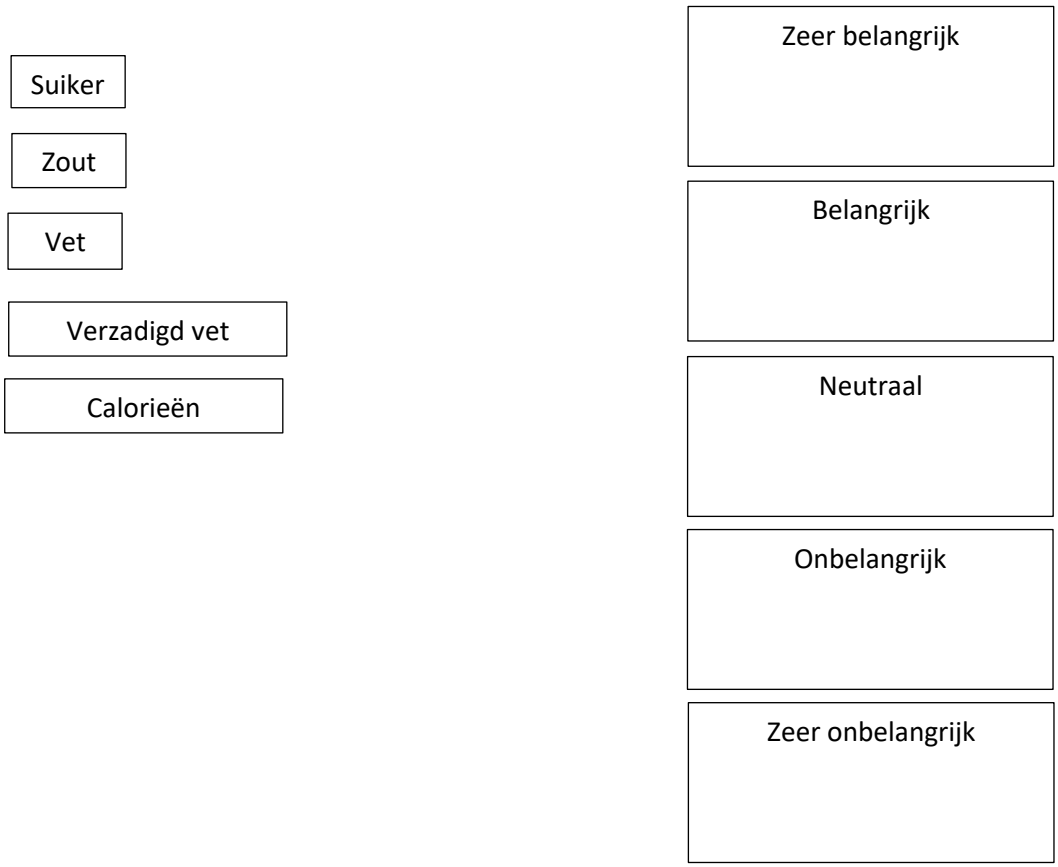
BMI
Om uw BMI te kunnen berekenen, zou ik graag uw lengte en gewicht willen weten. Wilt u deze vragen liever niet beantwoorden, dan kunt u ze natuurlijk overslaan.
Wat is uw lengte in centimeters?

Wat is uw gewicht in kilogram?

PERCEIVED IMPORTANCE OF NUTRIENTS REGARDING HEALTH
Pagina 5/10

Hoe belangrijk is het volgens u om verzadigd vet, vet, suiker, zout en calorieën te vermijden voor gezondheid?

Sleep alle onderstaande woorden naar de box waar u vindt dat ze het beste passen. U kunt meerdere woorden in één box zetten.



IMPORTANCE OF HEALTHY EATING

Pagina 6/10

Geef aan in hoeverre u het eens bent met onderstaande stellingen.

Gezondheid is voor mij belangrijk in mijn voedselkeuzes

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Ik kies altijd voedingsproducten die ik als gezond ervaar

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Ik laat gemakkelijk voedingsproducten staan die ik als ongezond beschouw

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

CURRENT DAILY DIETARY PATTERN

Maak de zin af.

In het dagelijks leven, probeer ik niet te veel te eten van…

Vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Suiker

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Zout

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Calorieën

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

SUBJECTIVE NUTRITION KNOWLEDGE

Pagina 7/10

Geef aan in hoeverre u het eens bent met onderstaande stellingen.

Ik weet veel over gezonde voeding

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Binnen mijn vriendenkring, ben ik één van de experts op het gebied van voeding

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

In vergelijking met andere mensen, weet ik minder over gezonde voeding

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

UNDERSTANDING OF NUTRIENTS AND CALORIES

Maak de zin af.

Voor mij is het duidelijk wat het effect is van … op gezondheid

Vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Suiker

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Zout

Zeer	Oneens	Beetje	Neutraal	Beetje	Eens	Zeer eens

oneens		oneens		eens		

Calorieën

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

UNDERSTANDING OF DIFFERENCE BETWEEN FAT AND SATURATED FAT

Geef aan in hoeverre u het eens bent met onderstaande stellingen.

Ik begrijp het verschil tussen vet en verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Er zit een verschil tussen vet en verzadigd vet wat betreft gezondheid

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

Verzadigd vet is gezonder dan onverzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

BACKGROUND IN NUTRITION

Heeft u een achtergrond in voeding (bijvoorbeeld een voedingsgerelateerde opleiding of een voedingsgerelateerde baan)?

- ☐ Ja
- ☐ Nee

INSTRUCTIONS FURHTER QUESTIONS

Pagina 8/10

Lees, voordat u verdergaat, onderstaande instructies.

1. De labels waartussen u moest kiezen, zijn opgesteld voor dit experiment en zijn dus niet allemaal realistisch. Ik zou u daarom willen vragen, de informatie van de labels, niet mee te nemen bij het beantwoorden van onderstaande vragen.
2. Ik zou graag willen benadrukken dat dit geen kennistoets is: ik ben echt geïnteresseerd in uw percepties en ideeën.
3. In onderstaande vragen wordt met "supermarkten", Nederlandse reguliere supermarkten zoals de Jumbo, de Albert Heijn en de Lidl bedoeld.

PERCEIVED HEALTHFULNESS OF FOOD PRODUCTS IN DUTCH SUPERMARKETS

Geef aan in hoeverre u het eens bent met onderstaande stellingen.

De voedingsproducten in supermarkten zijn over het algemeen gezond

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De gezondheidsverschillen tussen voedingsproducten in supermarkten zijn groot

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

PERCEIVED HEALTHFULNESS OF FOOD PRODUCT CATEGORIES

De pizza’s in supermarkten zijn over het algemeen gezond

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De gezondheidsverschillen tussen pizza's in supermarkten zijn groot

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De broden in supermarkten zijn over het algemeen gezond

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De gezondheidsverschillen tussen broden in supermarkten zijn groot

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De yoghurts in supermarkten zijn over het algemeen gezond

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De gezondheidsverschillen tussen yoghurts in supermarkten zijn groot

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De koekjes in supermarkten zijn over het algemeen gezond

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

De gezondheidsverschillen tussen koekjes in supermarkten zijn groot

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens

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PERCEPTIONS ABOUT THE LEVEL OF NUTRIENTS IN FOOD PRODUCTS IN DUTCH SUPERMARKETS

Pagina 9/10

Maak de zin af.

Over het algemeen zit/zitten er in voedingsproducten in supermarkten naar mijn idee veel...

Vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Suiker

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Zout

Zeer	Oneens	Beetje	Neutraal	Beetje	Eens	Zeer eens	Ik weet

oneens		oneens		eens			het niet

Calorieën

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Vul onderstaande vraag alleen in als u hier een duidelijke mening over heeft.
Een relatief gezond voedingsproduct, bevat vaak minder... dan andere voedingsproducten. Meerdere antwoorden aankruisen is mogelijk.

- ☐ Vet
- ☐ Verzadigd vet
- ☐ Suiker
- ☐ Zout
- ☐ Calorieën

PERCEPTIONS ABOUT THE LEVEL OF NUTRIENTS IN PIZZA
Maak de zin af.

Over het algemeen zit/zitten er in pizza's in supermarkten naar mijn idee veel...

Vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Suiker

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Zout

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Calorieën

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Vul onderstaande vraag alleen in als u hier een duidelijke mening over heeft.
Een relatief gezonde pizza, bevat vaak minder... dan andere pizza's. Meerdere antwoorden aankruisen is mogelijk.

- ☐ Vet
- ☐ Verzadigd vet
- ☐ Suiker
- ☐ Zout
- ☐ Calorieën

PERCEPTIONS ABOUT THE LEVEL OF NUTRIENTS IN BREAD
Maak de zin af.

Over het algemeen zit/zitten er in broden in supermarkten naar mijn idee veel...

Vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Suiker

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Zout

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Calorieën

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Vul onderstaande vraag alleen in als u hier een duidelijke mening over heeft.
Een relatief gezond brood, bevat vaak minder... dan andere broden. Meerdere antwoorden aankruisen is mogelijk.

- ☐ Vet
- ☐ Verzadigd vet
- ☐ Suiker
- ☐ Zout
- ☐ Calorieën

PERCEPTIONS ABOUT THE LEVEL OF NUTRIENTS IN YOGHURT
Maak de zin af.

Over het algemeen zit/zitten er in yoghurts in supermarkten naar mijn idee veel...

Vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Suiker

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Zout

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Calorieën

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Vul onderstaande vraag alleen in als u hier een duidelijke mening over heeft.
Een relatief gezonde yoghurt, bevat vaak minder... dan andere yoghurts. Meerdere antwoorden aankruisen is mogelijk.

- ☐ Vet
- ☐ Verzadigd vet
- ☐ Suiker
- ☐ Zout
- ☐ Calorieën

PERCEPTIONS ABOUT THE LEVEL OF NUTRIENTS IN COOKIES
Maak de zin af.

Over het algemeen zit/zitten er in koekjes in supermarkten naar mijn idee veel...

Vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Verzadigd vet

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Suiker

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Zout

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Calorieën

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Vul onderstaande vraag alleen in als u hier een duidelijke mening over heeft.
Een relatief gezond koekje, bevat vaak minder... dan andere koekjes. Meerdere antwoorden aankruisen is mogelijk.

- ☐ Vet
- ☐ Verzadigd vet
- ☐ Suiker
- ☐ Zout
- ☐ Calorieën

PERCEIVED IMPORTANCE OF RECEIVING NUTRITION INFORMATION
Pagina 10/10

Geef aan in hoeverre u het eens bent met onderstaande stelling

Ik vind het belangrijk om informatie te krijgen over de gezondheid van voedingsproducten

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

Geef aan in hoeverre u het eens bent met onderstaande stellingen

PERCEIVED USEFULNESS OF MTL LABEL

Het stoplichtensysteem geeft de goede informatie voor het maken van gezonde voedingskeuzes

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

PERCEIVED EASE OF USE OF MTL LABEL

Het stoplichtensysteem is gemakkelijk te gebruiken bij het maken van gezonde voedingskeuzes

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

INTENTION TO USE THE MTL LABEL

Wanneer het stoplichtensysteem in Nederland geïntroduceerd zou worden, zou ik het meenemen bij het maken van voedingskeuzes

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

EXPECTED EFFECT OF MTL LABEL ON THE HEALTHFULNESS OF FOOD CHOICES

Wanneer het stoplichtensysteem in Nederland geïntroduceerd zou worden, zou dit mijn voedingskeuzes gezonder maken

Zeer oneens	Oneens	Beetje oneens	Neutraal	Beetje eens	Eens	Zeer eens	Ik weet het niet

---

CLOSING TEXT

Dit is het einde van de vragenlijst. Bedankt voor het invullen!
Mocht u mee willen doen aan de loting, waarbij ik drie VVV-bonnen ter waarde van €10,- verloot. Laat dan hieronder uw mailadres achter.

IV. Text to acquire participants for the study via Facebook, Linkedin and e-mail

FACEBOOK

Hoi allemaal! In september ben ik begonnen met mijn afstudeeronderzoek en ik sta op dit moment voor een grote uitdaging: ik zoek 500 mensen die mijn vragenlijst in willen vullen! Zou jij mij willen helpen? De vragenlijst gaat over gezondheidslabels en het invullen duurt ongeveer 15 minuten. Ik ben jullie eeuwig dankbaar!

Wanneer je op deze link klikt, ga je direct naar de vragenlijst:
https://wur.az1.qualtrics.com/jfe/form/SV_9YNNw9XFuNLSjC5

Ps. Als bedankje verloot ik onder iedereen die meedoet 3 VVV-bonnen van 10 euro!

LINKEDIN

Beste connecties,

Ik ben op dit moment bezig met mijn afstudeeronderzoek en ik sta voor een grote uitdaging: ik ben op zoek naar 500 personen die mijn vragenlijst in willen vullen. Zou jij/u mijn vragenlijst in willen vullen en/of dit bericht willen delen? De vragenlijst gaat over gezondheidslabels en het invullen van de vragenlijst duurt ongeveer 15 minuten. Hij is overigens wel in het Nederlands, omdat mijn doelgroep 'Nederlandse consumenten' zijn. Alvast heel erg bedankt!

link naar vragenlijst

E-MAIL

Titel: Afstudeeronderzoek Chantal

Beste iedereen,

Ik ben op dit moment bezig met mijn afstudeeronderzoek als onderdeel van de master ‘Management, Economics and Consumer Studies’ aan de universiteit van Wageningen. Voor dit onderzoek heb ik een vragenlijst opgesteld en ik sta voor een leuke uitdaging: ik ben op zoek naar 500 personen die mijn vragenlijst in willen vullen!

Mijn vraag is dus: zouden jullie mij willen helpen door mijn vragenlijst in te vullen? De vragenlijst gaat over gezondheidslabels en het invullen duurt ongeveer 15 minuten. Dit is de link naar de vragenlijst: https://wur.az1.qualtrics.com/jfe/form/SV_9YNNw9XFuNLSjC5

Ps. Mochten jullie nog meer mensen weten die mij misschien wel willen helpen, zouden jullie de mail of de link van vragenlijst dan door willen sturen? Belangrijk om te vermelden is wel dat de vragenlijst in het Nederlands is, omdat mijn doelgroep ‘Nederlandse consumenten’ zijn.

Alvast heel erg bedankt!

Groetjes,
Chantal

V. Choice sets of the choice-based conjoint experiment

Table 14. Choice sets (n = 18) that have been offered to the participants

Choice set	MTL label left						MTL label right				
	Fat	Saturated fat	Sugar	Salt	Calories*		Fat	Saturated fat	Sugar	Salt	Calories*
1	Green	Amber	Amber	Red	Amber		Amber	Red	Red	Green	Red
2	Green	Amber	Red	Red	Amber		Red	Red	Green	Amber	Red
3	Green	Green	Amber	Amber	Green		Red	Amber	Red	Green	Red
4	Green	Green	Green	Amber	Green		Red	Amber	Amber	Green	Red
5	Green	Red	Green	Red	Amber		Red	Amber	Amber	Amber	Red
6	Green	Green	Red	Green	Amber		Red	Red	Amber	Red	Red
7	Amber	Green	Amber	Green	Amber		Green	Red	Red	Amber	Amber
8	Green	Amber	Green	Amber	Green		Amber	Green	Red	Red	Amber
9	Red	Green	Amber	Red	Red		Amber	Amber	Green	Green	Amber
10	Green	Amber	Amber	Amber	Amber		Red	Red	Green	Red	Red
11	Amber	Red	Red	Red	Red		Red	Green	Green	Green	Amber
12	Amber	Red	Green	Amber	Amber		Green	Green	Red	Red	Amber
13	Amber	Amber	Green	Red	Amber		Red	Red	Red	Amber	Red
14	Red	Amber	Green	Red	Red		Amber	Green	Amber	Green	Amber
15	Amber	Amber	Red	Amber	Amber		Green	Red	Amber	Green	Amber
16	Amber	Red	Amber	Amber	Amber		Red	Green	Green	Green	Amber
17	Amber	Green	Green	Red	Amber		Green	Red	Red	Green	Amber
18	Green	Red	Amber	Green	Amber		Red	Green	Red	Amber	Red

*A colour-code for calories was only included in one of the five experimental conditions (the calories condition)

VI. Choice sets of the choice-based conjoint experiment including choices.

Table 15. Choice sets (n = 18) that have been offered to the participants including the percentages of people choosing the left or the right MTL label in the four experimental conditions and the control condition.

	Choice set	MTL label left					MTL label right				
		Fat	Saturated fat	Sugar	Salt		Vet	Verzadigd vet	Suiker	Zout	
92.5%	1	Green	Amber	Amber	Red		Amber	Red	Red	Green	7.5%
59.2%	2	Green	Amber	Red	Red		Red	Red	Green	Amber	40.8%
98.6%	3	Green	Green	Amber	Amber		Red	Amber	Red	Green	1.4%
98.8%	4	Green	Green	Green	Amber		Red	Amber	Amber	Green	1.2%
46.1%	5	Green	Red	Green	Red		Red	Amber	Amber	Amber	53.9%
98.4%	6	Green	Green	Red	Green		Red	Red	Amber	Red	1.6%
98.6%	7	Amber	Green	Amber	Green		Green	Red	Red	Amber	1.4%
98.0%	8	Green	Amber	Green	Amber		Amber	Green	Red	Red	2%
2.6%	9	Red	Green	Amber	Red		Amber	Amber	Green	Green	97.4%
98.6%	10	Green	Amber	Amber	Amber		Red	Red	Green	Red	1.4%
0.8%	11	Amber	Red	Red	Red		Red	Green	Green	Green	99.2%
53.1%	12	Amber	Red	Green	Amber		Green	Green	Red	Red	46.9%
98.0%	13	Amber	Amber	Green	Red		Red	Red	Red	Amber	2%
1.8%	14	Red	Amber	Green	Red		Amber	Green	Amber	Green	98.2%
21.2%	15	Amber	Amber	Red	Amber		Green	Red	Amber	Green	78.8%
2.4%	16	Amber	Red	Amber	Amber		Red	Green	Green	Green	97.6%
93.5%	17	Amber	Green	Green	Red		Green	Red	Red	Green	6.5%
78.4%	18	Green	Red	Amber	Green		Red	Green	Red	Amber	21.6%

VII. Results of the variables that were not included in the results section

1. Time

The mean time that participants needed to choose between the two food products based on their MTL labels was 9.54 seconds (SD = 67.94), the mean 5.2 seconds, the minimum 0.82 seconds and the maximum 4541.9 seconds. After the outliers were removed, however, the mean time that participants needed to choose between the two food products based on their MTL labels was 5.92 seconds (SD = 3.76), the median 4.85, the minimum 0.82 seconds and the maximum 17.89 seconds. It was determined what were outliers via the creation of a leaf plot. All measurements that were higher than 17.89 seconds were deleted, so that in total 836 measurements were deleted.

1.1. Differences in time between the different choice sets

The mean time that participants needed to choose between the two food products based on their MTL labels differed between the different choice sets ($F(17, 10147) = 82.693$, $p < .01$). Post hoc comparisons using the Bonferroni correction showed that the mean time that participants needed was the highest for choice set 2 (M= 9.64, SD = 4.04). This was also the choice set which was the only choice set of which the number of red, amber and green colours were the same (an absolute colour difference of 0). The mean time that participants needed was also relatively high for choice sets 5 (M = 7.57, SD = 3.79), 12 (M = 7.67, SD = 4.02) and 18 (M = 7.79, SD = 4.09), followed by 15 (M= 7.25, SD = 3.98), 1 (6.94, SD = 3.92) and 17 (M = 6.27, SD = 3.79). The absolute colour differences of these choice sets respectively were 6, 4, 2, 4, 2 and 2. Indeed, all the of the above choice sets included the choice sets that had a colour difference of 2 or lower (choice sets 1, 2, 17 and 18). However, also one choice set which had a colour difference of 6 was included (choice set 5) as well as two choice sets with a colour difference of 4 (choice set 12 and 15). However, when also taking into account the specific colours of the MTL labels by counting a red colour as one, an amber colour as 2 and a green colour as 3 and thereby having an overall healthfulness score that can be compared, one can see that choice set 5, 12 and 15 all three had a difference in overall healthfulness of the labels of 1, 0 and 2.

Table16. Differences in time between the different choice sets

Choiceset	Absolute colour difference between the two MTL labels**	Total of colours in the left and right MTL label (difference)***	Percentage of participants choosing the left MTL label (%)	Mean time in seconds before the participants clicked on the submit button (SD)
Choiceset 1	2	8 vs. 7 (1)	92.5*	6.94 (SD = 3.92)
Choiceset 2	0	7 vs. 7 (0)	59.2*	9.64 (SD = 4.04)
Choiceset 3	4	10 vs. 7 (3)	98.6	5.12 (SD = 3.41)
Choiceset 4	4	11 vs. 8 (3)	98.8	4.51 (SD = 2.99)
Choiceset 5	6	8 vs. 7 (1)	46.1*	7.57 (SD = 3.79)
Choiceset 6	6	10 vs. 5 (5)	98.4	4.79 (SD = 3.05)
Choiceset 7	4	10 vs. 7 (3)	98.6	5.18 (SD = 3.27)
Choiceset 8	4	10 vs. 7 (3)	98.0	5.45 (SD = 3.67)
Choiceset 9	4	7 vs. 10 (3)	2.6	5.68 (SD = 3.61)
Choiceset 10	6	9 vs. 6 (3)	98.6	5.19 (SD = 3.17)
Choiceset 11	6	5 vs. 10 (5)	0.8	4.52 (SD = 2.80)
Choiceset 12	4	8 vs. 8 (0)	53.1*	7.67 (SD = 4.02)
Choiceset 13	4	8 vs. 5 (3)	98.0	5.41 (SD = 3.31)
Choiceset 14	4	7 vs. 10 (3)	1.8	5.47 (SD = 3.40)
Choiceset 15	4	7 vs. 9 (2)	21.2*	7.25 (SD = 3.98)
Choiceset 16	6	7 vs. 10 (3)	2.4	4.78 (SD = 3.14)
Choiceset 17	2	9 vs. 8 (1)	93.5*	6.27 (SD = 3.79)
Choiceset 18	2	9 vs. 7 (2)	78.4*	7.79 (SD = 4.09)

*Percentage of participants choosing the left MTL label being below 97% or above the 3% (the participants being divided in which MTL they believe represents the most healthful food product).

**e.g. when the left MTL label has two red and two green colours and the right MTL label has 1 red colour, one green colour and two amber colours, the colour difference is 1 (red colour) + 1 (green colour) + 2 (amber).
***Calculated giving a red colour a score of 1, an amber colour a score of 2 and a green colour a score of 3.

A multiple linear regression was performed to test if the absolute colour difference and the difference in the sum of the colours significantly predict the mean time that participants need to choose between two food products by using the MTL label. The test showed that 9,1% of the variance of the mean time that participants need to choose between two different food products by using the MTL label can be explained by the colour difference between the MTL labels and the difference in the sum of the colours (R^2 = .091, F (1, 10147) = 508.264, p <.01). More specifically, it was found that the absolute colour difference signifcantly predicts the mean time that participants need to choose between two different food products by using the MTL label (β = -.122, p <.01), but even more the difference in the sum of the colours (β = -.736, p <.01).
choice sets

1.2. Differences in time with respect to demographic characteristics
Different independent samples t-test were conducted to test whether the mean time needed to make the choices between the different food products on the basis of the MTL label differed with respect to demographic characteristics.

Regarding age, an independent-samples t-test to test whether the mean time used to choose between the two food products differed between people in older age groups and people in younger age groups showed that this is the case, with people in older age groups having a higher mean time (M = 7.74, SD = 4.12) compared to people in younger age groups (M = 5.64, SD = 3.69) (t (1304.356) = -12.698, p <.01).

An independent samples t-test to test whether the mean time used to choose between the two food products differed between people with a lower and higher education showed that this is the case, with people with a lower education having a higher mean time (M = 6.65, SD = 3.98) compared to people with a higher education (M = 6.07, SD = 3.89) (t(3002) = 3.380, p <.01).

An independent samples t-test to test whether the mean time used to choose between the two food products differed between people with a lower and higher BMI showed that this is the case, with people with a higher BMI having a higher mean time (M = 6.72, SD = 3.97) compared to people with a lower BMI (M = 6.00, SD = 3.85) (t(869.667) = -3.898, p <.01).

An independent samples t-test to test whether the mean time used to choose between the two food products differed between people with and without pre-teenage children living at home showed that people who have pre-teenage children living at home have a higher mean time (M = 6.76, SD = 3.79) compared to people who don't have pre-teenage children living at home (M = 6.12, SD = 3.93) (t(3002) = 3.042, p <.01).

A summary of the found results is presented in table 17. Other independent samples t-test showed that there are no differences in mean time needed to make the choices between the different food products on the basis of the MTL label between men and women and between people with and without a background in nutrition.

Table 17. Differences in the mean of the time participants needed to choose between the two different food products regarding demographic characteristics.

	Age	Education level	BMI	Pre-teenage children
Time	Older age groups > younger age groups **	Lower > higher **	Higher > lower **	Yes > no**

* p<.05
** p <.01

2. Strategy used to answer the questions of the choice-based conjoint experiment

In total, 78.2% of the participants report to look at the different colours of the MTL label and 64.3% of the participants report to also take into account which nutrients the colours represent. Only 6,4% of the participants report to take into account the food product category that the MTL labels are representing.

Regarding the different colours, two participants indicated to give numbers to each of the different colours and on the basis of the total score of each of the MTL labels make a decision. Another participants indicated to look at the number of green colours. Another respondent indicated to look at all the three different colours, except for when the two MTL labels looked very much the same regarding the colour pattern: then the respondent indicated to look at the number of green colours in both the MTL labels.

Regarding the various nutrients of the MTL label, a lot of participants reported to weight the nutrients differently. Most participants indicated to prioritize some nutrients over other nutrients in terms of avoiding some nutrients more than others. A single respondent also mentioned to use the MTL label the other way around by looking for high levels of salt in a food product, because of having a low blood pressure. One respondent mentioned to assume that all the nutrients have the same impact on health. Finally, one respondent indicated to interpret the order of the nutrients on the MTL label and indicated to assume that the first nutrient of the MTL was the most important and the final nutrient the least. Two other participants mentioned to interpret the colour for fat and saturated fat together. The participants indicated that when the MTL label contained a green colour for fat and a red colour for saturated fat, this still meant that the product did not contain a lot of fat, only that the majority of the amount of fat was saturated fat.

The participants that indicated to take into account the food product category in judging the healthfulness of food products, were divided about how they did this. Whereas 18 participants indicated to mainly focus on the nutrients that they expected to be present in the food product, 16 participants indicated to mainly focus on the nutrients that they did not expect to be present in the food product. Besides that, 6 participants indicated to focus on the nutrients that they expect to differ most between food products within the food product category.

3. Subjective nutrition knowledge

Participants rated their perceived nutrition knowledge on average with a mean of 4.60 (SD = 1.34) on a 7 points Likert scale (table 18).

Table 18. Mean scores on the different items of the subjective nutrition knowledge scale and a total mean score measured on a 7-points Likert Scale.

	Mean (SD)
I know pretty much about healthy eating	4.91 (SD = 1.35)
Among my circle of friends, I'm one of the "experts" on healthy eating	3.95 (SD = 1.80)
Compared to most other people, I know more about health eating	4.95 (SD = 1.38)
Average	4.60 (SD = 1.34)

* p<.05
** p <.01

Multiple independent samples t-test were conducted to test whether the mean score on subjective nutrition knowledge differs with respect to demographic characteristics. An independent samples t-test to test whether the mean score on subjective nutrition knowledge differs between men and women was found to be significant (t(575) = -5.379, p <.01), with men perceiving to have a lower nutrition knowledge (M = 4.13, SD = 1.20) compared to women (M = 4.78, SD = 1.35).

An independent samples t-test to test whether the mean score on subjective nutrition knowledge for people with a higher education level (M = 4.70, SD = 1.34) is higher compared to people with a lower education level (M = 4.14, SD = 1.23) was significant (t(575) = -3.930, p <.01).

An independent samples t-test to test whether the mean score on subjective nutrition knowledge differs for people with a background in nutrition (M = 5.81, SD = .90) is higher compared to people with a lower education level (M = 4.27, SD = 1.25) was significant (t(575) = -3.930, p <.01).

Finally, an independent samples t-test was conducted to test whether the mean score on subjective nutrition knowledge differs between people with a lower BMI (a BMI till 25) compared to

people with a higher BMI (above a BMI of 25). The test found that people with a lower BMI perceive to have more knowledge about nutrition (M = 4.74, SD = 1.37) compared to people with a higher BMI (M = 4.25, SD = 1.23) (t(514) = 3.367, p <.01).

A summary of the found results is presented in table 19. Three independent samples t-tests showed that there are no differences between people who are 39 years of age or younger and older than 39 years of age and no differences between people with and without having pre-teenage children living at home.

Table 19. Differences in mean scores on subjective nutrition knowledge regarding demographic characteristics

	Gender	Education level	Background in nutrition	BMI
Subjective nutrition knowledge	Women > men**	Higher > lower**	Yes > no**	Lower > higher**

* p<.05
** p <.01

4. Understanding the effect of nutrients and calories regarding health

In general, participants indicate that they understand the effects of the various nutrients of the MTL label on health with an average of 5.38 (SD = 1.18) on a 7 points likert scale. A one-way repeated measures analysis of variance (ANOVA) to test whether there are significant differences between means scores on the understanding of fat, saturated fat, sugar, salt and calories showed that this is the case (F(1,576) = 18022.508, p <.01). However, post hoc comparisons using the Bonferroni correction indicated that not many means different signifcantly from each other. The mean scores of saturated fat (M = 5.29, SD = 1.31) and fat (M = 5.20, SD = 1.19) (p>.05), salt (5.41, SD = 1.19) and saturated fat (M = 5.29, SD = 1.31) and the means of calories (5.43 (SD = 1.14) and salt (M = 5.41, SD = 1.19) did not differ signifcantly from each other. Thus, the participants indicate that they best understand the effect of sugar on health, followed by calories, salt, saturated fat and fat (with calories and salt, salt and saturated fat and saturated fat and fat not differing significantly from each other).

Multiple independent samples t-test were conducted to test whether the mean scores on the understanding of fat, saturated fat, sugar, salt and calories differ with respect to demographic characteristics. An independent samples t-test to test whether the mean scores on the understanding of fat, saturated fat, sugar, salt and calories differs between younger age groups (18-39) and older age groups (40-76), showed that older age groups perceive to understand the effect of fat on health better (M = 5.45, SD = 1.05) compared to younger age groups (M = 5.13, SD = 1.21) (t(575) = -2.607, p <.01), older age groups perceive to understand the effect of saturated fat on health better (M = 5.72, SD = 1.01) compared to younger age groups (M = 5.17, SD = 1.36) (t(253.244) = -4.886, p <.01) and older age groups perceive to understand the effect of salt on health better (M = 5.73, SD = .98) compared to younger age groups (M = 5.32, SD = 1.25) (t(276.100) = -4.270, p <.01). As for the two latter tests, levene's test for equality of variances was significant, the t statistics not assuming homogeneity of variances were interpreted.

An independent samples t-test to test whether the mean scores on the understanding of fat, saturated fat, sugar, salt and calories differs between people with and without a background in nutrition, shows that people with a background in nutrition score significantly higher on all of the different means. More specifically, where people with a background in nutrition score a mean of 5.90 (SD = .75) on fat, people without a background in nutrition score a mean of 5.01 (SD = 1.21) (t(234.265) = 10.230, p <.01). Where people with a background in nutrition score a mean of 6.02 (SD = .76) on saturated fat, people without a background in nutrition score a mean of 5.08 (SD = 1.36) (t(363.366) = 10.111, p <.01). Where people with a background in nutrition score a mean of 5.96 (SD = .83) on sugar, people without a background in nutrition score a mean of 5.48 (SD = 1.10) (t(257.803) = 5.367, p <.01). Where people with a background in nutrition score a mean of 6.03 (SD = .84) on salt, people without a background in nutrition score a mean of 5.23 (SD = 1.21) (t(280.554) = 8.477, p <.01). Finally, where people with a background in nutrition score a mean of 6.00 (SD = .77) on calories, people without a background in nutrition score a mean of 5.28 (SD = 1.18) (t(301.300) = 8.162, p <.01).

A summary of the found results is presented in table 20. Three independent samples t-tests showed that there are no differences between men and women (p>.05), no differences between people

with and without pre-teenage children living at home (p>.05) and no differences between people with lower education level and a higher education level with respect to the understanding of fat, saturated fat, sugar, salt and calories.

Table 20. Differences in mean scores on the understanding of fat, saturated fat, sugar, salt and calories regarding demographic characteristics.

	Age	Background in nutrition
Fat	Older > younger**	Yes > no**
Saturated fat	Older > younger **	Yes > no**
Sugar		Yes > no**
Salt	Older > younger **	Yes > no**
Calories		Yes > no**

* p<.05
** p <.01

5. Understanding the difference between fat and saturated fat

The majority of the participants indicated that they understand the difference between fat and saturated fat (M = 5.45, SD = 1.51), that they consider a health difference to exist between fat and saturated fat (M = 5.97, SD = .97) and that they consider unsaturated fat to be healthier than saturated fat (M = 4.95, SD = 1.38).

Multiple independent samples t-test were conducted to test whether the mean scores on the three different questions differ with respect to demographic characteristics. It was found that people who have a higher education level, perceive to better understand the difference between fat and saturated fat (M = 5.55, SD = 1.45) compared to people with a lower education level (M = 4.95, SD = 1.69) (t(134.838) = -3.345, p <.01), agree more with the statement that a health difference exist between fat and saturated fat (M = 6.03, SD = .926) compared to people with a lower education level (M = 5.69, SD = 1.12) (t(132.957) = -2.900, p <.01) and agree more with the statement that unsaturated fat is healthier compared to saturated fat (M = 5.62, SD = 1.74) compared to people with a lower education (M = 4.69, SD = 2.01) (t(135.030) = -4.342, p <.01). For all three t- tests, levene's test for equality of variances was significant, so that for all three tests, the t statistic not assuming homogeneity of variances was interpreted.

Besides that, it was found that people who have a background nutrition perceive to better understand the difference between fat and saturated fat (M = 6.37, SD = .87) compared to people that do not have a background in nutrition (M = 5.19, SD = 1.55) (t(362.207) = 11.074, p <.01). As for this test, levene's test for equality of variances was significant, the t statistic not assuming homogeneity of variances was interpreted. Moreover, it was found that people who have a background nutrition agree more with the statement that a difference exists between fat and saturated fat (M = 6.30, SD =.852) compared to people that do not have a background in nutrition (M = 5.88, SD =.980) (t(575) = 4.356, p<.01). Finally, it was found that people who have a background in nutrition agree more with the statement that unsaturated fat is healthier compared to saturated fat (M = 6.09, SD = 1.70) compared to people without a background in nutrition (M = 5.28, SD = 1.82) (t(209.689) = 4.650, p <.01). Also for this test, levene's test for equality of variances was significant, so that again the t statistic not assuming homogeneity of variances was interpreted.

A summary of the found results is presented in table 21. Two independent samples t-tests showed that there are no differences between men and women (p>.05), no differences between the different age groups of 18 to 39 and older than 39, no difference between people with and without pre-teenage children living at home and no differences between people with a BMI below the 25 and above the 25 (p>.05) with respect to the three different statements that are about the difference between fat and saturated fat.

Table 21. Differences between the answers to the three different questions that relate to the understand of the difference between fat and saturated fat regarding demographic characteristics.

	Education level	Background in nutrition
Understand the difference between fat and saturated fat	Higher > lower**	Yes > No**
Consider a health difference to exist between fat and saturated fat	Higher > lower **	Yes > No**
Consider unsaturated fat to be healthier compared to saturated fat	Higher > lower **	Yes > No**

* p<.05
** p <.01

6. Current daily dietary pattern

A one way repeated measures analysis of variance (ANOVA) was conducted to test whether the means for the various nutrients of the MTL label differ regarding the extent they are avoided in the participants' daily diets. The test showed that there is a significant difference ($F(1,585) = 15413135$, $p < .01$). However, post hoc comparisons using the Bonferroni correction, indicate that, whereas most means differ significantly from each other, this is not the case for fat ($M = 4.49$, $SD = 1.32$) and calories ($M = 4.35$, $SD = 1.41$) and saturated fat ($M = 5.20$, $SD = 1.30$) and sugar ($M = 5.08$, $SD = 1.30$). Thus, it can be concluded that, in their daily diets, the participants most often avoid saturated fat ($M = 4.49$, $SD = 1.32$) and sugar ($M = 5.08$, $SD = 1.30$) (with these two nutrients not having a significantly different mean scores), followed by salt ($M = 4.73$, $SD = 1.42$), fat ($M = 4.49$, $SD = 1.32$) and calories ($M = 4.35$, $SD = 1.42$) (with fat and calories not having significantly different mean scores).

Multiple independent samples t-test were conducted to test whether mean scores on avoidance of nutrients in people's daily diets differ with respect to demographic characteristics. An independent samples t-test to test whether women and men differ regarding which nutrients and in which amount they avoid in their daily diet showed that women avoid more of the nutrient saturated fat ($M = 5.26$, $SD = 1.26$) compared to men ($M = 5.02$, $SD = 1.39$) ($t(584) = -2.026$, $p < .05$) and more of the nutrient sugar ($M = 5.17$, $SD = 1.27$) compared to men ($M = 4.84$, $SD = 1.36$) ($t(584) = -2.806$, $p < .01$).

An independent samples t-test to test whether younger and older people differ regarding which nutrients and in which amount they avoid in their daily diet showed that older people avoid more of all of the various nutrients of the MTL label compared to younger people. Where older people score a mean of 4.95 ($SD = .99$) for fat, younger people score a mean of 4.36 ($SD = 1.37$) ($t(270.661) = -5.447$, $p < .01$). Where older people score a mean of 5.62 ($SD = 1.00$) for saturated fat, younger people score a mean of 5.08 ($SD = 1.35$) ($t(262.685) = -4.906$, $p < .01$). Where older people score a mean of 5.46 ($SD = 1.05$) for sugar, younger people score a mean of 4.98 ($SD = 1.34$) ($t(584) = -3.729$, $p < .01$). Where older people score a mean of 5.21 ($SD = 1.29$) for salt, younger people score a mean of 4.60 ($SD = 1.43$) ($t(584) = -4.347$, $p < .01$). Finally, where older people score a mean of 4.97 ($SD = 1.04$) for calories, younger people score a mean of 4.18 ($SD = 1.46$) ($t(274.24) = -5.634$, $p < .01$). For the tests on fat, saturated fat and calories, levene's test for equality of variances was significant, so that, in these three tests, the t statistic not assuming homogeneity of variances was interpreted.

An independent samples t-test was conducted to test whether people with a lower education differ regarding which nutrients and in which amount they avoid in their daily diet compared to people with a higher education. It was found that people with a lower education avoid more calories in their daily diet ($M = 4.57$, $SD = 1.18$) compared to people with a higher education ($M = 4.31$, $SD = 1.46$) ($t(180.474) = 1.993$, $p < .05$). As for this test, levene's test for equality of variances was significant, the t statistic not assuming homogeneity of variances was interpreted. The means for the other nutrients do not significantly differ between people with a lower and a higher education level ($p > .05$).

An independent samples t-test was conducted to test whether people with a background in nutrition differ regarding which nutrients and in which amount they avoid in their daily diet compared to people who do not have a background in nutrition. It was found that people with a background in nutrition avoid more of the nutrient saturated fat in their daily diet ($M = 5.69$, $SD = 1.07$) compared to people who do not have a background in nutrition ($M = 5.06$, $SD = 1.34$) ($t(240.811) = 5.496$, $p < .01$). Besides these two groups differing regarding the extent to which they avoid saturated fat in their daily diet, the t-test also showed that people who have a background in nutrition do avoid salt more in their daily diet ($M = 5.10$, $SD = 1.29$) compared to people without a background in nutrition ($M = 4.64$, SD

= 1.44) (t(218.341) = 3.420, p <.01). As for both tests levene's test for equality of variances was significant, the t statistics not assuming homogeneity of variances were interpreted.

Finally, an independent samples t-test was conducted to test whether people with a higher BMI (people who are overweight and have obesitas) differ regarding which nutrients and in which amount they avoid in their daily diet compared to people with a lower BMI (people who are underweight or are normal weight). This test showed that a difference between these two groups exist regarding fat, sugar and calories. People with a higher BMI find it more important to avoid fat (M = 4.84, SD = 1.02) compared to people with a lower BMI (M = 4.41, SD = 1.39) (t(215.601) = -3.605, p <.01). As for this test, levene's test for equality of variances was significant, the t statistic not assuming homogeneity of variances was interpreted. Moreover, people with higher BMI find it more important to avoid sugar (M = 5.31, SD = 1.18) compared to people with a lower BMI (M = 5.01, SD = 1.33) (t(523) = -2.132, p <.05) and people with a higher BMI find it more important to avoid calories (M = 4.69, SD = 1.12) compared to people with a lower BMI (M = 4.20, SD = 1.50) (t(211.914) = -3.731, p <.01). Also for this test, levene's test for equality of variances was significant, so that the t statistic not assuming homogeneity of variances was interpreted. Also, when the group having a BMI lower than 18,5 was left out, the same means were found as the means for the group including people with a lower BMI and still significant results were found.

A summary of the found results is presented in table 22. An independent samples t-test showed that no difference exists between people with and without having pre-teenage children living at home.

Table 22. Differences in mean scores on avoidance of fat, saturated fat, sugar, salt and calories in the participants their daily dietary patterns regarding demographic characteristics.

	Gender	Age	Education level	Background in nutrition	BMI
Fat		Older > younger**			Higher > lower**
Saturated fat	Women > men*	Older > younger**		Yes > no**	
Sugar	Women > men**	Older > younger**			Higher > lower*
Salt		Older > younger**		Yes > no**	
Calories		Older > younger**	Lower > higher*		Higher > lower**

* p<.05
** p <.01

7. Main difference in healthfulness within the different food product categories

Besides that it was asked to the respondents which nutrients they consider to be present in high, neutral and low levels in the different food product categories, it was also asked which nutrients differed the most between food products within the food product categories. The results showed that this is salt for bread, saturated fat and salt for pizza, sugar for cookies and sugar for yoghurt. These were all mentioned 30% of all the four nutrients or more.

VIII. Objective, methodology and results of the calories condition

1. Objective

None of the studies included a colour-code for the number of calories and calories as an attribute was even only included in one study (although not colour coded) (Hieke & Wilczynski, 2011). However, researching MTL labels in which calories together with a colour code are included, could be of relevance as it is an optional feature of the MTL label according to the recommendations of the FSA (2007). Besides that, in a review of Grunert and Wills (2007), it was found that calories and fat are most often mentioned first when European consumers are asked about what they consider to be important for the healthfulness of food products. Moreover, in different studies it has been found that there is generally a good understanding of calories, but confusion about nutrients (Grunert & Wills, 2007). Besides that, it is expected that especially lower educated consumers consider calories to be important regarding health, as well as people with a higher BMI, who are both interesting target groups. Furthermore, in the study of Hieke and Wilczynski (2011), the participants self-reported that, when using the MTL label, they mainly focus their attention on the colours of the label and hereafter the number of calories. Although in their experiment, calories turned not out to be relatively determinant compared to the other nutrients, Hieke and Wilcynski (2011) stated that this probably is because calories were not colour coded and that therefore it would be interesting if future research would include colour-coded calories. The research questions is thus "What is the effect of *including a colour code for calories in the MTL label* on how Dutch adult consumers judge the healthfulness of food products using the MTL label?"

2. Methodology

The choice-based conjoint experiment consisted of an experimental condition, with calories being included in the MTL label and a control condition, with calories not being included in the MTL label. In both conditions, no specific food product category was used (table 23).

Table 23. Set-up of the experimental conditions and control condition

	Experimental condition 5	Control condition
Food product category	No food product category	No food product category
Format of MTL label	A colour for fat, saturated fat, sugar, salt and calories	A colour for fat, saturated fat, sugar and salt

Calories were not included in the choice-based conjoint design but were included as a separate factor. This was chosen because it was determined that not varying a colour for calories would be best, because it cannot be considered to be independent from the colours for fat, saturated fat and sugar. When calories would be randomly varied, the MTL labels would become too unrealistic which would threaten the external validity and maybe even also the internal validity when participants would notice it. The procedure that has been used to determine the colours that were assigned to calories is explained appendix IX.

The labels were presented on a picture of a supermarket at the background and participants were asked to select the most healthful food product. Although examples of the FSA show both calories in the beginning and in the end (FSA, 2007), in this study they were presented at the end. This was done in order to keep the main focus on the nutrients, which are the obligatory and therefore the most important elements of the MTL label. Before the participants started with the experiment, the MTL was explained together with a practice question (appendix X).

The percentage of participants choosing either the left or the right MTL label in the 18 choice sets in the calories condition can be found in appendix XI. In order to determine the effect of including calories on the MTL label, two different binary logistic regressions were performed, one for the condition with calories and one for the control condition. Hereafter, the -2 Log Likelihood ratios of these binary logistic regressions were compared and as the difference between these -2 Log Likelihoods were significant, the part-worth utilities and importances of these binary logistic regressions were calculated and qualitatively compared.

3. Results

3.1. Randomization checks

Gender was equally balanced across the experimental condition and the control condition (x^2 (1) = .007, p = .932), as well as age (F (1, 218) = .810, p = .369). Besides that, it was found that education is equally balanced across the different conditions (G (6) = 4.421, p = .620). Also BMI turned out to be equally distributed across the different conditions (F (1, 200) = .174, p = .677). Moreover, whether having pre-teenage children living at home was equally balanced across the different conditions (x^2 (1) = .133, p = .715) and whetherhaving a background in nutrition (x^2 (1) = 1.328, p = .249). It was also checked whether the device the participants used was the same across the different conditions. It was found that this is the case (x^2 (2) = 5.488, p = .064).

3.2. Way of use of the MTL label when a colour code for calories is included on the MTL label

To test whether including a colour code for the level of calories in a food product influences how Dutch adult consumers judge the healthfulness of this food product using the MTL label, one binary logistic regressions was conducted for the experimental condition and one binary logistic regression for the control condition. Hereafter, these -2 log likelihoods were summed (-2 Log likelihood = 1817.1) and compared with the actual -2 log likelihood of the two conditions together (-2 Log Likelihood = 1881) (table 24). It turned out that the summed -2 Log likelihoods together were 64 -2 log likelihood smaller than the total -2 log likelihood. As the -2 log likelihood follows a chi-square distribution, a chi-square table was used in order to determine whether this was a significant difference. It was found that at a degrees of freedom of 8(as 8 parameters were estimated in the experimental condition and 8 the control conditions and therewith 16 parameters in the total model, which is a difference of 8) and for a p smaller than .001, the chi-square should at least be 26.124, which is the case. Thus, it can be said that there are differences between the calories condition and the control condition with respect to the parameters of the model (p<.001), which are the beta-coefficients of the various nutrients of the MTL label from which the part-worth utilities and importances of the nutrients and colours were calculated. Based on this it can be concluded that including a colour for calories on the MTL label influences how Dutch adult consumers judge the healthfulness of food products. However, it cannot be determined in what way.

Table 24. The real and expected -2 Log Likelihoods of the calories and control condition.

-2 Log likelihood	Calories	Control	Total
Real	806.9	1010.2	1881.1
Expected			1817.1
Differences			64

IX. Procedure for determining the colour code for calories on the MTL labels

First, by using the fact that the number of calories per 1 gram of fat or saturated fat is 9 and the number of calories per 1 gram of sugar is 4, it was measured how many calories a product consists off when all three colours for fat, saturated fat and sugar are green (then the product contains less than 60,5 calories per gram), amber (then the product contains between 60,5 and 275 calories per gram) or red (then the product contains more than 275 calories per gram). Hereafter, the averages of the different thresholds that the FSA (2007) uses for determining the colours of fat, saturated fat and sugar, which are formulated in grams per 100 gram, were calculated. For example, as fat gets a green colour when the product contains less than 3 gram per 100 gram, the average used is 1,5 grams per 100 gram. In order to determine the average of the red colours, the nutritional value of a couple of food products were looked up that contain relatively high levels of these nutrients. For example, peanut butter for fat. In this way, it was determined what a relatively high value is for the three various nutrients of the MTL label. Hereafter, again the fact that the number of calories per 1 gram of fat or saturated fat is 9 and the number of calories per 1 gram of sugar is 4, was used and this time it was used in order to, from the averages, calculate the number of calories per 100 gram. For example, when fat has a green colour, it on average consists of 13,5 calories per 100 gram. Finally, for a certain label, the average number of calories for the three various nutrients of the MTL label were just added up, so that the colour for calories could be determined. In the end, 12 MTL labels contained a red colour for calories, 21 MTL labels an amber colour and 3 MTL labels a green colour.

STEP 1
Writing down the criteria for each of the nutrients fat, saturated fat and sugar in gram/100 gram

Nutrient	Green (low content)	Amber (medium content)	Red (high content)
Fat	Less than 3g/100g	Between 3g/100g and 20g/100g	More than 20g/100g
Saturated fat	Less than 1.5g/100g	Between 1.5g/100g and 5g/100g	More than 5g/100g
Sugar	Less than 5g/100g	Between 5g/100g and 12.5g/100g	More than 12.5g/100g

STEP 2
Writing down the total number of calories per 100 gram based on the fact that fat and saturated fat contain 9 calories per gram and sugar 4 calories per gram.

	Green (low content)	Amber (medium content)	Red (high content)
Amount of calories	Less than 60.5 kcal/100g	Between 60.5 kcal/g and 275 kcal/100g	More than 275 kcal/100g

STEP 3
Calculating the average of the criteria in gram/100 gram

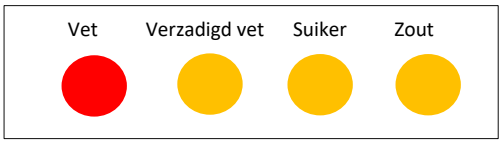
	Green (low content)	Amber (medium content)	Red (high content)
Fat	Average of 1.5g/100 g	Average of 11.5g/100g	Average of 28g/100g
Saturated fat	Average of 11.5g/100g	Average of 3.25g/100g	Average of 11.15g/100g
Sugar	Average of 2.5g/100g	Average of 8.75g/100g	Average of 30.25g/100g

STEP 4
Determining the upper level of the nutrients fat, saturated fat and sugar by looking at the levels in three food products that are known for containing high levels of fat, saturated fat and sugar and averaging that. For fat, this turned out to be 36g/100 gram, for saturated fat 17.3g/100g and for sugar 48g/100g.

STEP 5
Calculating the average number of calories for each of the nutrients and their colours.

Ingrediënt	Green (low content)	Amber (medium content)	Red (high content)
Fat	Average of 13.5 kcal/g	Average of 103 kcal/g	Average of 252 kcal/g
Saturated fat	Avarage of 6.3 kcal/g	Average of 29.25 kcal/g	Average of 103 kcal/g
Sugar	Average of 10 kcal/g	Avarage of 35 kcal/g	Average of 121kcal/g

STEP 6
For every MTL, now, the colour that should be assigned to calories could be determined. An example is shown below.



Number of calories = 252 + 29,25 + 35 = 316

Looking at 'STEP 3', one can see that when the number of calories is more than 275 kcal/100 gram, calories get a red colour.

X. Part of the questionnaire regarding the choice-based conjoint analysis of the calories condition

EXPLANATION OF MTL LABEL

Pagina 1/10

Hieronder ziet u twee voorbeelden van het stoplichtensysteem. De labels vertegenwoordigen ieder een eigen product (product 1 en product 2). Het label is ontworpen door een onafhankelijke instantie in Engeland en zal mogelijk ook geïntroduceerd worden in supermarkten in Nederland. Het label zal hierbij op de voorkant van verpakkingen van voedselproducten worden geplaatst.

Het label geeft met drie kleuren (rood, oranje en groen) aan hoeveel vet, verzadigd vet, suiker, zout en calorieën er per 100 gram in een product zit/zitten. Rood betekent dat er relatief veel van in zit, oranje gemiddeld en groen, weinig. Hierdoor kunt u producten met elkaar vergelijken op de mate van gezondheid.

INSTRUCTIONS EXPERIMENT

Pagina 2/10

Lees onderstaande instructie en beantwoord daarna onderstaande voorbeeldvraag.

Beeld uzelf in dat u in de supermarkt boodschappen aan het doen bent en op zoek bent naar gezonde voedingsproducten. Klik op het label dat volgens u het meest gezonde voedingsproduct vertegenwoordigt. Er is hierbij geen goed of fout: ik ben geïnteresseerd in uw keuzes.

Wanneer u op een label klikt, zal het label groen oplichten. U kunt maar één label aanklikken. Wanneer volgens u beide labels een even gezond voedingsproduct vertegenwoordigen, klik dan willekeurig op één van de twee labels.

Voorbeeldvraag.

Geef aan welk voedingsproduct volgens u het meest gezond is

Terug | Volgende

XI. Choice sets of the choice-based conjoint experiment including choices with respect to the calories condition

Table 25. Percentages of people choosing the left or right label regarding the 18 choice sets in the calories condition.

	Choice set	MTL label left						MTL label right					
		Fat	Saturated fat	Sugar	Salt	Calories*		Vet	Verzadigd vet	Suiker	Zout	Calories*	
96.5%	1	Green	Amber	Amber	Red	Amber		Amber	Red	Red	Green	Red	3.5%
86.1%	2	Green	Amber	Red	Red	Amber		Red	Red	Green	Amber	Red	13.9%
99.1%	3	Green	Green	Amber	Amber	Green		Red	Amber	Red	Green	Red	0.9%
99.1%	4	Green	Green	Green	Amber	Green		Red	Amber	Amber	Green	Red	0.9%
75.7%	5	Green	Red	Green	Red	Amber		Red	Amber	Amber	Amber	Red	24.3%
98.3%	6	Green	Green	Red	Green	Amber		Red	Red	Amber	Red	Red	1.7%
98.3%	7	Amber	Green	Amber	Green	Amber		Green	Red	Red	Amber	Amber	1.7%
98.3%	8	Green	Amber	Green	Amber	Green		Amber	Green	Red	Red	Amber	1.7%
0.9%	9	Red	Green	Amber	Red	Red		Amber	Amber	Green	Green	Amber	99.1%
99.1%	10	Green	Amber	Amber	Amber	Amber		Red	Red	Green	Red	Red	0.9%
0%	11	Amber	Red	Red	Red	Red		Red	Green	Green	Green	Amber	100%
60%	12	Amber	Red	Green	Amber	Amber		Green	Green	Red	Red	Amber	40%
99.1%	13	Amber	Amber	Green	Red	Amber		Red	Red	Red	Amber	Red	0.9%
0%	14	Red	Amber	Green	Red	Red		Amber	Green	Amber	Green	Amber	100%
20%	15	Amber	Amber	Red	Amber	Amber		Green	Red	Amber	Green	Amber	80%
3.5%	16	Amber	Red	Amber	Amber	Amber		Red	Green	Green	Green	Amber	96.5%
97.4%	17	Amber	Green	Green	Red	Amber		Green	Red	Red	Green	Amber	2.6%
89.6%	18	Green	Red	Amber	Green	Amber		Red	Green	Red	Amber	Red	10.4%